

# MINNESOTA



University of Minnesota Agricultural Extension Service, University Farm, St. Paul

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## Use Feeds Properly for Poultry Profits

GEORGE M. BRIGGS

MORE THAN one-half of the feeds sold by feed dealers in this state are poultry rations and concentrates with a total value of above 30 million dollars annually. It is very important, therefore, for the feed manufacturer and the feed dealer to have a good understanding of how poultry should be fed. This information should be passed on to the farmer so that he will properly use the feed he buys.

Obviously, the University's Agricultural Extension Service cannot advise each farmer personally about his individual feeding problems. In a general way, however, many feed dealers in Minnesota can help to reach the farmer.

### Giving Information

Feeding information can be given to the farmer in at least one of several ways. The best method, it would seem, is to print on the back of each tag specific directions for the feed contained in the bag. Such directions should stress that for best results the method outlined should be followed carefully.

In some cases as many as 20 or more different poultry rations are available to the farmer from one dealer. This stresses the importance of adequate printed directions, especially for medicated feeds.

Many feed dealers give the farmer small leaflets or booklets containing feeding directions for their type of feed. Also, the feed dealer may talk to the farmer personally concerning his feeding problems. While this method is not adequate when used alone, it is recommended for use along with printed directions. Don't depend upon the farmer's knowing how to use your feed instinctively!

### Feeding Directions

Information on the feeding of poultry often is not readily available to feed manufacturers or dealers of this area.

### What Is the Minnesota Feed Service?

*The Minnesota Feed Service* is a new publication of the University of Minnesota Agricultural Extension Service. It will be published four times a year and will bring to feed, seed, and fertilizer dealers and others the latest information on research and other developments in the field.

The publication is being started as a result of the recognition that local seed, feed, and fertilizer dealers have a decisive influence in most farm purchases of this material. Better understanding of the needs of the farmer will enable these dealers to help not only themselves but farmers as well. Much of the initial work and planning of this new service has come as the result of the efforts of the Northwest Retail Feed Association, Inc. and University staff members.

The following outline for feeding poultry can be passed on from the feedman to the farmer. The feedman may adapt the directions to his own conditions.

In general it should be made clear that, for all classes of poultry, mash must be available at all times and that adequate hopper space should be provided. It is also necessary that good clean water always be available. Automatic water fountains are preferable. Except to very small chicks, an insoluble grit should be given free choice at all times in separate hoppers.

It should also be stressed that good management and sanitation procedures as well as well-bred stock must be used for best results from any feed. When trouble occurs feed should be the last item suspected when a commercial feed is used.

### Feeding Starting Chicks

Starting chicks require a ration containing 20 per cent protein. As with all other rations the level of vitamins and minerals should come up to the National Research Council standards (obtainable from the National Research

Council, Washington, D.C. or from the University of Minnesota).

Special directions for starting chicks would include:

1. Feed chicks as early as possible and keep ration in front of the birds at all times.
2. Start giving cracked grain at about six to eight weeks.
3. Provide ample feeding space. One hundred chicks up to two weeks of age will require at least one four-foot hopper. From two to ten weeks, two four-foot hoppers are required.
4. At eight weeks of age, or when the birds are out on pasture, change to a growing ration. The starting ration may be used as a growing ration if desired.
5. One hundred chicks will need approximately 600 pounds of feed up to eight weeks of age.

### Growing Rations

The protein requirement of growing chicks is less than that of starting chicks and is approximately 16 per cent of the total ration from 8 to 18 weeks. The amount of grain to be fed to birds will depend on the protein



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level in the chick grower. For example, a 19 or 20 per cent chick grower ration can be fed along with equal parts of grain after 10 to 14 weeks.

Specific directions would include:

1. Start feeding a grower ration at about eight to ten weeks or when the birds are put on range.

2. Small amounts of cracked grain should be given at first and increased to about equal parts of whole grain and mash at about 15 to 16 weeks. Continue feeding mash and grain free choice after that time.

3. Growing chicks require at least two six-foot feeding troughs for every 100 chicks.

## Feeding Broilers

A broiler ration should contain 20 per cent protein so that one ration usually is used throughout. Specific feeding directions include:

1. Keep the ration in front of the birds at all times and encourage eating as much as possible.

2. Small amounts of cracked grain may be fed after the eighth week.

3. Provide ample feeding space (see starting chicks).

4. One hundred broilers will eat approximately 900 pounds of feed by the end of the eleventh week if they are free of disease and are a heavy breed.

## Feeding Pullets and Laying Hens

In general, the biggest error in feeding hens is in feeding too much or too little grain with the type of ration used. Hens require approximately 15 per cent protein for maximum production in the total ration. This can be obtained by feeding either a 15 per cent all-mash with no grain or by feeding grain along with rations of various protein levels.

Usually, a 20 per cent ration is fed along with restricted amounts of grain (equal parts of mash and grain). The grain is commonly fed in the evening.

Another method is to feed a protein concentrate of 28 to 38 per cent protein, free choice with grain. This allows the bird to select its own level of protein and is a labor saver. The popularity of this method is increasing. *Birds should not be given grain free choice unless at least a 27 per cent mash is fed.* With a 27 per cent mash or supplement approximately three parts of grain are consumed to one part of mash. With a 38 per cent mash approximately six parts of grain are consumed to one part of mash.

It is extremely important that the feed manufacturer clearly give the right information in this regard to the farmer. Other specific directions would include:

1. Feed the laying ration as soon as laying starts and when birds are housed.

2. Watch the weight of the laying pullets in the fall. If weight tends to go down, additional grain can be given in small amounts and vice versa.

3. It is necessary to feed oyster shell or limestone free choice in addition to insoluble grit. The oyster shell should be readily available in separate hoppers and should be kept clear of litter.

4. In case of cannibalism, blowouts, or pickouts, debeak the entire flock or use some other anti-pick device.

5. Provide enough feeding space. One hundred hens should have at least two eight-foot hoppers when a 20 per cent mash is used. For free-choice feeding have three eight-foot hoppers.

6. One hundred laying hens will eat 25 to 30 pounds of feed a day, depending upon the rate of egg production and the size of the hens. Half of this amount will be grain if 20 per cent mash is used.

7. Hens often lay a few thin-shelled eggs when they first come into production. This is not a sign of deficiency.

8. Supply clean fresh water at all times.

## Feeding Breeding Hens

The protein requirement for breeding hens is the same as for laying hens. Some of their vitamin requirements are higher and for this reason a special breeding mash should be fed to all hens whose eggs are saved for hatching. The directions for feeding should be the same as those for laying hens. In addition, it is important to start feeding the breeder mash at least a month before eggs are to be saved for hatching. Care also should be taken to see that the roosters have access to the feed. A special feeding trough out of the hens' reach is suggested for this purpose.

## It Pays to Read the Literature!

GEORGE M. BRIGGS

IT IS VERY important that the feedman keep up with the latest information on feeds, feeding, and nutrition by reading the current "literature" on this subject. This is necessary so that he can put out the best possible feed at the lowest cost and also so that he can help advise the farmer.

The purpose of this and following articles is to give a few brief suggestions on reading material available. It is sincerely hoped that the individual feedman will read at least several of these publications regularly.

### Trade Journals

A number of good feed journals and magazines written especially for the

### Feeding Turkeys

The protein requirement of starting turkeys is from 25 to 28 per cent. This is higher than for chicks.

In general, the methods of feeding turkeys are the same as for feeding chickens. However, there are a few exceptions as follows:

1. It may be necessary to teach starting poults to eat and drink individually.

2. Feed a ration as soon as possible and keep it in front of the birds at all times.

3. After approximately eight weeks grain may be fed to turkeys free choice.

4. Under normal conditions it will take about four or five pounds of total feed to make a pound of meat over the entire growing period.

### Special Mash

It is very important that the various specialty rations such as fattener rations, finishing mashes, medicated feeds, and concentrates, have detailed directions for their use. It is especially urged that the feed dealer who mixes feed locally or who does custom mixing, give adequate feeding directions to his customers.

**Whether a feed dealer sells poultry, swine, or dairy feeds, it is extremely important that concise and adequate directions are given along with the feed. This is especially true in areas where considerable local grain is available. Not only the farmer but also the feed dealer benefits when his feeds are used properly.**



feedman are available. The most common ones for this area are listed below:

1. *Feedstuffs*, 118 So. 6th St., Minneapolis, Minnesota. This publication is recommended for anyone who handles feed in any manner. It is published weekly and is nationally circulated.

2. *The Grain and Feed Review*, 408 So. 3rd St., Minneapolis, Minnesota. This is a monthly publication and is the official publication of the Northwest Retail Feed Association, Inc. It is recommended to feed manufacturers and dealers in this area.

3. *The Feed Bag*, 1712 West St. Paul Avenue, Milwaukee, Wisconsin. This magazine specializes in merchandising material. It has many fine features, especially its "Nutrition Digest," a digest of current nutrition research.

4. *Feed Age*, 45 West 45th St., New York 19, N. Y. This is a new monthly magazine published by the American Trade Publishing Company and intended as a "business magazine for feed manufacturers." It contains original articles by experts in their respective fields.

5. *Flour and Feed*, 407 East Michigan St., Milwaukee, Wisconsin. This is also a monthly publication of general interest and one of the oldest in its field.

6. *American Feed and Grain Dealer*, 613 National Bldg., Minneapolis, Minnesota. This is a monthly publication for the feed and grain dealer and has several especially interesting features.

7. *Hatchery and Feed*, Mount Morris, Illinois. This monthly publication is especially recommended for hatcherymen who are also selling feed.

### General Magazines

There are many general magazines on chickens, turkeys, broilers, swine, dairy, etc. which would help the feedman keep up with the latest in the individual animal fields. Some of these are published in Minnesota.

Feed men would also benefit by reading at least one of the general farm magazines such as *The Farm Journal*, *Successful Farming*, *The Country Gentleman*, *The Farmer*, *Hoard's Dairyman*, *Capper's Farmer*, and others.

In a later issue of *Minnesota Feed Service* we will list the names of several of the better books and technical journals in the field. The mentioning of any book or magazine does not constitute endorsement or recommendation by the University since the University does not endorse any commercial product or publication. The opinions expressed are those of the author and not necessarily those of the University.

# Proteins for Pigs

L. E. HANSON

IT HAS been known for 135 years that animals require protein in their diets. It also was shown during the last century that not all proteins are of equal feeding value for pigs. Early in the 1900's it was shown that the protein of corn is very deficient for growing pigs. During the past 20 years, proteins have been studied extensively in terms of the amino acids they contain.

Amino acids are organic compounds which contain nitrogen and from which proteins are built. There are at least 23 amino acids; of which 10 are known to be essential to rats. Six of these 10 are known to be essential to pigs.

Today, we are primarily interested in the amino acids, especially when we consider rations suitable for pigs. Considerable research during the past five years has been conducted to determine the protein needs of pigs in terms of specific amino acid requirements for growth. Some of these data are summarized in the table below.

This summary shows remarkably good agreement between the results obtained at Purdue and those obtained at Cornell. The results also bring out a point that needs emphasis. It is this: the pig's requirement for any particular amino acid is related to the total protein content of the ration. For example, 0.6 per cent lysine is sufficient when the ration contains only 10.6 per cent protein, whereas the requirement for lysine is 1.2 per cent when the protein content of the ration is increased to 22 per cent. This relationship of specific amino acid requirement to protein content of the ration is also shown for methionine in the Cornell and Purdue studies.

What do these results mean in terms of feed formulation and feeding practice? They mean that when a pig is fed a low-protein ration, he needs less of each required amino acid because he can only grow slowly on the low-protein ration. When the protein content of the diet is increased so that

more amino acids are available for growth, then a required amino acid must be increased proportionately. Otherwise it will limit the animal's ability to use the other amino acids.

The essential amino acids cannot, in general, substitute for one another. A shortage of one of them cannot be compensated for in any way by using a large amount of protein that is also deficient in the same amino acid. Thus, for efficient growth of pigs, a good protein supplement cannot be made up by using a small amount of "good protein" and the balance made up with any kind of protein feeds.

Fortunately, the various high-protein feeds are not deficient in the same amino acids. It has been shown that all protein supplements of plant origin, except soybean oil meal, are deficient in lysine. All of the cereal grains are deficient in lysine also. That is why good results cannot be expected when we try to balance a grain ration with wheat by-products and linseed or cottonseed oil meal. Soybean oil meal is deficient in methionine. Tankage and blood meal are deficient in isoleucine.

By properly choosing feeds, a mixed supplement can be formulated in which the amino acid deficiencies of one ingredient are made good by an excess of that particular amino acid or acids in another ingredient. Then the finished mixed supplement will be well-balanced with respect to all of the essential amino acids. That is the goal in formulating efficient protein supplements for pigs.

A protein supplement mixture for pigs, which will supply protein of good quality when fed with corn, can be made as follows: tankage or meat scraps 20 per cent; soybean oil meal 46 per cent; linseed oil meal 10 per cent; alfalfa meal 20 per cent; steamed bone meal 2 per cent; and iodized salt 2 per cent. This mixture also supplies adequate calcium, phosphorus, iodine, and salt for the growing pig. There are many other mixtures, also, which are entirely satisfactory.

Amino Acid Requirements for Growth of Young Pigs

Amino acid	Required in the ration	Protein in the ration	Source
	per cent	per cent	
Lysine	0.6	10.6	Cornell U.
Lysine	1.2	22.0	Cornell U.
Lysine	1.0	26.0	Purdue U.
Tryptophan	0.2	24.0	Purdue U.
Methionine	0.6	22.0	Purdue U.
Methionine	0.27	10.0	Cornell U.
Histidine	0.20	10.0	Cornell U.
Isoleucine	0.70	22.0	Cornell U.



# Extra Nitrogen Can Increase Corn Yields

A. C. CALDWELL

HOW MANY farmers in Minnesota would be willing to trade 100 pounds of ammonium nitrate fertilizer for 12 bushels of corn? How many would swap \$4.00 for \$18.00? An experiment conducted by the University's Division of Soils showed that an increase of 11.7 bushels of corn was obtained from a side-dressed application of 30 pounds of nitrogen. In addition to the yield increase, the protein content of the corn was increased also.

It is not always possible to get such good results from sidedressing nitrogen for corn. Soils already adequately supplied with nitrogen will not need any further nitrogen for good yields. Soils which have been heavily manured, rich bottom lands, soils on which a good rotation has been practiced with plenty of leguminous green manure plowed under will be very unlikely to need extra nitrogen. Furthermore, corn stands averaging less than three stalks per hill will not be heavy enough to respond much to extra nitrogen unless the soil nitrogen is very low.

On the other hand, if a soil has not been heavily fertilized or manured and is several years away from a legume crop and if an average stand of three to five plants per hill (12,000 to 17,000 plants per acre) is maintained, excellent results from sidedressing nitrogen are possible.

## How, When, How Much, and What Kind of Fertilizer to Apply

There are several good nitrogen fertilizers, any one of which should prove suitable as a source of nitrogen. Fertilizers such as ammonium sulfate, am-

A GOOD BULLETIN for any feed man to have at hand is USDA Circular 788, *Nutritive Requirements and Feed Formulas for Chickens*. This is a revision of a circular of the same number and title first issued in 1948. It gives up-to-date information on ingredients as well as mixtures, in accordance with recommendations of the National Research Council. It also provides a wide choice of mixtures.

Middle Western mixers will not fail to notice the lack of high-protein concentrates for free-choice feeding, but this does not detract from the value of the rest of the information offered.

A section on feeding practices and one on efficiency of utilization of feed make this a publication of general usability.

It can be obtained at 10 cents a copy from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

monium nitrate, or urea will be satisfactory. Of these three, ammonium nitrate has come to be the most common and is the one most likely to be available for purchase. There is a chance that the fertilizer may not be made available to the plant because of lack of moisture, so 40 pounds of nitrogen per acre is as much as should be risked in an application. It is not likely to be worthwhile to apply less than about 20 pounds of nitrogen per acre, so applications should be kept between 20 and 40 pounds as lower and upper limits. (To apply 40 pounds of nitrogen will require about 85 pounds of urea, 120 pounds of ammonium nitrate, or 200 pounds of ammonium sulfate.)

Work here and at other experiment stations has indicated that as good results can be had by applying nitrogen when the corn is about two feet high as at any other time. To avoid an extra

operation in some cases the recommendation could be to apply the nitrogen at the second cultivation. It is desirable to place the nitrogen as deeply as possible to get it into moist soil within reach of roots. Fertilizer placed too close to the surface may remain in dry soil and thus be ineffective.

It is good practice also to get the nitrogen as near the plant as possible, but not so close that deep placement cuts roots. Placement of the fertilizer a foot away from the plant and four inches deep should be satisfactory.

Sidedressing nitrogen is somewhat new in Minnesota. The individual farmer should decide whether or not to sidedress after considering the various factors mentioned above. If it appears that extra nitrogen might be beneficial, try sidedressing on a relatively small scale the first time in order to satisfy yourself that the practice will be worthwhile.

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