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Feeding Small Grains to Live Stock

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COLLEGE OF AGRICULTURE
UNIVERSITY OF NEBRASKA

This publication was prepared with the thought that with prevailing conditions, the interest in feeding small grains to livestock in Nebraska during the summer of 1935 probably would be greater than ever before.

No attempt has been made to present the information contained in this circular in a technical way. In its preparation the work of the Nebraska Experiment Station at Lincoln and that of the substations at North Platte, Scottsbluff, and Valentine has been freely used. In addition, work done at the experiment stations of Illinois, Indiana, Ohio, Wisconsin, Michigan, Minnesota, Iowa, Missouri, Kansas, South Dakota, North Dakota, Colorado, Wyoming, Montana, Idaho, and Washington as well as information summarized in Henry and Morrison's admirable work, "Feeds and Feeding", has been considered.

The University of Nebraska Agricultural College Extension Service
and United States Department of Agriculture Cooperating
W. H. Brokaw, Director, Lincoln

Feeding Small Grains to Live Stock

M. L. BAKER, W. J. LOEFFEL, AND W. W. DERRICK *

Because of its outstanding importance as a crop and because of its nutritive qualities, corn is the standard by which all feed-grains are measured in Nebraska. It is true that corn is relatively low in protein and that its protein is not well balanced. It is also deficient in mineral matter, especially calcium. On the other hand it is relished by all classes of live stock, it is high in digestible carbohydrates and fats and consequently in energy value, and it is usually relatively cheap and available.

At times, price conditions or relative availability make it advisable to consider the place of other grains in the feeding of live stock in Nebraska. Wheat, oats, barley, and rye are of greater or less importance in the different sections of the state. In recent years, proso or hog millet has attracted some attention in western Nebraska because of its adaptability as a catch crop.

Although these grains vary from corn and between themselves in certain respects, it should be remembered that they are all carbonaceous feeds lacking in protein, in the quality of their proteins, and in mineral matter. For satisfactory results with them, these deficiencies must be taken care of by other feeds in the live stock ration.

WHEAT

Compared with corn, wheat contains more protein, slightly more digestible carbohydrates, but much less fat. It is also low in mineral matter but does contain somewhat more calcium and phosphorus than corn. Like corn, its protein is not well balanced and for best results wheat must be properly supplemented to correct its protein and mineral deficiencies.

WHEAT AS A CATTLE FEED

Wheat is not as well liked as corn by cattle and when fed as the sole concentrate, only about 85 to 90 per cent as much grain will be eaten as if corn is fed. At the same time more roughage will be consumed by the cattle fed wheat. Wheat has a slightly higher nutritive value for cattle than corn and when fed with a full feed of roughage will produce as large or approximately as large gains as corn. Cattle fed on wheat do not carry quite as much finish as similar cattle fed corn although for a three-year period at the North Platte Substation in which calves were fed for approximately 200 days, calves fed ground wheat and alfalfa hay sold as well as those fed shelled corn and alfalfa hay.

Gains made on ground wheat are economical. As an average of the three trials mentioned above, 8 6/7 bushels of shelled corn and 243 pounds of alfalfa hay were required for each 100 pounds of gain when shelled corn was fed, and 7 bushels of ground wheat and 275 pounds of alfalfa hay when wheat was fed.

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Wheat is rendered more palatable for cattle by mixing it with certain other concentrates. For example, in work done at the Nebraska Station, a mixture of one-third ground wheat and two-thirds shelled corn was consumed in greater quantities and produced larger gains at a smaller feed requirement per unit of gain than shelled corn. Several stations, including the North Platte Substation, have found that from the standpoint of gains, economy of gains, and finish of the cattle at the close of the feeding period, a mixture of equal parts of ground wheat and corn is equal to or superior to corn alone. The Kansas Station reported that a mixture of one-third ground corn and two-thirds ground wheat was fully equal to corn alone for yearling steers.

A mixture of equal parts of shelled corn, ground wheat, and ground oats was found by the Illinois Station to be slightly better than equal parts of corn and ground wheat and considerably better than shelled corn alone. A mixture of ground wheat and ground oats produced smaller gains than a mixture of equal parts of ground wheat and corn or the mixture of equal parts of corn, oats, and wheat mentioned above. At the Missouri Station, more grain was eaten and slightly greater gains were made when approximately one-third ground oats was substituted for ground wheat. A mixture of equal parts of ground barley and ground wheat was approximately equal to ground wheat for fattening calves at the Minnesota Station. At the Montana Station, a mixture of equal parts of ground wheat, ground oats, and ground barley produced more gain than a ration of ground wheat and produced such gains more economically. More than thirty years ago, the Nebraska Station reported that wheat had a five per cent greater value for fattening cattle than corn when a ration of 20 per cent bran and 80 per cent ground wheat was compared with a similar mixture of bran and ground corn. It is probable that not more than 20 per cent of the concentrate ration for fattening cattle should consist of bran regardless of the price at which it can be bought. If ground or chopped alfalfa is available, mixing it with ground wheat would doubtless improve the palatability of the ration.

Where grain is fed to cattle in smaller amounts than a full feed, there is every reason to believe that ground wheat is fully equal to or superior to corn. As a supplement to carbonaceous roughages for wintering cattle, two pounds of ground wheat is equal to from three-fourths to one pound of cotton seed cake.

In feeding mixtures containing ground wheat, it is necessary that care be taken to secure an even mixture to avoid the possibility of an animal getting a heavy feed of wheat when not accustomed to it. The value of mixtures containing oats or barley will vary with the amount of fiber contained in these grains. In getting cattle up to a full feed of ground wheat, it is advisable to do it carefully as the general opinion is that wheat is difficult to feed to cattle. In the three years' work at the North Platte Substation, no digestive troubles were caused by wheat but it is perhaps as well to err on the side of caution.

Wheat should be ground as coarsely as possible for cattle and fed with alfalfa hay, some other legume hay, or with a carbonaceous roughage supplemented by a protein-rich concentrate such as cotton seed meal. It is also probable that if carbonaceous roughages are used, the ration will be improved by the addition of 1/10 pound of ground limestone per head per day.

WHEAT AS A FEED FOR HOGS

Wheat has long been regarded with favor as a feed for hogs when its price relationship with corn permitted its use. Like corn, for its most efficient utilization by hogs, wheat should be fed with a high-protein concentrate such as tankage. Hogs fed wheat, particularly in the dry lot, do not require as much tankage as similar pigs fed corn.

As a rule pigs fed wheat consume more grain than similar pigs fed corn. They also make larger and more economical gains. This seems more likely to be true in dry-lot feeding than on pasture. Coarsely ground wheat varies in value for fattening hogs from equality with shelled corn pound for pound to as much as ten per cent greater value than corn.

It is usually considered advisable to grind wheat for hogs. This is apparently true when hand feeding is practiced. In one trial at the Nebraska Station in which wheat was self-fed, grinding increased its efficiency only four per cent above that of the unground wheat. Soaking wheat has been a popular substitute for grinding. It is doubtful if soaking wheat pays for the labor involved.

For breeding hogs which are otherwise properly fed, wheat may be substituted for an equal amount of corn.

WHEAT FOR SHEEP

Wheat may be used to replace an equal amount of corn or other grain in the ration for breeding sheep. It may also be fed to fattening lambs. Compared with No. 2 shelled corn, whole wheat is about 85 per cent as efficient based on the feed required per unit of gain. In trials at both the Nebraska Station and the North Platte Substation, lambs finished on whole wheat and alfalfa hay sold at the same price as lambs fed shelled corn and alfalfa hay. The corn-fed lambs produced slightly more desirable carcasses and especially in the North Platte trials were more uniformly finished. A mixture of whole wheat and shelled corn is intermediate in value between shelled corn and whole wheat.

Ground wheat is not as well liked by lambs as whole wheat and is not as easy to feed, but it is slightly more efficient. In the Nebraska trials mentioned above, the conclusion was drawn that grinding wheat for lambs was profitable if 100 pounds of wheat could be ground for less than the value of 6.8 pounds of wheat and 8.4 pounds of alfalfa hay. In the same trials it was found that a mixture of equal parts of ground corn and ground wheat or of 25 per cent ground corn and 75 per cent ground wheat was as valuable for fattening lambs as shelled corn. In order to feed these mixtures profitably, wheat must be enough cheaper than corn that

the difference in the cost of 50 pounds of these two grains in the first case and 75 pounds in the second case will pay for grinding the mixture of 100 pounds.

WHEAT AS A FEED FOR HORSES

For horses wheat should be rolled or crushed if possible. Otherwise it may be coarsely ground. In either event it should be mixed with oats, bran, or cut hay to avoid digestive troubles and to render it more palatable.

OATS

Oats are particularly prized for breeding stock and for young growing animals because of their high protein content, the excellence of their protein, and their high mineral content. Their high fiber content, which may vary from as low as 10 or 11 per cent in the better grades of oats to as high as 20 per cent in the poorer grades, is objectionable from the standpoint of the fattening ration. Because of the high price per pound which usually prevails for oats, they cannot often be profitably used except as a part of the concentrate ration. In recent years considerable interest has been shown in hulled oats but their high cost discourages their extensive use.

OATS AS A FEED FOR CATTLE

Oats are highly prized as a part of the calf ration. For creep-feeding calves, a mixture of oats and corn makes a desirable ration. Because of the bulkiness of the oats the calves learn to eat them readily and there is less danger of digestive troubles when calves are creep-fed under pasture conditions than if the ration consists entirely of corn or some other heavy concentrate. Even so, from a review of such literature as is available, it seems probable that not more than one-fourth to one-third the ration should consist of oats. For fattening cattle not more than the same proportion of oats should be included in the ration. Fed in this proportion, good ground oats are probably worth as much or about as much per pound as shelled corn. When fed in greater amounts, the value of oats in the fattening ration goes down rapidly because they tend to produce growth rather than finish.

As a supplement to prairie hay for wintering calves, work at the Valentine Substation indicates that two pounds of whole oats are about equal to three-fourths of a pound of cotton seed cake.

OATS AS A FEED FOR HOGS

When not too high in price, oats constitute a valuable addition to the ration of pregnant sows up to one-third the ration and they may be fed satisfactorily up to one-half the ration. Oats are highly prized as a part of the grain ration for growing pigs and for developing breeding stock. Interest in the use of oats for fattening hogs has greatly increased during the past few years. According to the Illinois Station, they cannot be used for more than one-fourth to one-third the ration without retarding gains and increasing the feed requirement per unit of gain. Oats should be ground for hogs as they are worth not more than three-fourths as much whole as when ground.

OATS AS A FEED FOR SHEEP

Oats make an excellent grain ration for breeding sheep. For fattening lambs, the value of oats as reported by the different experiment stations varies greatly, probably due to differences in the weight and quality of oats produced in different sections of the country. Under Nebraska conditions, it is probable that oats should comprise not more than one-third the grain ration for fattening lambs except when lambs are being started on feed. Even in this proportion oats are worth probably not to exceed 80 per cent of the value of shelled corn pound per pound for fattening lambs. It is not necessary to grind oats for sheep.

OATS AS A FEED FOR HORSES

Oats are generally recognized as the standard concentrate for horses. Because of their bulk, they are considered safer to feed than the other cereals. For colts they should be crushed or ground. For mature horses, oats are usually fed whole.

BARLEY

In general characteristics barley falls between oats and corn. It contains less digestible crude protein than oats but more than corn. It is higher than oats in carbohydrates but lower than corn. Like oats, barley varies a great deal in feeding value with variations in its fiber content and in its test-weight per bushel.

BARLEY AS A FEED FOR CATTLE

In some sections of the United States barley is used extensively for feeding cattle. It should be crushed or ground for cattle. Cattle gain about as rapidly on barley as on corn but require somewhat more grain per unit of gain. The value of ground barley for fattening cattle seems to be about 95 per cent that of corn pound for pound. As most of the experimental work with barley has been done in regions where corn is likely to be of poor quality it may be that 95 per cent is too high a value to ascribe to barley under Nebraska conditions. It should be noted also that there is a greater tendency to "grain bloat" when barley is fed than when corn or wheat is fed. This difficulty is more pronounced while cattle are being brought to a full feed than after they are on full feed. There is some indication that there is less danger of "barley bloat" if cattle are first brought to a full feed on some other grain and then switched to barley. It is suggested that when mixtures containing barley are fed that care be taken to mix the barley evenly with the other grains.

For wintering cattle on carbonaceous roughage, two pounds of ground barley will replace from three-fourths to one pound of cotton seed cake.

BARLEY AS A FEED FOR HOGS

For breeding hogs, ground barley is worth probably about as much pound for pound as shelled corn. For fattening hogs, work at the Nebraska Station indicates that ground barley is worth from 83 to 88 per cent as much as shelled corn when fed with a high-protein supplement. Ground

barley is about five per cent more efficient for fattening hogs than whole barley. Soaking barley for hogs is not advisable.

Hogs are made sick when fed scabby barley. Since it apparently does not affect cattle or sheep injuriously, scabby barley should be utilized for these animals rather than for hogs.

BARLEY AS A FEED FOR SHEEP

Barley is a standard lamb feed in many of the western states. Gains are almost as large as when corn is fed but more grain is required per unit of gain and lambs fed on barley are not, as a rule, as well finished as those fed on shelled corn. After feeding barley extensively, the Scottsbluff Substation concluded that it was worth approximately 75 per cent as much pound for pound as shelled corn for feeding lambs. Barley should not be ground for sheep.

BARLEY AS A FEED FOR HORSES

Barley should be crushed or ground for horses. Care should be used in feeding barley to horses until they become accustomed to it.

RYE

Rye resembles wheat closely in composition. It has not been fed extensively in an experimental way until recent years except to hogs and opinions as to its feeding value vary greatly. Rye containing appreciable amounts of ergot should not be fed to pregnant animals.

RYE AS A FEED FOR CATTLE

Rye should be ground as coarsely as possible for cattle. At the North Platte Substation, fed as the only grain to fattening calves for approximately 200 days, ground rye produced approximately as rapid gains as shelled corn and produced these gains economically. The rye-fed calves lacked finish and attractiveness when compared with the corn-fed calves. It was apparent that after about four months corn should have been added to the ration in order to secure a desirable finish. A mixture of equal parts of ground rye and shelled corn was approximately equal to shelled corn in every respect when fed in the same trials. Calves fed ground rye will eat about as much grain as if fed ground wheat and will gain about as well. They do not carry quite as much finish as calves fed wheat,

Two pounds of ground rye fed with carbonaceous roughages to wintering cattle replaces from three-fourths to one pound of cotton seed cake.

RYE AS A FEED FOR HOGS

Rye has not proved entirely satisfactory when fed to hogs in a dry lot even when supplemented by a mixed protein supplement containing green alfalfa hay. The reason for this is not apparent but the fact remains. After a variable period of usually from two to three months on rye in the dry lot, pigs become listless, lose their appetite, and begin to lose flesh. If continued on the ration some pigs will die. Pigs are not affected equally.

Usually there are some which will make good gains but none present the sleek, attractive appearance shown by pigs finished on corn.

Mixing ground rye with an equal amount of corn results in improved thrift and in increased gains on the part of the hogs. Fed in this proportion, ground rye is worth from 80 to 85 per cent as much as shelled corn for fattening hogs. It is an interesting observation that when pigs are fed shelled corn and ground rye free choice, that they will eat more rye than corn. The greater rye consumption results, however, in lowered gains when compared with those made by hogs fed the mixture of equal parts of corn and rye.

Rye is much more satisfactory when fed to hogs on pasture than when fed in dry lot. In several trials at the North Platte Substation, pigs on pasture ate less tankage and more grain when fed ground rye than similar pigs fed shelled corn. The rye-fed pigs gained approximately 90 per cent as much as the corn-fed pigs. In these trials ground rye was worth 83 per cent as much as shelled corn. Hogs self-fed whole rye on pasture gained as rapidly as hogs fed ground rye under similar conditions, but ate more grain so that the whole rye was worth only about 86 per cent as much as ground rye or slightly more than 70 per cent as much as shelled corn.

RYE AS A FEED FOR SHEEP

Rye is more satisfactory for fattening lambs than for hogs. At the Minnesota West Central Station, whole rye was approximately equal to whole wheat or barley for fattening lambs. At the North Platte Substation, whole rye was fully equal to or slightly superior to whole wheat for fattening lambs when fed with alfalfa hay, or approximately 90 per cent as valuable as shelled corn. A mixture of equal parts of shelled corn and whole rye was very little better than whole rye in these trials. It is not necessary or advisable to grind rye for sheep.

RYE AS A FEED FOR HORSES

Rye which is free from ergot may be fed to horses if crushed or ground and mixed with oats, bran, or chopped hay, or other bulky feeds.

PROSO OR HOG MILLET

Proso is not of great importance in Nebraska but has attracted some attention because of its adaptability as a catch crop. The seed is small and hard and should be ground or crushed. Values assigned to proso as a live stock feed vary greatly, probably because of the varying quality of corn with which it has been compared. In tests at the North Platte Substation, it was 83 per cent as efficient as shelled corn when fed with tankage on sudan grass pasture to fattening hogs. It apparently has about the same efficiency as a feed for fattening lambs and probably a somewhat lower value for cattle.