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Roughage Is Basis of Dairy Ration

RALPH W. WAYNE*

A REALISTICALLY planned feed sales program this year must take into full account the abundance of roughage on many Minnesota farms.

The dealer who helps his customers use their roughage to best advantage may not increase immediate sales, but the chances are that he will keep these customers and their patronage will pay off in the future.

Roughage is the foundation of dairy feeding. Not only is the dairy cow admirably equipped to utilize roughage, but she must have large quantities of it in order to be healthy and produce profitably. With larger than usual amounts of roughage being preserved in various forms on many Minnesota farms this year, the problem is how best to make use of this feed.

If the feed is palatable, a 1,200-pound cow will usually eat 12-15 pounds of hay and 40-45 pounds of silage daily. The total nutrients in such a ration are enough to satisfy the needs of the cow's body weight and produce about 20 pounds of milk a day. On good pasture a cow can gather 150 pounds of grass daily, and this will provide nutrients for maintenance and production of about 30 pounds of milk daily.

Cows having ability to produce more than these amounts of milk should be fed about one pound of grain mixture for each two pounds of milk produced over the above-mentioned amounts.

Protein Content Varies

On Minnesota farms homegrown grains make up the major part of the grain mixture, which is often supplemented with high protein concentrates. The protein content of these grain mixtures should be varied according to the kind of roughage fed:

1. Where legume hay or legume silage or both make up the roughage, any homegrown grain is all that is needed for a grain mixture. This is also true where corn silage is limited and up to 20 pounds of good legume hay is fed daily.

2. Where legume hay in usual amounts, along with corn silage, makes up the roughage, homegrown grains are satisfactory for average production. Some high protein concentrate should be fed to high-producing cows.

3. Where mixed grass and legume hay and corn silage are fed, the grain mixture should contain one part of high protein concentrate for each four or five parts of homegrown grain; or a 16 per cent crude protein, ready-mixed feed may be fed.

4. Where grass hays are fed—either with or without corn silage or corn fodder—the grain mixture should contain one part of high protein concentrate for each three parts of grain. A 20 per cent ready-mixed feed may also be used.

For all practical purposes homegrown grains—corn, oats, barley—have about equal feed value on a pound basis. Most farmers will feed what they have raised, and this will vary in different areas.

Cows Need Less Variety

The feeding of dairy cows is much less complicated than for one-stomach animals like pigs. In the rumen the cow can split up protein and recombine the components into the protein she needs. Therefore, variety in a cow's ration is of less importance than with other animals.

The main point is to feed her enough total digestible nutrients with sufficient total protein. She can switch these raw materials around to meet her needs. Therefore, where a dairyman wants to supplement homegrown grains, he usually gets the cheapest ration by buying the feed furnishing the greatest amount of digestible protein at a given cost.

Vitamin deficiency in dairy cows is rarely seen, as their vitamin needs are usually taken care of by sunlight, rumination, and the feeds ordinarily provided.

Feeding of legume hay prevents calcium deficiency. It may be necessary to provide some mineral such as bone meal, which is rich in available phosphorus, if roughages are grown in phosphate-deficient soil. Feeding iodized salt provides both sodium chloride and iodine.

Breed Affects Production

While low performance of dairy cows may be due to poor feeding, lack of care, or disease conditions, it is well to keep in mind that the breeding or inherited ability to produce may actually be the prime cause of low production.

To be profitable, dairy cows should produce at least 300 pounds of butterfat a year. With our state average of all milk cows at only 200 pounds, it can be seen we have a long way to go.

In contrast, the 3,000 herds in Minnesota Dairy Herd Improvement Associations averaged 358 pounds last year, with several hundred herds going over 400 pounds average. This shows what can be done by following sound practices with well-bred cows. A cow producing 400 pounds of butterfat a year returns five times as much per hour of labor spent taking care of her as does a 200-pound producer.

Profitable dairy farming depends first on having cows with inherited ability to produce, and second on feeding and caring for them so they can produce to the limit of their ability. A great number of cows with good breeding never produce to this limit because of inadequate feeding and care.

If we can help owners of such herds to improve their practices, they will increase their income and will feel that money spent for feeds is a good investment.

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Find Soil Needs Through Tests

PAUL M. BURSON*

If a farmer writes a check, regardless of the amount, he knows how much money he has in the bank both before and after writing it. On the other hand, when he gets ready to plant his crop, it is quite likely that he will give very little thought to the plant food balance in the soil. Nor in many cases will he give much thought to the quantity of plant food that will be withdrawn from the soil bank by the proposed crop.

In one case we have the bank cashier to watch the bank balance and not let the account be overdrawn. In the other case a more exacting worker, Mother Nature, is always present to prevent the farmer from allowing the plant food balance in the soil to be seriously overdrawn.

This brings to attention a widely-discussed technique to solve soil problems—the proper fertilization of agricultural crops.

Crops Need Nutrients

The way to profitable yields could be stated as a mathematical formula: application of the right grade and amount of lime and fertilizer + constant watching for hunger signs during the growing season + good soil management = high yields per acre.

The soil test is the basic tool to guide the farmer in finding the relative level of available plant foods in the soil. That information, along with the plans for the crop or rotation to be grown next on the soil, is a concrete yardstick for lime and fertilizer recommendations for particular crops on particular soil conditions.

The Division of Soils at the University of Minnesota has been testing soils for farmers for many years, and in the fall of 1949 a state soil testing laboratory was established at University Farm to meet the increased demand for soil tests. This program was set up with four main objectives:

1. to serve the individual farmer.
2. to guide and serve the limestone and fertilizer industry.
3. to aid in research by locating soil problems.
4. to assist in the Extension Educational Program in Soils.

The soil testing program in Minnesota is unique since this is the only state where the lime and fertilizer industry is a definite part of the program. The county agent is in charge of the program in each county, and he cooperates with the local fertilizer dealers to establish a soil collection depot at some dealer's store. These depots provide the farmers with soil sample information sheets and with containers in normal times, but because of the present emergency and shortage of paper it is almost impossible to maintain a supply of these containers.

Dealers Can Serve Farmers

Dealers who are interested in helping the farmers in their communities to get the right kind of fertilizer are of real service and the Minnesota program is serving as a guide to these fertilizer dealers in selecting suitable grades of fertilizers for the soils in their communities. Many dealers in fertilizer and lime write to the soil testing laboratory for this assistance.

Since the soil testing laboratory started a year and a half ago 19,080 samples have been tested, coming from every county in Minnesota. The results of the tests so far show that phosphate is generally needed throughout the state, but this is not true for potash.

Potash Requirements Varied

Potash needs vary in the various soil association areas. Along the western edge of the state and in the Fayette-Tama soil association in the southeastern part of the state less than 10 per cent of the samples tested "low" potash. In south-central Minnesota and along the light soils of the eastern edge of the Red River Valley 10 to 20 per cent of the samples tested "low" potash. In the Carrington-Clyde soil association in the vicinity and north of Austin, 20 to 30 per cent of the samples tested "low" potash. In northcentral and northeastern Minnesota over 30 per cent and up to 60 per cent in some cases tested "low" potash.

To simplify the interpretation phosphate and potash tests are read as low, medium, or high. Applying a phosphate fertilizer on soils that are low or medium will affect all crops if all other nutrients are present in sufficient amounts.

A fertilizer containing potash applied to soils which are low or medium in phosphate will affect crops such as potatoes, sugar beets, truck crops, and old fields of alfalfa. Potash generally will not affect other crops which test medium but will if the tests show low.

Lime Needed in Some Areas

The need for lime is one of the main problems in parts of Minnesota where an attempt is being made to establish and hold legume crops such as alfalfa and sweet clover. In the eastern third of the state where lime is needed there are still many farmers who either have not limed or have not applied enough.

Through the southern two tiers of counties in the state many areas have been found to be low on lime, and in these areas legumes are difficult to establish and hold. However, lime is not generally recommended in this area. Further study needs to be made, for good reports have been received in a few cases where farmers have limed.

So it can be seen that soil testing pinpoints the problem in the certain field or on a certain soil condition; it makes general recommendations specific. And by passing on these specific recommendations limestone and fertilizer dealers can be of good service to their farmers.

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Send Samples Now to Soil Test Laboratory

Now is the time to take soil samples in order to determine your lime and fertilizer needs for next year.

It appears that the phosphate supply will not improve in 1952. Farmers will need to place orders as soon as possible for all kinds of fertilizer and take early delivery to get the grade they need.

For information on how to take a soil sample, see your county agent or fertilizer dealer. A charge of 50¢ is made for each sample sent to the testing laboratory at University Farm. This fee should accompany the sample.

About 10 days is usually required for analysis and forwarding of fertilizer recommendations to the farmer.

Experiments Show Effects of Arsenicals

LAWRENCE E. CARPENTER*

Growth stimulants are taking on an increasingly important role in stepping up hog performance. It is only during the past few years that we have put into widespread practice much of the knowledge that has been gathered on the use of proteins, vitamins, and minerals. And even today there are probably facts on nutrition still undiscovered that will play a major role in swine feeding in the future.

Just as we are beginning to recognize the value of past discoveries to the individual swine producer we find many new substances that do not seem to have any nutritive value but do help growth. Among these new materials are some of the arsonic derivatives, also called arsenicals.

The effect of arsonic acid was first demonstrated in 1946 by workers who observed that one arsonic acid, 3-nitro 4-hydroxy phenyl arsonic acid, stimulated the growth of chicks when added to drinking water. This work was confirmed by demonstrations that some closely related arsenicals helped growth, and in 1949 it was found that the 3-nitro compound hastened growth in turkey poults.

Tests Applied to Pigs

We at the Hormel Institute have been interested in applying these findings to weaned pigs. In doing so we have conducted several tests in which 3-nitro 4-hydroxy phenyl arsonic acid has been added to swine diets. The results of two of these tests are given in table 1—in each case the pigs fed the 3-nitro compound gained faster and made better use of the feed than the control pigs. The pigs fed the diets containing the arsenical also appeared more thrifty and had smoother and glossier haircoats than the control pigs.

It was noticed in the first experiment that the pigs fed the arsenical at levels of 0.01 and 0.02 per cent of the diet developed sensitive feet, an unnatural walk, and irritability to the touch. If the arsenical was removed from the diet the symptoms disappeared in a short time. However, if the arsenical was continued at the high level the symptoms increased until the pigs lost control of their rear quarters and also could not control urination. None of the pigs fed a low level of the arsenical developed any of these symptoms.

Although only a small amount of arsenical was fed it seemed desirable to find how much arsenic was stored in the tissues of swine fed the 3-nitro compound. The results of one test are listed in table 2 showing that the arsenic stored in the liver and kidney quickly disappeared after the arsenical was removed from the diet. Within one week the arsenic content of the liver approached normal. The amounts of arsenic in muscle tissues (such as ham and loins) of both the arsenical-fed and control hogs were too small to be determined accurately. During the first 12 days of the test the control pigs gained an average of 17 pounds, compared to 25 pounds for the pigs fed the arsenical.

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Size of Litters Increased

What would happen if the arsenical were fed when sows are pregnant or are suckling their young? In order to answer this question we conducted a test on 12 sows, feeding them the arsenical at a level of 0.00375 per cent during the complete gestation and lactation period, and comparing their farrowing and lactation records with control dams. The test sows farrowed slightly larger litters than the control sows but the size of the pigs at birth and the number of dead pigs farrowed were the same for both lots. No bad effects were noted during the lactation period; in fact the weaned pigs from test dams were slightly heavier than those weaned by the control dams.

Our studies at the Hormel Institute agreed with the claims that arsonic acids other than the 3-nitro compound stimulated growth but showed that not all derivatives tested were effective.

Cause of Growth-Aid Unknown

What happens when the 3-nitro compound is fed is not known. Because it was found that the compound is not a nutrient, the theory has been offered that instead it has some effect on the flora in the intestines, making these flora more helpful to the animal.

It is important to point out that anyone thinking of using any growth stimulant must consider the conditions under which it will be used. Like the antibiotics the 3-nitro 4-hydroxy phenyl arsonic acid will not help growth under **all** conditions and the amount of growth will probably depend on the environment.

The above remarks were based on observations on the swine herd and the environmental conditions that exist at the Hormel Institute, and it should be pointed out that here the amount of growth varied from one test to another. Another warning should also be given: one should not be misled by the term arsonic acid derivative, for there are very many such derivatives and only a small number of them have been tested on swine. Of these, the one that has been studied most is 3-nitro 4-hydroxy phenyl arsonic acid.

Table 1. The Effect of 3-Nitro 4-Hydroxy Phenyl Arsonic Acid on the Growth of Swine

Lot no.	Diet supplement	Number of pigs: Start	Number of pigs: Finish	Average daily gain	Feed consumed per pound of gain
	Experiment 1 (four weeks)			pounds	pounds
1	None	10	10	0.45	5.39
2	Arsenical, 0.005%	10	10	0.67	3.15
3	Arsenical, 0.01%	10	10	0.73	3.38
4	Arsenical, 0.02%	10	10	0.75	3.10
	Experiment 2 (nine weeks)				
5	None	10	10	0.75	6.66
6	Arsenical, 0.01%	10	9*	1.20	3.60

* One pig developed piles and was removed from lot.

Table 2. The Storage and Elimination of Arsenic from the Livers and Kidneys of Swine Fed a Diet Containing 0.005 Per Cent 3-Nitro 4-Hydroxy Phenyl Arsonic Acid

Number of pigs	Days off test	Average As_2O_3 content of fresh tissues: Liver	Kidney
	Controls	ug/g	ug/g
10	.....	0.19	0.05
	Test animals		
5	0	1.69	1.32
5	2	0.49	0.61
5	5	0.61	0.44
5	7	0.29	0.46

Mange Cuts into Hog-Producers' Profits

HENRY J. GRIFFITHS*

Every year swine raisers throughout the country lose large sums of money because of a contagious skin disease of hogs known as mange.

Actual losses in terms of dollars and cents cannot be accurately calculated, but it is well known that mangy hogs become stunted, fattening is delayed, gains per pound of feed are greatly reduced, and sometimes death occurs.

Two Types of Mange Found

Two forms of hog mange are found in the United States, the type known as sarcoptic mange and the less common type known as demodectic mange. They are caused by different types of mange mites.

Sarcoptic or common mange is caused by the mite known as *Sarcoptes scabiei var. suis.* These mites are extremely small though just visible to the human eye; the adults are about 1/50 of an inch long. The entire life cycle of this mite is spent on its host, and as a general rule the mites do not live long if separated from the living animal. In burrows just below the skin surface the female mite lays from 20-25 eggs. These eggs hatch in from 3-10 days; the young mites soon make new burrows and when mature begin laying eggs.

Mange lesions often seem to appear first on the head of the hog—around the eyes, nose, or ears—where the hair is thinnest. From these areas they spread to the neck, shoulders, back, and sides. The mites cause much irritation and itching—a constant annoyance to the host.

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As the condition progresses serum oozes from the irritated areas, this dries, and hard granules or scabs are formed. The skin finally becomes markedly thickened, and deep folds appear.

A positive diagnosis of sarcoptic mange is made by finding and identifying the mites which are the sole cause of the disease. Material for examination is obtained by making deep skin scrapings of the affected areas and examining this material for the presence of mange mites under a microscope or good magnifying glass. If the findings are negative on the first examination it is very important that the examination be repeated.

Contact Spreads Disease

The chief way this condition is spread is through contact between diseased and clean animals, though it is possible to pick up the mites from infested quarters. The same mites that frequent hogs are also known to attack man and although they may only live for a short while on the human host, they may produce lesions that persist for several weeks and cause much discomfort.

Mange in swine is most prevalent during the winter months—especially in animals kept in close contact and in dark, overcrowded quarters. The disease does not seem to be much of a problem to well-nourished, healthy hogs kept outside in the sun during the summer. Mange spreads most rapidly among young and undernourished animals, though older hogs are often badly infested.

The treatment of swine infested with sarcoptic mange consists of killing the mites on or under the skin without causing any harm to the animals. A number of different dips and sprays are available. When treatment is undertaken the **entire** herd should be treated, not just those animals which appear mangy. The hogs should be dipped or sprayed during mild and warm weather. If the weather is too cold, spread of the disease may be checked temporarily by applying the dip by hand on the most severely infested animals.

Materials for Control Listed

Some common materials used for the control of hog mange are these: crude petroleum, crankcase oil, lime sulfur dips, benzene-hexachloride, and lindane and chlordane sprays. Of these, lindane and chlordane are the most effective against this mite.

A second but not so common form of mange is also caused by a mite—known as *Demodex folliculorum;* the disease is known as demodectic or follicular mange. This mite is cigar shaped and only 1/100 of an inch long. In small numbers demodectic mange mites do not appear to do much damage but the type of mange they cause may spread rapidly.

The lesions are first seen in the form of pimples or small hard nodules seen around the eyes, snout, neck, or belly, or between the hind legs. These nodules may be quite small or grow to the size of a pea. If they are squeezed they yield a creamy-white, cheesy material in which many mites usually are found. Treatments recommended are usually the same as those used for sarcoptic mange, though there is no known treatment that will readily clean up demodectic mange in swine.

DATES TO REMEMBER

The following events of interest to the feed trade are sponsored wholly or partly by the University of Minnesota. News of other events of interest to feed dealers may be found in trade publications.

Sept. 12-15—National Barrow Show, Austin

***Sept. 17-18—Animal Nutrition Short Course, University Farm**

***Sept. 21—Swine Feeders' Day, University Farm**

Sept. 26—Livestock and the Land Institute, Albert Lea

Oct. 8-11—Junior Livestock Show, South St. Paul

* Details are available from the Office of Short Courses, University Farm, St. Paul.

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