MINNESOTA FEED SERVICE

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What's Ahead in Egg Production?

ROBERT W. BERG

It is always dangerous to predict what may be ahead of us in any industry. We are going to see even greater changes in our poultry industry in the next 10 years than we have seen in the past 10 years. According to the 1949 census Minnesota had 123,395 farms that sold eggs. In 1959 Minnesota had 74,784 farms selling eggs. This is a reduction of 39.4 percent. With this decrease in number of farms selling eggs there has been an increase in the total number of eggs produced and a decrease in the number of hens on farms. This has been possible because of the increased performance of our hens through better breeding, feeding, and management. Continued improvement is still expected at a continued high rate.

The change in the number of farmers selling eggs will continue to be reduced very rapidly because of marketing trends. The higher costs of handling small lots of eggs will become a more important factor. Larger units are necessary. The question arises—how large should the laying house be? This question can only be answered by each individual producer. He must consider several factors.

1. **Does he like chickens?** This is very important. If he has a diversified farm, other segments of his enterprise will be taken care of first if he does not like chickens. Under these circumstances the poultry enterprise should remain a supplementary enterprise. If he likes chickens he will go to the hen house first and the chickens will get good care. Under these circumstances he will most generally be a successful egg producer, so he should consider expanding his poultry operation to be a major part of his income.

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2. **What about credit?** Credit is a very important consideration. Regardless of the source one must consider the price paid for credit. The price paid is usually reflected in the risk that the lender is taking. Usually as the amount of money needed reaches the point where the risk requires an increase in interest rate then we feel that the farmer has reached his limit. The higher interest rate will steal from his labor return. It is usually better to expand at a slower rate. Regardless of the size planned, expansion should always be considered. As a person grows in his managerial ability so should his operation grow. Many times a commitment to a lender may greatly reduce a producer's flexibility so he will not be able to exploit profits that may result because of a changing condition.

Easy credit often results in overexpansion and reduced profits to an industry. The basic objective of each producer is to maximize his profits. This does not necessarily mean that it will maximum the profits for the whole industry. Easy credit has to be studied very carefully because if it is made available to the entire industry then overproduction is certain to result with reduced profit. However, a well planned commercial operation on a farm enterprize can have a considerable influence on the total returns of the farm. In the long run, the success of any operation must be based on sound judgment and logical decisions reached after careful analysis.

3. **What effect will expansion have on the labor supply?** In most cases a well planned poultry program could be expanded with no increase in labor requirements. The producer can do this by considering using bulk feed stored in the poultry house or augered into the building. One end of the poultry house can be used for egg storage rather than the basement of the house. If he is in an area where he can take advantage of in-plant cleaning of eggs then he can gather the eggs directly on the plastic egg case flats. This eliminates a great deal of egg handling. Thus there are many things to consider and in many cases the size flock can be doubled with no real labor increase.

4. **What house design or construction is best?** Michigan State University has done a lot of work on poultry house construction. A well designed house should:

- ★ Be economical to construct
- ★ Provide optimum environmental conditions so top performance can be expected.
- ★ Provide convenient arrangement of equipment for the chickens.
- ★ Provide for maximum labor efficiencies.

By combining these factors, egg production can be maintained both profitably and economically.

The initial cost of a laying house may seem very high but when the housing cost is prorated over a 20-year period and over each dozen of eggs produced it becomes very small. The difference in cost of a good house and a poor house is only a small cost per dozen of eggs produced. A good house should maintain a minimum of 45° F. in winter and a maximum of 85° F. in summer. The relative humidity should be maintained at 60 percent with a maximum of 80 percent. The air movement should be at least 1 cubic foot per minute for each bird during the cold months and 3 cubic feet per minute per bird during the warmer months.

To keep the building warm in winter and cool in summer, it must be well insulated with a minimum of 4 inches of commercial type insulation.

Michigan State has designed such a house in 1,000 bird units. It is very desirable to have small units of 500 to

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PASTURES FOR SWINE

L. E. HANSON

For the first half of this century pasture was essential for efficient production of growing pigs. Research in swine nutrition has advanced to the stage where today the use of pasture is not essential. Whether or not to use pasture for growing pigs depends on several factors, some of which will be reviewed in this article.

Recent Studies

During the past 6 years, 8 experiment stations (in the Corn Belt, East, and Southeastern states) have reported 15 experiments in which dry lot (paved) and pasture feeding were compared. These studies included a total of 1,830 pigs. The pastures were alfalfa, alfalfa-ladino, Balbo rye, oats and wheat, millet and other legume, or legume-grass mixtures. The average results follow:

	Avg. daily gain	Feed per 100 pounds gain	Feed cost per 100 pounds
	pounds	pounds	gain
Dry lot	1.63	334	$10.42
Pasture	1.59	325	$ 9.95

In 9 of the 15 comparisons pigs fed in dry lot gained more rapidly than those fed on pasture. In 13 of the 15 comparisons pigs on pasture required less feed per pound of gain. The largest difference was 26 pounds per 100 pounds gain but the average difference was only 9 pounds.

Source of Protein and Vitamins

Excellent pasture is a good source of protein and vitamins. When pigs are raised on such pastures no vitamin supplements are needed in the ration. The elimination of vitamin supplements does not constitute much saving, however, because the needed supplements are relatively inexpensive.

The saving in protein by using pasture depends on the age and size of the pigs and how they are fed. When pigs weighing less than 100 pounds are self-fed they usually do not eat enough pasture to affect appreciably the level of protein required in the concentrate mixture. Therefore they should be fed about the same level of protein on pasture as in dry lot.

Pigs weighing 100 to 200 pounds make better use of the pasture, even though self-fed. For these the protein level can be reduced from the recommended 12 percent (corn ration) to 10 percent.

In the studies summarized above, two stations fed higher protein levels in dry lot than on pasture. For these the average difference in feed cost was 77 cents less per 100 pounds gain for the pigs on pasture. One acre of excellent pasture is usually adequate for 20 self-fed pigs. Thus if the pigs are fed to gain 170 pounds each (from 40 to 210 pounds) the savings in feed cost per acre of pasture is $26.18 (20 pigs x 1.7 cwt. gain x 77 cents per cwt.). Greater savings in feed cost can be made if the pigs are fed restricted rations, 65 to 80 percent of full-feed. However, this practice results in more labor and requires a 4 to 6 week longer feeding period.

Other Considerations

The use of pasture eliminates the problem of manure disposal and more of the fertility value of the feed is returned to the land. Use of pasture may or may not save labor. To control parasites it is important that pigs be provided with **clean** pasture. The extra fencing, feed, and water hauling that usually is necessary may require as much labor as is needed to haul manure and in feeding and caring for pigs on concrete floors.

Good sanitation and parasite control require that pigs in dry lot be kept on floors that can be kept clean. Such facilities are highly desirable, and in many instances they are essential for successful winter feeding in this area. After such facilities are built they are available for use year-round and often the most economical practice is to use them to capacity.

The saving in total feed, vitamins, and protein under present price relationships is not high enough to justify the use of high priced tillable land as pasture for self-fed growing pigs. Other considerations should be the basis of decision—dry-lot facilities available, labor distribution, size of enterprise, etc.

In some areas excellent pasture can be grown on land unsuited for annual cultivation and the production of corn or other high income crops. However, it should be kept in mind that an excellent pasture is produced only on fertile soil and with adequate moisture. Poor pasture, in terms of available forage, saves no protein, vitamins, or total feed. Such pasture is useful only as part of a management system when suitable dry lot facilities are not available.

In Minnesota, pasture is of most value to the producer who raises only one crop of pigs per year and who has limited facilities. By good management the one-crop producer can raise pigs successfully on pasture with very little capital investment in feeding floors and buildings.

Breeding Stock

Pasture is of relatively greater value for the breeding herd than for market pigs because older animals use the forage more efficiently and rapid gains are neither necessary nor desirable.

Two former Minnesota students at the Ohio Experiment Station raised three successive generations of swine in continuous confinement on concrete. They fed high quality dehydrated alfalfa meal as a pasture substitute and showed that even the breeding females did not require pasture when adequate rations were fed.

However, recent studies have shown that the use of excellent pasture makes possible a substantial saving of feed during gestation. On the average, bred gilts and yearlings fed on such pastures will require about 2 pounds less feed daily and mature sows about 3 pounds less per head. This is a total saving of 208 pounds feed per gilt or yearling sow and 312 pounds feed per mature sow during 104 days of gestation (6th to 110th day). Excellent pasture will carry about eight gilts per acre and in one experiment the carrying capacity was eight mature sows per acre. Thus the feed saved by pasture can vary from 1,600 to more than 2,400 pounds per acre.

Furthermore sows on pasture can be fed simpler rations and less foot and leg difficulty is encountered when the animals are on the ground than when confined to concrete. We believe that most producers should plan to provide excellent pasture for the breeding herd for as much of the year as possible.

Summary

1. Pasture is not essential for properly fed swine of any age.

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L. E. Hanson is professor and head in the Department of Animal Husbandry.

Medicated Feeds Come Under Federal Drug Act

A. HARRIS KENYON

Mixers of medicated feeds, including those who operate on a custom basis, have several responsibilities under the Food, Drug, and Cosmetic Act. First, the mixer must control the formulation, mixing, testing, and labeling of his feeds to assure that the label accurately states the composition of the feeds. One may say that this is nothing new; for years the feed mixer has been required to see that the guaranteed analysis statements on his tags are correct.

However, the manufacturer of medicated feeds has the task of accurately dispersing throughout his feeds small proportions of potent drugs. This requires especially thorough mixing. Because the drugs used are potent, care must be used in handling them. They should be stored in a restricted area set aside for this purpose so that unauthorized personnel cannot have access to them. Also, because of the potent nature of the drugs, equipment must be adequately flushed between formulations to avoid cross contamination.

The mixer of medicated feeds should have some knowledge of new drugs, certifiable antibiotics and food additives, and the legal restrictions of their use. "New drugs" are those drugs for which the safety, because of the short time in use or in new types of use, has not been completely established.

Before feeds containing new drugs can be marketed in interstate commerce, there must be on file with the Food and Drug Administration, an effective new drug application for the particular feed. The Food and Drug Administration will not permit a new drug application to become effective until there is evidence that the drug is safe.

Feed mixers cannot legally receive new drugs or new drug concentrates in interstate commerce for mixing unless a new drug application or supplemental application is effective for the product they mix. If the drug or the concentrate is from an interstate source, the mixer is obliged to have each of his products containing it covered by an effective NDA or supplemental NDA whether or not the finished mixed feed is shipped in interstate commerce. The mixer is not only obliged to have an effective NDA, but is responsible for observing its conditions. Material changes in composition, manufacturing methods, facilities, controls, or labeling from the provisions in the effective NDA constitute grounds for suspending the application.

New drugs and new drug concentrates received by mixers cannot legally be used for "prescription compounding" even on the prescription of a veterinarian unless the prescription is the subject of an effective NDA. This restriction is similar to one that applies to new drugs for human use. The reason for these restrictions is the same in both cases, consumer safety, man or animal.

The "certifiable antibiotics" under the Food, Drug, and Cosmetic Act are chlortetracycline, penicillin, streptomycin, bacitracin, chloramphenicol, and their derivatives. Regulations have been established that give the conditions under which these certifiable antibiotics can be used in medicated feeds by themselves or in combination with other drugs. The regulations define the tag claims, feeding directions, and potency.

When a new drug is combined with a certifiable antibiotic, the regulations require the filing of an antibiotic form 10. This is a modified new drug application, with the added requirement that the feed containing the antibiotic will be effective for the labeled claims. As in the case of new drugs, feeds manufactured from certifiable antibiotics received in interstate commerce are subject to the requirements of the law even though the finished feed is not shipped out of the state.

"Food additives" are those substances that can be expected to become a component or otherwise affect the characteristics of any food. They are not generally recognized by competent experts as having been shown to be safe under the conditions of their intended use.

This includes not only substances that are added intentionally to food, but also those that may reasonably be expected to become a component of food. Under the law, food additives cannot be marketed until the Food and Drug Administration has determined that they are safe.

This means that any substance to be added to animal feed that is not itself generally recognized as safe must be shown to be safe for the animal under the intended conditions of use. Where this cannot be demonstrated, authorization to use the additive is denied by FDA.

Where safety to the animal can be established, then the interested party must demonstrate either that the edible products of the animal—meat, milk, or eggs—are free of any residue of the substance and its degradation products. Or, if such residues are found, they must be safe for consumption by man or other animals as the case may be.

When a new drug application involves the use of a drug in a way that also causes it to be a food additive, the application is processed by FDA with a view to its food additive implications as well as its drug aspects.

The Food, Drug, and Cosmetic Act is a consumer protection law. It forbids interstate commerce in adulterated or misbranded foods, drugs, devices, and cosmetics. Under this law medicated feeds must be safe, unadulterated, and properly labeled. If you have questions about this law or the legality of a feed write to Food and Drug Administration, Washington 25, D. C. In writing, be sure to include the quantitative formula and a draft of the proposed labeling. This information is essential to answer your inquiry.

A. Harris Kenyon is director, Minneapolis District, Food and Drug Administration, Department of Health, Education, and Welfare.

Pastures —

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2. Pasture is of greatest value for breeding stock and of least value for growing pigs that are self-fed.
3. Whether or not pasture should be used for growing market pigs depends on dry lot facilities available, system of management, labor available, and other factors. Pasture effect on feed costs is small when pigs are full-fed.
4. The use of pasture is recommended for breeding stock—under most conditions.

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Summer Feeding of Dairy Cattle

JOHN D. DONKER AND
GORDON C. MARTEN

Use of Concentrate Feeds for Cattle Pasturing High-quality, Abundant Pasture in Minnesota

Many people ask if it pays to feed dairy cattle concentrates when the cattle are on good quality pasture. We do know, of course, that dairy cattle need concentrates to supplement roughages when roughage will not supply enough nutrients to keep milk production up.

We studied the use of concentrates for dairy cattle on good quality pasture at the Rosemount Dairy Unit of the University for 3 years (see the table). Cattle were in good flow of milk and they were kept at pasture except to be milked and fed concentrates in a milking parlor. Pasture was available for a 90-day period each year. A weekly rotational system with four subpastures within the field was used.

During the first 2 years three animals were subjected to each level of feeding for one period. Then all levels were compared simultaneously with three animals for three periods the first year and six periods the second year. During the third year the extreme levels of previous years were compared on a continuous basis, i.e. no switching of levels of concentrates between cows.

In general using higher levels of concentrates produced higher levels of milk. There was a greater difference in the first 2 years between low and medium level feeding of concentrates than between medium and high levels, indicating that the law of diminishing returns was operating. You can figure for yourself the profitability of using the different levels in the table.

Adding 5.8 to 6.0 pounds of concentrate apparently allows the cow to produce between 3.5 to 4.0 pounds more milk. If concentrates are worth 2.5 cents per pound of feed and milk 3.25 cents per pound, adding concentrates wouldn't pay. Going to an even higher level of concentrates was even less favorable.

There is much more to the story than what the averages in the table show. To test the various levels of concentrates used the first 2 years it was necessary to shift levels fed to cattle both upward and downward. Over the 2-year period when concentrates were removed abruptly from a cow's ration, she dropped in milk production an average of 1 pound of milk for every pound of concentrate. This relationship was independent of the natural rate of decline and apparently was independent of the level of milk production observed or level of grain fed at the time of change.

Average pounds of concentrates used per day on three levels of concentrate feeding with the resulting average daily production of milk by year

Year	Number of cows	Length of experiment	Pounds of concentrates used			Pounds of milk		
		days	H*	M*	L*	H*	M*	L*
1	9	30	10.9	7.8	2.0	38.8	37.9	33.9
2	9	15	16.0	8.0	2.0	36.8	35.3	31.8
3	6	90	16.0	.....	2.0	39.5	.....	38.3

* H, M, and L refer to high, medium, and low level of concentrate being used.

These results emphasize the importance of recognizing what is really happening. These animals were all past peak milk flow. In this situation milk production is quickly and easily lost under adverse conditions, even though they may prevail as short a time as 14 days, as in the second year, but it is not reversed when the adverse condition is removed.

A completely different situation prevailed in the third year. The cows were slowly adjusted to their experimental rations. The animals on low concentrate evidently were able to compensate for loss of concentrates by increased forage intake, or else they had no need of the concentrates in the first place. From this latter instance it is obvious that the animals that were fed the liberal amounts were being fed extravagantly.

To finally resolve the question one has to know the cost involved in providing the type of pasture needed to support production as was done here. We were always very careful to provide abundant, high-quality pasture. Under the system used there was considerable pasture wastage. On the average the cattle used about 60 percent of the standing forage and produced milk equivalent to 4,000 pounds per acre from forage consumed.

Does It Pay to Pasture?

The tendency toward increased mechanization of forage harvesting on many dairy farms has put the spotlight on zero-grazing or green chopping (soiling) as a substitute for pasture grazing. The question concerning the practicality of this shift from conventional grazing involves agronomic, nutritional, and economic factors. The answer depends on consideration of all of these factors as a group.

It is desirable to keep in mind a list of advantages and disadvantages of mechanical harvest versus animal harvest of summer forage for the herd. The following points favor zero-grazing:

1. It results in more complete use of the grass growing in the field, in effective utilization of high yielding crops, and, hence, increased yield of milk per acre;

2. Much fencing can be eliminated;

3. Less energy is spent by cows in obtaining feed (the degree of importance of this factor is controversial);

4. Soiling enables the farmer to make better use of fields that may be too distant or inaccessible for grazing;

5. The farmer has a better knowledge of exactly what the cows are eating with a green chop system. This allows more accurate estimates of need for supplements;

6. The farmer has better control over consumption of bloat-producing forages.

Green chopping has some important disadvantages:

1. The costs of machinery, feeding facilities, and labor for harvesting and feeding the crop are considerable;

2. The nutritive value of forage actually consumed will be higher on pasture, since the cow selects only the better portions of the plant. This often means less milk per cow under a green chop system;

3. Harvesting in the spring often cannot be started as early as grazing;

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Egg Production —

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1,000 birds even on the large poultry farms. Thus the large houses should be divided into small pens. This means that any flock of 1,000 birds or more becomes an economic unit to house. The number of these units on any one farm will depend on the individual farmer.

5. **What size operation is desirable?** We are rapidly approaching the time when the scare of bigness may be one of the worst obstacles to the family-owned and operated farm business. The transition to a larger flock will be forced upon us whether we like it or not. We can see that this change is necessary from three important standpoints:

★ Efficiency of production.
★ Better quality product.
★ Demands of the market.

These conditions can be carried out on the family owned farm under a planned program. This is where most farmers need some real help and encouragement to expand their present poultry operation. This can be done in a number of ways but it is necessary for the farmer to grow in managerial ability. As his flock becomes larger the problems become greater. But with a good job of management his profits will grow with him. Flock sizes of 2,000 to 3,000 birds is a good size to fulfill our economic needs now. This is large enough for production economies and small enough to be handled by a family operated farm. Thus the birds receive more personal attention and produce at a slightly higher rate. As the flock becomes too large the mortality rate goes up and production goes down. This is probably due to lack of experience with large units.

These flocks are large enough to warrant the necessary care and equipment to produce good quality eggs. This means the flock must be confined and the eggs gathered three to four times a day. An egg cleaner and a cooler are necessary to maintain top quality. A flock of 1,000 birds or more can easily justify this equipment. If in-plant cleaning of eggs grows in popularity then one man can double his flock with no increase in labor. This may be a real stimulus to the expansion of our egg industry. This is new in Minnesota but it has real possibilities because egg cleaning is a chore most people dislike.

Market demands are changing. Markets are requesting larger and larger lots of good quality eggs. Some super markets are buying direct from the farmers with large flocks. This trend will increase because it eliminates the chain of handling, labor, and profits. More direct marketing allows a smaller spread between the farm price and the retail price. Part of this saving will be passed back to the producer.

At present our poultry flocks are too small. We should begin now to enlarge them on a sound economic basis. This means looking into the future with good judgment and logical decisions on the farm operation.

To Kill Wild Oats Keep Up the Attack

Harley Otto, extension agronomist at the University of Minnesota, suggests the following cultural weed control methods for wild oats:

1. Do not plow under seeds that have shattered from the current crop. They may remain alive for many years when buried. Weathering helps break dormancy if seeds stay near the surface.

2. Cultivate shallow in the spring to break the soil crust and cover the seed. Cultivate later to kill the wild oats that have germinated and to bring up other seed that is no longer dormant. Late spring and summer cultivation should be shallow.

About the middle of June put in a crop adapted to late sowing—such as an early variety of flax, potatoes, corn, sugar beets, proso millet, buckwheat, Sudangrass, or soybeans.

3. Cultivate as in suggestion number 2 and sow barley late. Use fertilizer and heavy rate of sowing.

4. Sow tame oats early and cut for hay before wild oats have formed seed. Plow immediately after the hay crop.

5. More than 1 year of early tillage, and delayed sowing or cutting of tame oats for hay, is necessary on badly infested fields.

Oat Plus Pea Mixture Boosts Protein Yield

By planting an oat-pea mixture instead of oats alone for silage or feed grain a farmer can grow feed of higher protein content and raise his protein yield per acre.

R. G. Robinson says that because of the greater concentration of protein in oat-pea silage or feed grain, some livestock producers may be able to buy less commercial protein supplement and still maintain high production.

In addition to making a higher protein silage than oats alone an oat-pea mixture may retain more succulence, thus prolonging the time available for harvest, and may compact better in the silo.

University of Minnesota trials at three locations in southern Minnesota and at the Northeast Experiment Station, Duluth, have shown that in most areas of the state 48 pounds of oats with 90 pounds of peas is a suitable seed mixture.

A mixture of 64 pounds of oats and 60 pounds of peas is more practical for areas where lodging is severe and in southwestern and west central Minnesota. In northern Minnesota, where pea growth is vigorous, a mix of 64 pounds of oats and 60 pounds of peas or less is satisfactory because of the vigorous growth of the peas.

Recommended field pea variety for these mixtures is Chancellor.

Average protein yield per acre for oat-pea silage grown at the four locations was 529 pounds compared to 388 pounds for oats alone. When harvested as feed grain the protein yield averaged 219 pounds for acre for oats; 332 pounds for the oat-pea mixture.

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