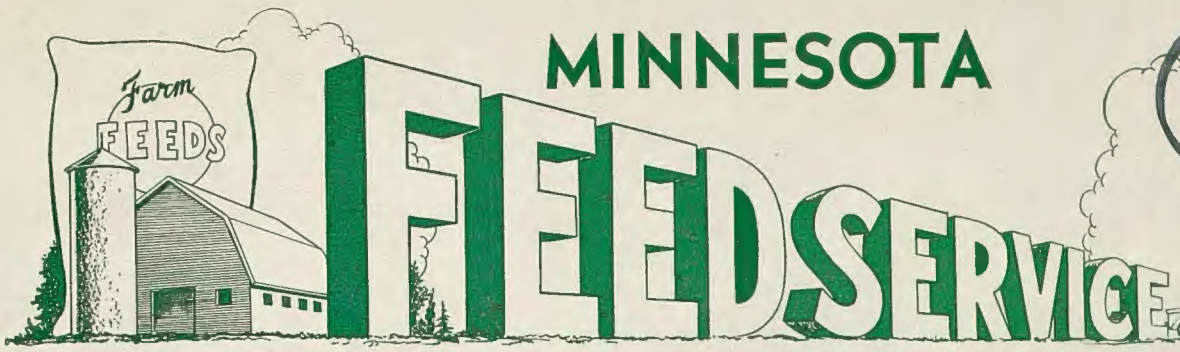

MINNESOTA
FEED SERVICE

University of Minnesota Agricultural Extension Service, St. Paul — March 10, 1955

New Developments in Cattle Feeding

W. E. Morris*

Over the years in the Midwest, corn has been the basis for fattening cattle. In earlier days, the standard cornbelt ration was corn and clover or alfalfa.

Corn and alfalfa ration—Where a high quality alfalfa hay is available, corn and alfalfa make a very satisfactory ration. However, much of our alfalfa isn't good enough to balance the ration of corn. In these cases, a protein supplement needs to be fed with the ration. For example, in dry lot feeding ¾ pound per day of a supplement like soybean oilmeal or its equivalent ordinarily will do, depending upon how good or how bad the alfalfa is.

Corn, alfalfa, corn silage ration—If corn silage is put into a ration of corn and alfalfa, the makeup of the ration changes entirely. The alfalfa hay supplies most or all the needed protein and a large part of the mineral. Adding corn silage reduces consumption of alfalfa hay. The intake of protein naturally is reduced, and it immediately becomes necessary to add about 1½ pounds of protein supplement per steer per day to this ration for top efficiency.

With corn high priced in recent years, greater economy of feeding has been necessary. This has meant that profit must come from the feeding itself rather than depending entirely on a margin of selling price over the cost price of the cattle. As a result, cattle feeding methods have changed. More and more feeders are attempting to utilize more roughage and pasture in their rations to reduce the amount of corn needed to finish the cattle. Different systems of winter feeding have been used to do this.

Winter Feeding in Dry Lot

Some livestock producers feed entirely in dry lot, but still feed a considerable amount of roughage. They rough the cattle through the winter on heavy roughage and limited gain. They then finish them off from late winter to midsummer in dry lot with a full feed of grain—feeding, of course, a well balanced ration.

Roughing Through Winter

More numerous are the feeders who rough calves and yearlings through the winter. They may be in a soil conservation program or have had a good rotation including alfalfa, alfalfa-brome, or alfalfa-timothy. Consequently they have considerable legumes available to pasture after roughing their cattle through the winter. The roughing through the winter is done with either corn silage or alfalfa silage, each supplemented properly.

Corn silage from our high yielding fields today has considerable energy value. Consequently corn silage needs to be supplemented with 1 to 1¼ pounds per head per day of a good 36-44 per cent protein supplement plus minerals. This makes an excellent ration, giving daily gains as high as 1½ pounds per head. Two or 3 pounds of good alfalfa hay can be fed in addition to the silage.

Legume silage as roughage would be full fed. Such a ration contains ample protein and a liberal supply of minerals, but it is short of energy value. Consequently the ration should be supplemented with about 4 pounds of corn per head per day.

The results from these two methods of feeding—corn silage and legume silage—would be about the same from a gain standpoint. Then the cattle go to pasture in the spring.

Pasture Feeding

During the early lush pasture period, it is economical not to feed any grain for two months, depending on the moisture condition and yield of grass. As high as 2 pounds daily gain can be obtained from such pasture, without grain feeding.

After the lush period, grain feeding should start. Half a feed of corn per head per day (about a bushel of corn per steer per week) will suffice as long as there is a good yield of grass. As the pasture supply declines, more grain can be added so that the cattle may be virtually on full feed when they need to be taken out and put in the dry lot. Cattle on pasture need no supplement.

Dry Lot Feeding

The length in dry lot will depend on the degree of finish the cattle are carrying when put on dry lot. Thirty to 60 days will usually be about right. When they go into dry lot, cattle need up to 1½ pounds per head per day of a good supplement to balance the ration.

Special Feeding Plans

Occasionally, feeders attempt to winter on low grade roughages, such as corn cobs, oat straw, or corn stalks. Such roughages are extremely low in nutrients and need to be balanced differently than a good roughage ration. Here is where such supplements as Purdue "A" come into the picture. Palatability is a factor, and molasses is used in this supplement to increase palatability. Vitamins and extra minerals are also added.

These complicated supplements are necessary only with low grade roughages. They would give results with good fattening rations but would be too costly.

Feed Mineral Supplement

Mineral supplements should be self-fed with all these low grade roughage rations. With heavy roughage rations a mixture of two parts bone meal and one part iodized salt self-fed makes a good supplement. With this, mineralized salt should be self-fed separately.

With a fattening ration, bone meal, ground limestone, and mineralized salt in equal parts make a good mineral supplement, self-fed.

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* Extension animal husbandman.

What's New in Weed Control?

E. H. Jensen*

More than 3 million acres of grain were sprayed for control of weeds in Minnesota this past year. This is nearly 23 per cent of the total grain acreage and represents an increase of 4.5 per cent over the 1953 figure. This acreage is increasing not only because new herbicides are developed but also because the older ones are being more widely used. 2,4-D is still the most popular herbicide in Minnesota, being applied on 2,674,554 acres of oats, wheat, barley, and flax, and on 254,527 acres of corn. This article deals largely with new developments in herbicides and does not cover all recommendations.

Complete recommendations and discussions of the weed control practices for Minnesota are given in University of Minnesota Agricultural Extension Service Folder 191, "Weed Control in Minnesota for 1955." Write for your copy to the Bulletin Room, University of Minnesota, Institute of Agriculture, St. Paul 1, Minnesota or to your local county agent.

New Uses for 2,4-D

However, new uses for 2,4-D are continually being sought. Recently it has been found that 2,4-D and MCP can be used to control cockleburs in soybeans without reducing the yield. Cockleburs should be sprayed when in the seedling stage with 2 ounces of the amine salt. The least injury to the beans is obtained when the plants are 3 to 5 inches tall. Another new use for 2,4-D is the heavy application of it to control some of the persistent perennial weeds. Recent reports state that fall applications of 2,4-D amine at the rate of 40 to 60 pounds per acre have given good control of Russian knapweed.

Fall or spring applications of 2,4-D amine at the rate of 40 pounds per acre have been used to eliminate leafy spurge. However, more trials are needed before these heavy rates can be recommended in Minnesota.

CMU

Some of the first chemicals that were introduced into weed-control practice were the chlorates and arsenicals. When these are applied at high rates they give complete vegetation control, and many tons are still used each year in Minnesota. Recently CMU has been earning a place in this field.

One advantage of CMU is that it can be effectively applied at much lower rates and therefore is easier to handle. When applied at the rate of 30 to 40 pounds per acre in either fall or spring, complete vegetation control will usually result for two or more years. There are a few pernicious weeds, such as leafy spurge, that are tolerant to this herbicide.

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TCA

Quack grass is one of the more troublesome weeds in Minnesota and it can be effectively controlled by use of herbicides. Since World War II, plant scientists have found that TCA applied at the rate of 22 pounds per acre in the fall after plowing will control this weed. However, care must be taken to plant crops that are tolerant to TCA the next growing season. Normal crops of flax, oats, corn, and alfalfa can be grown after the application of TCA the previous fall. To eradicate quack grass the farmer should either cultivate after harvest or apply a second dose of TCA at 18 pounds per acre.

MH

More recently experiments have shown that MH applied at the rate of 4 pounds per acre on quack grass foliage followed by plowing in 4 to 8 days will give seasonal control of quack grass. This treatment gives the best results in soils that are fertile and are especially high in nitrogen. MH does not leave a toxic residue; therefore, crops may be sown a few days after application.

Dalapon

Dalapon is a herbicide that has recently been put on the market. This is a grass killer that has some advantage over TCA in that it can be effectively applied to the foliage, whereas TCA is applied on the soil and absorbed through the roots. Both Dalapon and TCA are most effective when the grass plants are small. Tolerance of crops to Dalapon is in the following descending order: oat, flax, barley, wheat, and soybeans.

Corn

Only about 5 per cent of the corn acreage in Minnesota is sprayed for weed control. This limited spraying perhaps is due in part to the variable results obtained when using 2,4-D. To control annual weeds with 2,4-D, spray early at rates of ¼ to ½ pound per acre. Use the lower rate when very susceptible weeds, such as cockleburs, are to be controlled or whenever the danger of injury is great. Rates of up to 1 pound may be used for resistant weeds but injury to the corn may occur. The corn may be sprayed during the period from emergence to tasselling. When the corn is large enough, put the spray under the top leaves by means of a drop nozzle.

However, injury to the corn may occur even when sprayed with 2,4-D during the period of emergence to tasselling. This injury is apparently associated with environmental factors rather than stage of growth. This is perplexing to the farmer who can readily see the stage of development of the corn but may have difficulty in evaluating environmental factors affecting growth. If more constant results could be attained, undoubtedly the acreage of corn sprayed for control of broad-leaved weeds would be increased.

Frequently annual grasses are most troublesome in corn. This past season selective sprays of the DNBP type such as Premerge or Sinox PE have shown much promise. Application of 2 to 4 pounds per acre in 20 to 40 gallons of water applied shortly after the corn has emerged when it is still in the spike stage has controlled grassy weeds with no injury to the corn. If the spray is applied later, some burning of the leaves may occur, but this injury does not always reduce yields. These sprays kill those seedling grasses and broad-leaved weeds contacted. Their treatment helps to keep the row clean and substitutes for the first cultivation.

There are a number of other new chemicals being evaluated. Even though we are continually looking for new chemicals to do a better job, we must not neglect to use the present ones to best advantage.

MINNESOTA FEED SERVICE

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Cattle Feeding

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Urea

Urea has come into the feeding picture. It is a synthetic nitrogen compound which can be utilized by ruminants as an extender for natural proteins. Its value is largely in lowering the cost of a mixed protein supplement and, therefore, has a definite place in the feeding of cattle. Urea has been of great help in lowering the cost of protein supplements for cattle and lambs when mixed with the oilmeals and therefore the cost of producing gains.

Molasses

Molasses is of interest from a price standpoint. Six and one-half gallons of molasses is equal in feeding value (and therefore price) to one bushel of corn. A gallon weighs 11.7 pounds. If 6½ gallons of molasses can be purchased for less than a bushel of corn, molasses can be used to advantage in a cattle- and lamb-fattening ration. Molasses is palatable and may be used also to increase the palatability of an untasty ration.

Stilbestrol

Much has been written about the use of stilbestrol, a hormone used in fattening cattle.

Iowa State College tests—feeding corn to fattening steers weighing 600 pounds and more and using a stilbestrol supplement—showed daily gain increases of up to ¾ pound per head. The substance lowered costs of gain 2 to 4 cents a pound and profit per steer was boosted as much as $22. The hormone was fed in a mixed protein supplement at the rate of 5 to 10 milligrams per head daily.

Heifers did well on the same supplement, making gains of 2.4 pounds a day with 10 per cent less cost of gain. They produced choice beef at 19.6 cents per pound. In the heifer group, profits per head were boosted $7.18.

On a high roughage feeding, an extra 75 days full feeding of corn was found necessary to make choice beef. Good results can be obtained with grass or corn stalk silage, when a stilbestrol supplement is added.

Grade yield and finish are not changed by feeding stilbestrol. And carcasses of stilbestrol-fed animals are about the same—no better, no poorer—than those of cattle fed the same ration without stilbestrol.

Key to good results is proper mixing. To safeguard the process, Iowa State College patented the method to control the amounts that could be used in a feed. Feed firms now buy the premix to mix in their feed from a pharmaceutical firm.

An important warning is found on the feed bag of a ration containing stilbestrol: don't take a chance feeding it to dairy cattle, breeding cattle, sheep, or swine. It was developed for use in stimulating growth and fattening of cattle being fed for slaughter. Hormones are powerful substances. Wrongly used, they can have damaging side-effects.

Much remains to be learned about stilbestrol. Its value and limitations are being studied in many trials throughout the country.

The Role of Fats in Feeds

O. H. M. Wilder*

In the short space of a year, animal fat—the by-product tallows and greases of the meat packing and rendering industries—has found its way into a large portion of the manufactured feeds used in this country. About 250,000,000 pounds of animal fats are being used this way annually.

About 2½ billion pounds of tallow and grease were produced in this country last year which were direct by-products of the animals produced on farms. Traditionally, the major use for these fats has been in soap manufacture, while smaller amounts have been used for other industrial purposes and for export. The introduction of synthetic detergents competitive with soap has left a surplus of animal fat which has been estimated at nearly a billion pounds. Raymond H. Ewell, Stanford Research Institute, has indicated that by 1957 there would be an annual surplus of about 1.1 billion pounds if new uses were not found.

In view of the low prices for these fats and their high potential energy value in animal and poultry feeds, experiments have now been conducted in many university, experiment station, and feed manufacturers' laboratories to find out the value and best way to use these materials in feeds.

Animal fats are added to feeds because they improve the nutritional quality of most feeds and improve certain physical characteristics of the feed. These reasons make it economically feasible to add fats to many feeds.

Experiments with Poultry Feed and Dog Food

A series of feeding tests was initiated at the American Meat Institute Foundation to evaluate the use of fats in broiler diets and in dry dog food. A typical broiler ration was made up containing yellow corn, 65.2 parts; soybean oilmeal, 16.0; meat and bone scrap, 8.0; fish meal, 3.0; blood meal, 2.0; corn gluten meal, 2.0; alfalfa meal, 2.0; butyl fermentation solubles, 1.0; fish liver oil, 0.3; iodized salt, 0.5. Aureomycin, choline, niacin, and manganese were also included.

A choice white grease was stabilized with an antioxidant and added to portions of this diet at levels of 2, 4, and 8 per cent. Results of the test showed that fat could be used in modern chick feeds (table 1).

Table 1. Effect of Adding Animal Fat on Feed Efficiency (9-week period)

Per cent fat added	Feed efficiency
None	2.56
2	2.50
4	2.50
8	2.33
Basal + choline and antibiotic + B_{12}	
None	2.50
2	2.38
4	2.38
8	2.27

Rate of growth of these birds was not affected by additions of fat to the diet, but there was a general trend toward a higher feed conversion at higher levels of fat. To show what feed savings could be made up to the broiler stage, the various lots were grouped together and feed consumption calculated to the time the chicks weighed 2½ pounds. These data (table 2) indicate a definite feed saving due to increasing fat additions up to the 8 per cent level.

Table 2. Effect of Adding Animal Fat on the Feed Intake of Chicks Raised as Broilers (2½ Pounds)

Ration	Average feed consumption
	pounds
Basal	6.25
Basal + 4 per cent fat	5.95
Basal + 8 per cent fat	5.75

The use of animal fat in dry dog foods also looked encouraging.

Other laboratories have also been busy studying the use of animal fats in feeds, among them the University of Wisconsin, where M. L. Sunde used several different grades of fats, including choice white grease, yellow grease, brown grease, prime tallow, no. 1 tallow, hydrogenated fat, oleic acid, and stearic acid, each fed at a 5 per cent level. Dr. Sunde reported that all products tested except the hydrogenated fat and stearic acid were effective in improving feed efficiency.

The fats having a high fatty acid con-

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THE ROLE OF FATS IN FEEDING - Continued from page 3

tent appeared to be as effective as the low-acid fats when fed to chicks. Further work with turkey poults indicated also that fats increased feed utilization.

However, the inclusion of brown grease or oleic acid in turkey diets resulted in an approximately 30 per cent incidence of a hock disorder which was not observed in the poults fed the other grades of fats. This work emphasizes the need for using a grade of fat that is properly stabilized with a suitable antioxidant.

Another report from W. E. Donaldson of the University of Maryland indicated that the addition of 5 per cent stabilized yellow grease improved feed conversion. In one test at Maryland, involving 8,000 broilers in a 10-week trial, the use of 4 per cent added fat resulted in a feed saving of 0.08 pound per pound gain in weight, or at least 1,600 pounds of feed saved in the 10-week period.

Egg production appears to be favorably influenced by higher energy rations also. F. W. Hill of Cornell University has reported that adding tallow to hens' diets resulted in a higher egg production in winter and spring months, and the feed requirement per dozen eggs produced was reduced when fat was added to the diet at the 2½ or 5 per cent level.

Other Livestock

Other livestock as well as dogs and poultry appear to benefit by the addition of a certain amount of fat to their diet. Hogs, lambs, and beef cattle have also been used in feeding tests to determine the value of added fat in rations.

Hogs—Researchers at West Virginia University report that the addition of 10 per cent animal fat to their control ration for hogs resulted in an improved rate and efficiency of gain. They reported that the addition of fat resulted in a 14 per cent increased rate of gain, and the feed requirement for each 100 pounds of gain was reduced by 18 per cent. The Florida Experiment Station has reported similar results.

Lambs—The Texas A and M College has reported that gains made by lambs fed 5 per cent fat were $1.33 cheaper per 100 pounds than those of the control lot. This was the result of a greater rate of gain and an 11 per cent greater feed efficiency. Carcass grades of the lambs fed 5 per cent fat were higher than grades of carcasses from lambs fed either the control ration or diets containing more than 5 per cent fat.

Beef cattle—The feeding of fat to beef cattle has resulted in much the same type of results. A test conducted at Texas A and M College indicated that a high-fat ration had a markedly beneficial effect upon feed utilization. Higher fat levels also improved absorption and utilization of dietary carotene.

The University of Nebraska has also reported favorable results from feeding tallow pellets to beef cattle.

Stabilization of Fats

The two chief considerations in selecting a grade of fat for feed use are palatability and stability. Palatability is important chiefly if the fat is fed to dogs, cattle, or sheep; it is probably of lesser importance in feeds for swine or poultry. Stability is important in any fat going into feeds because of a tendency for unstable fat to turn rancid with attendant problems of lesser palatability, odors, and destructive action on certain vitamins.

Stabilization to prevent oxidative rancidity is easily accomplished at the time fats are produced, and once done, they will remain free from rancidity for months. In many cases an unstabilized fat will be perfectly satisfactory, but it is a risk that need not be taken.

Why Fats Are Used

There are other reasons for adding stabilized animal fat to livestock feeds in addition to those that are concerned primarily with nutritional value. Most of the reasons may be summarized as follows:

1. Control of dustiness
2. Increased feed utilization
3. Increased palatability
4. Increased vitamin stability
5. Improved appearance or "feel" of ration
6. Decreased wear of mixing and pelleting machinery
7. Ease of pelleting
8. Favorable price for fats

The cost factor relative to results obtained must always be considered when adding any ingredient to feed. Fats contribute 2.25 times as much energy to a diet as does an equal weight of carbohydrate or protein, so that the relative price that can be paid for fat may be calculated in comparison with the material that it is to replace. Fats in the diets, however, have produced better results than might be accounted for on an energy substitution basis.

There are, however, certain precautions that must be observed in using fats in feeds.

1. Use only fats that have sufficient stability.

2. Consider the nutritive ratio in the finished feed. When energy is increased, the protein should also be adjusted upward. A low level fat addition to a feed will give all the advantages of improvement of physical condition, but if higher levels are to be used, careful attention to nutritive ratio will result in greatly improved feed efficiency.

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