MINNESOTA FEED SERVICE

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# Hog Cholera in Minnesota:
## prevention-control-eradication

**Raymond B. Solac**

Hog cholera is being eradicated.

To date, no animal disease has been eradicated from the United States without some measure of regulatory control. The state legislatures and the U.S. Congress determine what can be done in regulatory matters through the assignment of authority and funds. Usually, after hearings before committees these legislative bodies weigh and decide the merits of proposed programs from a broad public viewpoint. Through these bodies, individual citizens and organizations may express their views and indicate support or disapproval. This applies both to new undertakings and the continuance of those already in progress.

### Prevention and Control

The prevention and control of hog cholera has been supported by Minnesota swine producers and by the State of Minnesota for several decades. Initial control steps were taken by the State Livestock Sanitary Board in 1903. Hog immunizing agents were first field tested in Renville County and produced on the University's St. Paul Campus before the products were available to farmers from commercial sources. In later years millions of hogs were vaccinated against cholera under private treaty arrangements, and hog cholera control was carried out essentially under basic control measures developed between 1905 and 1924. This activity resulted in a remarkable decrease in number of cholera cases found in Minnesota. Where hog cholera was reckoned by hundreds of cases per county per year, we now have fewer than a hundred cases reported in the state annually (1963, 66 cases; 1964, 38 cases; to September 16, 1965, 17 cases). This control, however remarkable, still falls short of eradication.

Eradication of an infectious disease implies the elimination of the causative agent. In practice, this has meant the destruction of diseased animals, proper disposal of carcasses, and indemnity to the owner. Condemnation has been done in the public interest. Although public health was the historic basis of public interest, this does not hold true in the case of hog cholera. Swine are still the only known animals in which the hog cholera virus causes death. Hog cholera eradication marks a change in the thinking concerning this point.

### Benefits of Eradication

The benefits of hog cholera eradication to the swine producer and to his suppliers of feed and other products and services and to the handlers and processors of pork and pork products have been appreciated for some time. Not so well understood are the benefits that accrue to others not closely associated with the swine industry.

The many ramifications concerning eradication become more apparent when, for instance, one knows that U.S. pork is barred from 17 countries because hog cholera exists in this country. Or when we have reached the point where the cost to the public for containing a disease in terms of man hours, travel, inspections, quarantines, certification, permits, diagnostic facilities, etc., exceed the cost of eliminating a few sources of infection.

While Minnesota has the authority and responsibility for the control and eradication of hog cholera within its own borders, its efforts cannot be separated from what is happening elsewhere. The Federal Government, of course, has the authority to regulate the interstate movement of swine, and has furnished much help to state agencies in their intrastate disease eradication activity. There is a trend toward the global eradication of hog cholera as manifested by the International Meetings on Hog Cholera and African Swine Fever held in Rome May-June 1965 by the Food and Agriculture Organization (FAO) and the Office of International Epizootics.

### Cooperative Eradication Program

A Cooperative State-Federal Hog Cholera Eradication Program was begun in November 1962 after the U. S. Department of Agriculture adopted cooperative program standards recommended by the U. S. Livestock Sanitary Association, an independent association which serves as a livestock sanitary science clearing house between itself and all groups and individuals interested in livestock.

The Cooperative Hog Cholera Eradication Program is divided into four phases representing a gradual buildup in a state effort until the disease is eradicated. Minnesota moved directly into Phase II, "Reduction of Incidence," at the end of March 1964.

Phase III of the program, "Elimination of Outbreaks," is intended to eliminate those few infected and exposed herds which remain as threatening sources of infection. This is also the first phase in which federal indemnities can be paid for hogs destroyed because of cholera. Minnesota now has enabling legislation that makes it possible for the state to enter into Phase III on July 1, 1966, if the number of cases of hog cholera remains significantly low.

### Prospects for the Future

While the program in Minnesota is progressing favorably and while there are no forseeable insurmountable obstacles to final eradication, hog cholera eradication will not come inevitably. Two areas of concern are now becoming evident. The first is the need of continued interest and support of control and eradication measures by swine producers in face of the declining numbers

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of hog cholera cases. The second has to do with vaccinating or not vaccinating hogs at this point in the program. Eliminating the need to vaccinate is a long-term objective of the hog cholera eradication program. Although the desire to discontinue vaccinating is understandable, it appears that it would be premature to stop vaccination now.

While the individual swine producer is free to discontinue vaccinating his hogs at any time he chooses, the decision should not be made lightly. As a rule, hog cholera kills all the unprotected swine exposed to the disease. As an individual, the swine producer cannot protect his swine against all possible exposure to the disease. It would be safer to stop vaccinating when hog cholera apparently no longer exists in Minnesota and when the swine in the state are protected against reinfection. These conditions are likely to occur shortly before or when the state enters Phase IV, "Protection Against Reinfection," of the Cooperative Hog Cholera Eradication Program.

# *Growing Alfalfa Successfully on Sandy Soils*

**Curtis J. Overdahl**

Alfalfa is seldom grown successfully on sandy soils that test low in potassium or have pH values below 6.3.

These conditions generally prevail in soil areas of Minnesota approximately north and east of a line from the Twin Cities to Alexandria to the Canadian border. There are, of course, many exceptions to such a general description. Although many of these soils are not sandy, the nutrient deficiencies are often similar.

Limited experiments and field demonstrations indicate that high-yielding, high-quality alfalfa can be grown if details of fertilization, liming, variety, and proper cutting times are observed.

In cooperation with county agents, fertilizer dealers, and farmers, several field demonstrations were established in the general area starting in 1959. Results varied from complete failures to continuous stands of high-yielding alfalfa. Close observation of plots that failed usually showed definite reasons for the failure; for example, lime or fertilizer rates often weren't high enough. During dry summers, surface applications didn't appear as effective as deeper treatments.

Experimental plots have more recently been established at Pierz in Morrison County and at the Northeast Experiment Station, Duluth. These plots were established to determine needed rates of potassium and lime, but phosphorus, sulfur, and boron were applied to be sure a deficiency of these elements didn't limit growth.

Results at these two locations definitely show that high rates of potassium, both at seeding time and topdressed later, are necessary for most economical production. There is a lime response even at pH levels of 6.2 or 6.3.

**Results at Pierz**

Over a 2-year period, yields from plots receiving single applications of up to 240 pounds per acre of potassium showed the 240-pound rate to be most profitable (table 1).

The soil is a Brainerd sandy loam with average pH of 6.3, phosphorus originally testing medium, and potassium low. Average yield where no fertilizer treatments of any kind were made was 2.1 tons per acre.

The experiment was designed for topdressing three rates of $K_2O$ annually (0, 120, and 240 pounds per acre on each seedtime treatment). Plots were topdressed after the last cutting in 1964. Results in 1965 indicate the greatest increase on plots receiving the lowest treatment at seeding time. Conclusions


**Note large first cutting growth difference between the high potassium treatment and area untreated with potassium at the Pierz experimental plot.**


**Note a much larger yield increase with treatment above 120 pounds per acre of $K_2O$ at seeding time (200 pounds of 0-0-60).**

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Curtis J. Overdahl is professor and extension soils specialist.

Photos courtesy of R. D. Munson, American Potash Institute.

**Table 1. Alfalfa yields in tons per acre and related profits according to varying treatments of potash***

| Year | Cuttings | Seeding time rates of $K_2O$, pounds per acre 0 | 60 | 120 | 180 | 240 |
|---|---|---|---|---|---|---|
| 1964 | 2 | 2.31 | 2.40 | 2.60 | 2.70 | 3.00 |
| 1965 | 3 | 4.02 | 4.16 | 4.50 | 5.08 | 5.36 |
| 2-year yield total | | 6.33 | 6.56 | 7.10 | 7.78 | 8.36 |
| Potash cost/acre | | 0 | $3.00 | $6.00 | $9.00 | $12.00 |
| 2-year increase tons/acre | | 0 | .23 | .77 | 1.45 | 2.03 |
| Value of increase at $20/ton | | 0 | 4.60 | 15.40 | 29.00 | 40.60 |
| Hay value less potash cost | | 0 | 1.60 | 9.40 | 20.00 | 28.60 |

* Data from L. D. Hanson and C. J. Overdahl

**Table 2. Alfalfa-brome yields in tons per acre according to potash treatment with related soil tests and tissue analysis***

| $K_2O$ lb./acre | 1962 | 1963 | 1964† | 1965 | Average | K soil test | Average % K and relative level |
|---|---|---|---|---|---|---|---|
| 0 | 2.7 | 2.4 | 1.1 | 2.2 | 2.1 | 70 low | 1.00 deficient |
| 120 | 3.1 | 3.0 | 1.5 | 3.2 | 2.7 | 80 low | 1.40 deficient |
| 240 | 3.5 | 3.7 | 1.6 | 3.0 | 3.0 | 83 low | 1.44 deficient |
| 480 | 3.4 | 3.9 | 2.0 | 3.5 | 3.2 | 106 medium | 1.78 low |
| 960 | 3.6 | 4.3 | 2.5 | 3.5 | 3.5 | 203 medium-high | 2.33 sufficient |

* Data by Grant, Hopen, Caldwell, and Baker.
† Sampled at 0- to 6-inch depth in fall 1963 (3 years after application).

**Table 3. Four-year net returns from varying potassium treatments**

| $K_2O$ lb./acre | 4-year increase over check, tons/acre | 4-year gross returns* | K fertilizer cost† | 4-year net profit increase |
|---|---|---|---|---|
| 120 | 2.19 | $43.80 | $ 5.50 | $38.30 |
| 240 | 3.34 | 66.80 | 11.00 | 55.00 |
| 480 | 4.20 | 84.00 | 22.00 | 62.00 |
| 960 | 5.23 | 104.60 | 44.00 | 60.60 |

* $20 per ton of alfalfa.
† $K_2O$ figured at $55 per ton.

**Table 4. Topdressing effect on 1964 yield, surface soil test, and tissue analysis**

| $K_2O$ lb./acre broadcast 1960 | | topdressed 1963 | Yield 1964 | 1965 | 2-year increase | K soil test | Percent K tissue and relative level |
|---|---|---|---|---|---|---|---|
| 120 | | | 1.5 | 2.5 | | 80 low | 1.33 deficient |
| 120 | + | 200 | 1.8 | 3.2 | 1.0 | 140 medium | 2.42 sufficient |
| 240 | | | 1.6 | 2.5 | | 83 low | 1.46 deficient |
| 240 | + | 200 | 2.1 | 3.0 | 1.0 | 146 medium | 2.55 sufficient |
| 480 | | | 2.0 | 2.9 | | 106 medium | 1.87 deficient |
| 480 | + | 200 | 2.3 | 3.5 | 0.9 | 246 high | 2.56 sufficient |

about topdressing cannot be drawn until the experiment runs longer because 1965 had above-average rainfall and results may be different under other weather conditions. The 240-pound-per-acre rate of $K_2O$ topdressing increased alfalfa yields 1.5 tons per acre on plots where no seedtime treatment was made and 0.7 tons on the plots receiving 240 pounds per acre at seeding time.

**Lime Results**—Since returns from lime treatment prior to seeding are expected to continue for several years, it is too early to determine the most practical rates. Results over 2 years show that 2½ tons of lime increased yields 0.38 ton per acre and 5 tons of lime has increased yields by 0.80 ton. These increases are observed in spite of the 6.3 pH before lime treatment. The 2½-ton-per-acre application has changed the soil pH from 6.3 to 6.7, and 5 tons per acre has raised the pH to 7.0.

**Phosphorus Responses**—Typical soils in this area test high or very high in phosphorus. The Pierz plot, however, tested 19 pounds of adsorbed phosphorus which is only medium-high. Treatments of 30 and 60 pounds of $P_2O_5$ (the amount found in 250 and 500 pounds per acre of 0-12-36 respectively) were made annually. Two-year averages show that 30 pounds of $P_2O_5$ has increased alfalfa yield by 0.52 ton and 60 pounds has increased yields by 0.74 ton per acre. These results indicate that fertilizers including both phosphorus and potassium may be most desirable, particularly where soil tests less than high. For comparison, a soil testing 60 pounds of adsorbed phosphorus (very high) in Pine County showed no alfalfa response to identical rates of phosphorus during the same 2 years.

### Results at Duluth

In fall 1960 a study was undertaken at the Duluth Station to determine the effect of various levels of potassium on alfalfa yield, tissue analysis, and soil test. Treatments of 0, 120, 240, 480, and 960 pounds of $K_2O$ per acre were broadcast and plowed under in fall 1960 and the plots were seeded to an alfalfa-grass mixture with oats as a nurse crop in spring 1961. Phosphorus, lime, and boron were applied in adequate amounts to all plots. In 1963, 200 pounds per acre of $K_2O$ were topdressed on half of each of the plots after the first cutting.

Simple economics show that best profits from potassium use are among the high treatments.

If the potassium treatments continue to produce the above yield trends, it appears that the greatest profit increase will be from the very high levels of potassium.

### Attention to Details

High potassium and lime rates are the key to successful alfalfa growing in this soil area. For long-term stands, topdressing of potassium either annually or biannually is a must. However, attention to other details as well are essential to obtain best growth. It appears that phosphorus should be included in the fertilizer used, particularly at seeding time. Boron deficiency often cuts yields seriously, and borated fertilizers should be used once every 2 or 3 years. Many soils in this area are extremely sulfur deficient, and consultation with county agents or other agricultural specialists is necessary to determine local conditions.

Varietal selection, weed control, and time of cutting are other important considerations. Research shows that early first cuttings result in higher quality alfalfa and also increases chances for taking a third cutting. Observance of September 1 as final cutting or grazing date is essential to avoid winterkill.

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**Soils and Fertilizer Short Course**
**Hotel Leamington, Minneapolis**
**December 6-7, 1965**

# When the Feed is Suspected

**Paul E. Waibel**

"Optimum performance and profit depend upon healthy animals and efficient production." As long as this situation exists, the poultry farmer is in a good competitive position.

This article is a response to frequent questions regarding the probability of feed causing suboptimum performance, and the testing of suspected feeds.

All should agree that the feed industry and nutritionists have done a remarkably good job in providing uniform, high-quality feeds. When one considers the many problems which could arise due to improper feed formulation, improper mixing, or toxic agents, it is remarkable that feed so seldom is the cause of trouble.

After possible disease, parasite, and management problems are explored, it is usually desirable to do some tests on the feed. A growth test comparing the feed to a reference batch can be most helpful and should be considered in acute problems. Other routine tests described later will give some indication as to the general characteristics of the feed.

### Proper Sampling Needed

Whether one uses the feeding test, the analytical approach, or both, it is first necessary to take a proper sample of the feed. Usually by the time a problem is observed the feed which may have caused the problem is completely used and gone. Therefore, if analysis is conducted on the feed used when the problem is observed, there is a very good chance that this feed is back to normal.

A poultryman or feed supplier who is interested in preparing himself for the eventuality of having to examine the feed at a later date should sample each batch of feed and hold this sample until sure it is no longer required.

The accepted device for sampling feed is a probe. A long double-walled tube (with holes and pockets) is inserted into the feed for a depth of 5 feet, the cylinders are turned, and the feed is sampled at various locations.

In the absence of a probe, the scoop method can be used. Here representative portions of a given load or from differing sacks of the same load of feed are taken in perhaps six spaced places (avoiding the very top or bottom of the batch).

The container for holding the feed should be a new plastic bag labeled as to shipment number, date, kind of feed, manufacturer, and person taking sample. The sack should be tied tightly to prevent moisture changes and stored in a clean, cool room. The ideal situation here would be to save about 25 pounds of the batch of feed, as this would allow enough feed for growth *and* analytical tests.

### Feed Analysis

The most commonly employed analyses include protein, fat, fiber, and moisture. This grouping costs about $6. With these results it is possible to compare the feed against the guarantees on the feed tag. Not more than 1 pound of feed is required for these tests.

If leg problems in poultry are evident one should assay for calcium, phosphorus, and possibly vitamin D, although the latter is very expensive (approximately $120). If wet droppings are a problem, it might be desirable to assay for salt. Another frequently conducted analysis is for true vitamin A (approximately $10). Analyses beyond these become very expensive, averaging about $20 per amino acid, vitamin, or toxicological agent. Thus, one might easily spend over $1,000 to analyze a single feed sample.

Samples are frequently sent to the University in the expectation that they will be analyzed for "whatever is missing." Unfortunately, facilities are not available for conducting these analyses. However, several good analytical laboratories available for this purpose are listed at the end of this article.

The State Department of Agriculture does analyses on a regulatory basis; this requires that the sampling be done by an official inspector. These checks are usually made in a periodic manner to be sure that general feed guarantees are followed. In specific instances, where feed is apparently implicated in a problem, it has been possible for the Department to pick up official samples at the request of the feeder or the feed manufacturer.

The next question regards what a feed user should do with his analytical or performance results; that is, how does he tell whether these results are abnormal. While we at the University are not in a position to perform analyses, we are always willing to advise when questions of this nature arise. Also, it would be proper to discuss the results with the feed manufacturer.

In cases when feed has been *proven* to be responsible for a problem, the writer does not know of a single instance where the feed manufacturer did not willingly correct the loss. The unfortunate occurrence which happens all too often is that the feed is incriminated on the basis that "since no other cause was found, it must be the feed." Inherent in this assumption is the mistaken reasoning that all other causes of problems are identifiable.

This article is offered in the hope that by outlining a systematic testing program it will help determine whether or not the feed is involved before incriminating a feed manufacturer when a problem arises.

Paul E. Waibel is a professor in the Department Poultry Science. This article is adapted from *Poultry Patter* 3(4), July 1965.

### ANALYTICAL AND TESTING LABORATORIES

Doty Laboratories (335-5335)
924 Flour Exchange Building
P. O. Box 2093
Minneapolis, Minnesota 55415

Ingman Laboratories (333-6419)
324 Fourth Avenue South
Minneapolis, Minnesota 55415

Markley Laboratories, Inc. (633-5477)
4700 North Highway 10
Twin City Ordnance, Gate 4
New Brighton, Minnesota 55112

Minnesota Valley Testing Laboratories, Inc.
206 Woolworth Building
New Ulm, Minnesota 56073

A. D. Wilhoit Laboratory (339-7707)
1000 Flour Exchange Building
Commerce Station, Box 2068
Minneapolis, Minnesota 55415

*Specializing in toxicology (insecticides, herbicides, poisons):*

Key Laboratories, Inc. (335-7719)
529 South 7th Street
Minneapolis, Minnesota 55415

*For special vitamin, amino acid, mineral, toxicological, and growth tests:*

Wisconsin Alumni Research Foundation
506 North Walnut Street
P. O. Box 37
Madison, Wisconsin 53701
(Phone Code 608; 257-4851)

Lime Crest Research Laboratory
R. D. 1, Box 192
Newton, New Jersey 07860

Names of testing firms are furnished for information only; inclusion does not constitute endorsement and omission does not constitute discrimination by the Minnesota Agricultural Extension Service.

**An abundance of high-moisture corn that has low market value does not justify paying exorbitant prices for feeder cattle, hogs, or sheep**

# HIGH-MOISTURE CORN

R. M. Jordan*

WET CORN AGAIN! How should I store it? What livestock can use it best? Does fermented corn have as much feed value as dry corn? Does drying with heat decrease its palatability and feed value?

Research at many state experiment stations and experience by Corn Belt feeders provide answers to most of these questions. With considerable soft corn in Minnesota this fall, let's look at how to make the best use of this crop.

Actually there are two kinds of soft or high-moisture corn—immature and mature corn. Illinois researchers consider corn grain containing 30 to 35 percent moisture *mature* because there is little or no additional translocation of carbohydrates, protein, fat, etc., into the kernel after this stage of development. On the other hand, the South Dakota Station reported that dented corn containing as much as 48 percent moisture is mature since it contains as much nitrogen-free extract (NFE) as dry corn. For this article our definition is that dented corn containing less than 50 percent moisture is mature.

What is immature corn? It is corn containing more than 50 percent moisture. The NFE, ether extract, and carotene content of the dry matter of immature corn are low while the crude fiber is high (4 to 5 percent). A good indication of fiber content of a feed is its weight per bushel. In South Dakota studies corn was dried to 15 percent moisture. When this was done, corn containing 50 to 59 percent moisture weighed 31 pounds per bushel; 30 to 39 percent moisture, 38.2 pounds; and 15 to 19 percent moisture, 49.2 pounds. Thus the feed value per pound of dry matter is considerably less for immature corn than for mature corn, due to the high fiber and chaffiness of immature corn.

### STORAGE METHODS

The feeder has three alternatives in harvesting, storing, and using his corn. The method he selects will be determined by his storage facilities and/or how fast he is able to feed a crop as perishable as high-moisture corn. The alternatives follow.

#### High-Moisture Ear Corn

Pick corn to be stored as ear corn late in the fall and store in cribs or narrow piles on the ground. Research workers at the South Dakota Station reported that:

1. During cold weather little deterioration or reduction in the feed value of high-moisture corn took place.
2. The dry matter in high-moisture but mature corn (26 to 32 percent moisture) was about equivalent to the dry matter in dry corn. In terms of dry corn, high-moisture (soft) corn (26 to 32 percent moisture) had 82 percent the value of hard corn when fed to steers, 78 percent when fed to fattening lambs, and 76 percent when fed to hogs or steer calves.
3. The mold that developed on soft corn was not poisonous to either cattle, hogs, or sheep.

If you use this method, do not pick the corn until late fall (November) and plan to have it fed by April 1. Warm weather causes heating and spoilage, and such corn loses about 50 percent of its original feed value.

#### Artificially Dried Corn

Corn harvested with a picker-sheller lends itself particularly well to artificial drying.

What does heat do to the nutritive value of corn? In a Nebraska report, the dry matter in high-moisture corn dried at 190° F. was not damaged. There was no nutrient loss or any decrease in digestibility when compared with field-dried corn. This was true whether it was fed to cattle on maintenance rations or fattening rations.

However, if the corn is heated so it scorches or parches (280-300° F.), the corn becomes less palatable and there is a decided loss in nutrients, particularly protein. The U. S. Department of Agriculture dried corn at 280° F. with forced air directing the heat through the corn, and reported no loss of nutrients. However, above 280° F. scorching took place.

In Illinois experiments, corn dried at air temperatures ranging from 140 to 220° F. produced equal gains and feed efficiency when fed to 50-pound pigs.

The South Dakota Station reported than corn originally containing 45 to 50 percent moisture and dried to 17 percent moisture was as good feed as hard corn for either cattle, hogs, or sheep.

We conclude that mature high-moisture corn properly dried should give about the same results in feeding, on a pound-for-pound basis, as mature field-dried corn.

#### Ensiling High-Moisture Corn

Ensiling high-moisture corn is a popular method of storage. However, to be successful and provide a feed of high nutrient content for a long time, including the warm weather season, you must have airtight storage.

The test of a good feed or a good storage method for the feed is the amount of meat or milk that can be produced per ton of feed harvested and not per ton of feed fed. There is quite a difference between the two. Most reports are on the basis of feed fed.

Many livestock producers have been disappointed with ensiled ground ear corn or ensiled shelled corn because of the tremendous spoilage during warm weather. The only way spoilage can be minimized is to maintain an airtight storage condition. This, of course, can be done in the steel glass-lined silos and in conventional silos that have been sealed. But once conventional silos are opened and fed from the top, spoilage will start. Therefore, if it is impossible for you to maintain airtight storage, feed the ensiled corn before warm weather.

How good a feed is ensiled ear corn or ensiled shelled corn? Not everyone agrees.

The Purdue, Illinois, and Iowa Stations have done considerable research work on the question. In general, they report that the dry matter of high-moisture *ground ear corn* stored in silos was used more efficiently than that from dry corn. The type of corn (ensiled high-moisture corn or dry corn) had no effect on the rate of gain or the pounds of dry matter consumed daily.

The Michigan Station reported that high-moisture corn was as good as dry corn for cattle feeding, but it produced no significant difference in gains because of the high moisture content.

The Iowa Station reported that when ensiled *shelled corn* (35 percent moisture) was fed to yearling cattle, over 20 percent of the kernels passed through the cattle undigested.

Both Purdue and Iowa reported somewhat lower gains with ensiled shelled corn than rolled dry corn.

Both the ensiling process and the digesting of corn in the rumen result in fermentation products called organic

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acids. The steer or lamb uses these fermentation products to meet a part of its energy requirement. The question is which method of producing these organic acids from the corn dry matter is the more efficient. To answer this question researchers at Minnesota fed fattening lambs both ground ear corn and shelled corn processed in three different ways: (1) corn picked at 35 percent moisture and dried to 14 to 15 percent moisture, (2) corn picked at 35 percent moisture and ensiled, and (3) corn picked at 35 percent moisture, dried to 14 percent moisture, and then sufficient water added to bring the moisture content back to 35 percent.

The corn was sealed in plastic bags and ensiled. Ensiling did not increase the nutritive value of either shelled corn or ground ear corn. Ensiling corn that had already been dried did not cause any significant change in the nutritive value. Shelled corn, whether fed as dry corn or ensiled corn, produced greater lamb gains than dry or ensiled ground ear corn. Apparently ensiling had little effect on the utilization of the cob portion by lambs.

The conclusion drawn from the three lamb-fattening trials was that dry matter from ensiled corn was as good but no better than that from corn dried to 14 to 15 percent moisture. Similar results have been reported by the Missouri Experiment Station.

The Purdue Station conducted three feeding trials with growing pigs fed ensiled shelled corn (25 to 32 percent moisture) or dry corn. They reported that the pigs gained 3 to 5 percent faster on ensiled corn than on dry corn but required about 10 to 12 percent more feed per pound of gain (dry corn equivalent).

One can conclude that the dry matter in high-moisture corn, whether stored as ear corn in a crib, artificially dried, or ensiled and stored in airtight silos, is every bit as desirable and nutritious as the dry matter in nature, field-dried corn. Whether ensiling actually increases the nutritive value of corn is still open to question.

**EARLY HARVEST ADVANTAGES**

There are some clear-cut advantages for harvesting corn when it has a moisture content too high to store in conventional storage-facilities.

**1.** Corn can be picked earlier and stalks can be used more advantageously as either roughage or as fertilizer.

**2.** Early harvest speeds fall plowing.

**3.** Corn picked when it contains 30 to 35 percent moisture can be picked with less harvesting loss. Iowa reported 3 to 6 bushels less loss in picking high-moisture corn than dry corn.

**4.** According to Illinois reports, it is decidedly easier to get cattle on full feed when they are fed high-moisture corn than when they are fed dry corn.

Whichever method you use—cribbing, drying, or ensiling—will depend primarily on your storage facilities and the degree of mechanization that can be adapted to your feedlot.

The main thing to remember is that mature high-moisture corn can be as valuable per acre as hard corn if handled properly and marketed through livestock as part of a well-balanced ration.

WILLIAM D. FLEMMING, co-founder of Minnesota Feed Service, died in Minneapolis in March. He had been active in the grain and feed industries for four decades. He served as secretary-treasurer of the Northwest Retail Feed Association, published and edited Grain & Feed Review for many years prior to its merger into Grain Age in January 1964, and was a contributing editor of Grain Age to the time of his death. Mr. Flemming was 59.

## Demand for Beef

**Paul R. Hasbargen, extension economist**

The longrun outlook is bright for the U.S. beef industry. The rapid increase in demand for beef during the past 20 years is expected to continue in the coming decade.

Americans have increased their per capita demand for beef at the rate of about 2 pounds per year. When this amount has been added to annual population growth, total demand has increased by 4 to 5 percent per year. An average annual increase of at least 3 percent can be expected during the next 10 years.

Slaughter of steers and heifers will have to increase by 800,000 to 1 million head each year. *So a 5-percent annual increase in cattle feeding will be required.*

Beef cow numbers must increase at an even faster rate to allow for the normal calving rate of about 85 percent and a continuing decline in dairy cow numbers. *Therefore, the minimum average increase in beef cows over the next decade will be 1 million head per year.* This projected expansion rate about equals the rate prevailing since 1957. Cow numbers may decline slightly during any one year, such as 1965. But, unless the expansion rate greatly exceeds the 1 million a year figure for long, no prolonged cutback is expected.

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LUTHER J. PICKREL, director
Cooperative agricultural extension work, acts of May 8 and June 30, 1914.

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