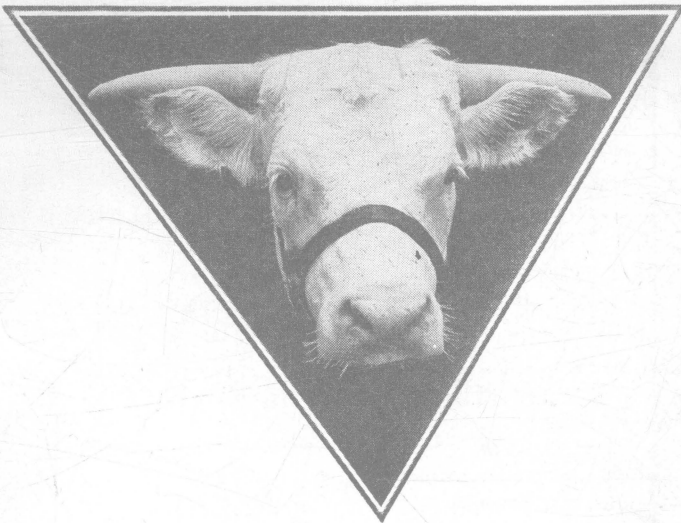


No. 130

BULLETIN
OF THE
AGRICULTURAL COLLEGE EXTENSION SERVICE, THE OHIO STATE UNIVERSITY

Revised JUNE, 1942

Beef Cattle Feeding



Prepared by

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RAISING BEEF CALVES. Extension Bulletin 209.

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The following bulletins may be obtained from the Agricultural Experiment Station, Wooster.

MOLASSES IN RATION FOR FATTENING CALVES. Bulletin 463.

BI-MONTHLY BULLETINS NOS. 149, 151, 152, 166, 173, and 175 contain references to Cattle Feeding.



Ask Your County Agent to Help You with Your Livestock Problems

Beef Cattle Feeding

QUESTIONS OF GENERAL INTEREST TO FEEDERS

TIME TO BUY AND SELL

THE PRICE on the top grades of fat steers usually rises to a high point in the late summer or fall months. While this does not occur every year it is the average tendency of the market, because there are comparatively few well-finished cattle reaching the market at that particular season. On the other hand there is a high proportion of top grade cattle reaching market in the late winter and spring months most years. Heavy runs of grass cattle in the late summer and fall months usually depresses the price of the lower grades of slaughter cattle at that time. This depressed price, however, does not apply to the top grades of feeder cattle, coming off grass ranges at that same time.

The scarcity of thin cattle or plain grades of cattle during the late winter and spring months results in a higher market price for such cattle during that period. The accompanying chart indicates these differences quite clearly, and points out the fact that normally spring months are a poor time to have choice or prime fat cattle ready for market. But on the other hand it also illustrates the fact that common and medium grades sell to their best advantage during this very same period, and in some years the price lines of the lower grades of slaughter cattle and those of the top grades are very close together. Actual instances have been seen on the market when common cattle sold within 50 cents per 100 of the top grades on a given day. This, of course, meant that such common cattle were carrying a

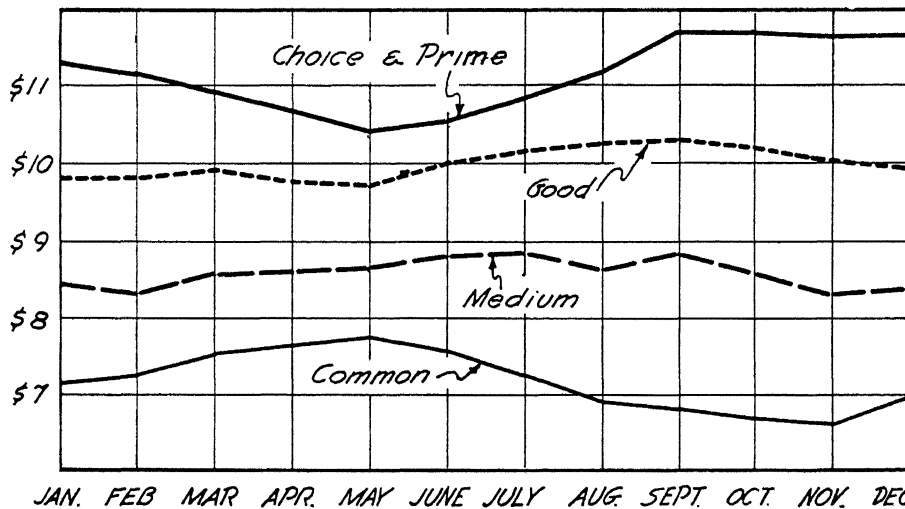


Fig. 1.—Average price of slaughter steers at Chicago, 1922-1940. The top grades of steers have averaged highest in price in the fall and early winter months, while common steers were highest in late winter and spring months.

good finish and would dress out a high percentage of meat in accordance with live weight.

Therefore, for best results the finisher of top grades of steers should aim at a late summer or fall market, while the man who wants to market his cattle in the spring as a rule is taking less risk if he feeds the plainer grades.

The customary high prices on choice and prime fat steers during the autumn months have a tendency to influence many cattle feeders to buy high quality cattle regardless of the time they expect to have them finished and marketed.

The veteran feeder does not look at the matter in this light, but rather considers the time his cattle will be ready for market and the price his particular grade is likely to bring at that season of the year. He fully realizes that if he is to make the best returns on good quality feeders purchased in the fall, they will have to be held through a 10 or 12 months' feeding period and be finished for market about the same general season as when they were bought, in order to hit the autumn price rise.

The feeder buyer, when going on the market in the fall, should consider the average price of all grades of cattle as represented by the four lines in the chart, rather than be misled by thinking only of the top price as represented by the upper line. Feeder cattle salesmen find the top price on choice and prime cattle a good talking point to help them in making sales. The wise buyer of feeder cattle will discount the extreme market top at the time he is buying, and think of the average price as represented by a point somewhere between the four price lines in Fig. 1.

Most cattle feeders throughout Ohio buy in the fall and market in the late winter, spring, or early summer months. Activities in connection with the running of the average farm play a big part in the feeder's decision on buying and marketing. If this is definitely to be the period in which the cattle will be finished and sold, then careful attention should be given to the grade or grades that will sell to best advantage at that time.

Some feeders hesitate to consider the feeding of plain cattle because they are just a trifle chagrined at having folks find cattle of that class on their farms. But there are many places in Ohio where cattle out of the lower brackets fit into the picture much better than any others. If this condition exists because of a special market outlet, or seasonal feeding practices, why not recognize the fact and follow the lead which promises the biggest financial return? This statement is not made with the idea of urging anyone to feed "yellow hammers," but as long as these cattle continue to be a factor in trade they might just as well be considered for what they are worth. However, most feeders will naturally do a better job of feeding when they have cattle of a higher grade.

AGE AND WEIGHT OF FEEDERS

In considering the feeding of yearlings, 2-year-olds, or older cattle as against calves, the man in the feedlot first of all should try to figure out what the market demand will be for light and heavy cattle at the time his stock will be ready for the butcher. In this connection it must be remembered that the buying public usually sets the pattern as to weight and quality of cattle that the packer is willing to pay the best price for, month after month.

Anyone who has studied consumer demand in recent years will readily understand that retail butchers have a greater sale for cuts out of lighter weight carcasses than they did some years ago. The writer was very forcefully impressed on this point on visiting a packing house in company with the beef buyer for a chain of 22 groceries in a large city. In going down the beef rail and picking the carcasses which he ordered sent out to various stores this man did not choose a single carcass that would have represented a live animal of more than 900 pounds, and most of them were much below this. Upon being questioned as to the matter of weight he said that their stores could not profitably handle carcasses any heavier than these under ordinary conditions.

Of late years the demand for heavy weight cattle has been very narrow and rather unchanging, with the result that a slight over-supply of big steers on



Fig. 2.—Choice home-raised heifer calves seen on a Pickaway County cattle feeders' tour.

the market soon has a depressing effect upon their price. Many feeders, even though knowing that the outlet for big cattle is limited, have hesitated to make the change over to calf-feeding, because feeder calves as a rule are more expensive to buy. Against this fact, however, there is another factor of importance which must not be overlooked, and that is, the greater economy with which calves and young cattle put on their gains in contrast to older cattle.

At the Nebraska Experiment Station, under Professor H. J. Gramlich, several trials¹ were conducted over a period of 6 years, with calves, yearlings, and 2-year-olds. Corn and alfalfa hay were the feeds used in these trials. For the yearlings it required only 88 per cent as much feed to put on the same amount of gain as for the 2-year-olds, and only 65 per cent as much feed for the calf as for the 2 year-old.

At the Colorado Experiment Station a similar trial was conducted, using a ration suitable to conditions in that state. In this instance the yearlings made

¹ Nebraska Bulletin 229.

their gains for 84 per cent as much feed as the 2-year-olds, and only 68.5 per cent as much was required for the calf as for the 2-year-old. With this greater economy in the cost of gains it is not difficult to see that the feeder can afford to pay a slightly higher price for calves than he can for the older cattle.

Another objection to calves voiced by some is that they lack the ability to make use of roughage to the same degree that older cattle are able to do. Of course, as calves are smaller than older cattle they naturally lack the same capacity for feed that the bigger animals possess, but, if feeding capacity is reduced to the basis of 1,000 pounds live weight, we find some interesting things. This was done in the case of the Nebraska test in three of their yearly trials. Over an average feeding period of 200 days it showed that calves were able to consume more feed per 1,000 pounds live weight than either 2-year-olds or yearlings. In the consumption of roughage, on their ration of alfalfa and shelled corn alone, the calves consumed 38.7 per cent as much hay as shelled corn, against 42.1 per cent of hay to shelled corn for the 2-year-olds; a difference which would have to be considered rather slight.

For a short feed, cattle with some age and weight will finish more quickly.

Calves possess another advantage over big cattle: if the market is not right when the time comes to sell, they can be held and fed for a month or two longer with less increase in the cost of gain than cattle of greater weight. When big cattle are finished and ready to sell they cannot safely be held any great length of time for markets to improve. Their weight and increasing cost of gain are both against them.

HEIFER OR STEER CALVES?

With the increase in calf feeding there has been a tendency among feeders to use heifer calves in the feedlot, whereas such a procedure would not have been followed in the feeding of heavier cattle. These heifer calves as a rule can be bought for a lower price than steer calves, and at marketing time if they are in good condition and of the right weight they frequently sell on or near the same price level as steers of similar grade.

Feeding tests that have been conducted for the purpose of comparing steer and heifer calves indicate that heifers do not gain as rapidly nor as economically as steers over a feeding period of 180 to 200 days. Over a period of less than 150 days, however, they will fatten ahead of the steers. At the Colorado Experiment Station under Professor E. J. Maynard, in a 200-day test of this kind, the heifers made a daily gain of 1.94 pounds compared to a gain of 2.14 pounds for the steers, and the feed cost per 100 pounds gain was 80 cents higher on the heifers than on the steers. Based on these figures Professor Maynard said: "If the steer calves in this test had cost \$11 per 100 pounds the heifer calves at \$9.82 would have given the same results."

At the University of Nebraska the average of tests over a period of 3 years gave steer calves an average daily gain of 2.20 pounds compared with a gain of 2.04 pounds for the heifer calves. In these tests the steers made their gains for 78 cents per 100 pounds less than the heifers. Consequently we may conclude, as the result of these tests, that steer calves will make heavier and cheaper gains

than heifer calves of similar age and breeding when they are both fed around 200 days on the same ration.

In all of these tests it was evident that heifers fattened more quickly than steers, and are ready for market in 30 to 45 days less than steer calves handled in the same manner. Where heifer and steer calves are fed together on a good standard fattening ration the wise procedure would be to top-out the heifer calves around 150 days, holding the steer calves until they show the proper degree of finish.

In the case of calves, heifers and steers may be fed together with satisfactory results, there being very little disturbance where they are handled under this plan. A comparison of handling heifers and steers fed separately in experimental

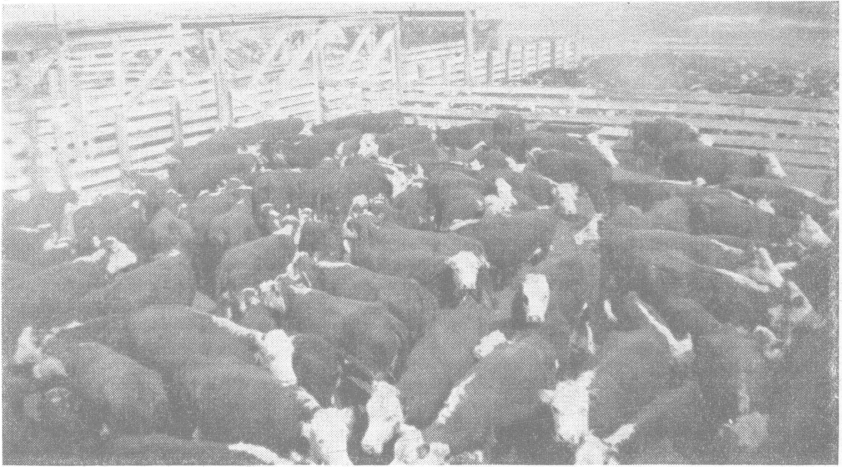


Fig. 3.—Western cattlemen frequently drive both cows and calves to shipping points where the calves are loaded on cars; the cows are then driven back to the ranch. These cows, belonging to Chas. E. Collins, Kit-Carson, Colorado, are at the loading point.

tests shows no advantage for the extra trouble of keeping the heifers penned to themselves either in the rate of gain or the cost of gain.

If heifers are kept in the feedlot with hogs following, a close watch must be kept for injury to them. If the hogs get started at the habit of “nipping” the heifers, serious trouble and heavy losses may be the result. Many feeders are inclined to under-estimate this danger, but it is a very real one and should be guarded against. If the habit is started by hogs, the only safe procedure is to keep them penned away from the cattle except for one or two hours during the day. If possible, the time to turn the hogs into the feedlot should be selected at a period when most of the cattle are ordinarily on their feet.

When it comes to marketing, the matter of weight is much more important with heifers than with steers, the most satisfactory range being from 600 to 750 pounds. When heifers get above the latter weight they meet with discrimination. This is more pronounced on some markets than on others, and any feeder who

expects to handle heifers regularly should study his markets carefully in order to avoid those channels that will penalize his product.

OLDER HEIFERS AND COWS

The feeding of larger heifers and cows is a more specialized business and also one that carries more hazards. With heavy weight heifers the question of "calfy" individuals always brings discrimination on the part of the buyer regardless of the word of the seller. The market outlet for weighty heifers is much more restricted than for fat heifer calves.

Cows make their gains at a much higher cost than steers or light weight heifers.

COMPARISON OF BREEDS

Many enthusiasts of certain breeds maintain that their particular favorite will do the best in the feedlot. For the most part, experiment stations have kept away from making breed comparisons on most classes of livestock. With beef cattle in particular it is a recognized fact that between the three principal breeds found in this country there is little difference in their ability to make use of feed.

The veteran range man and commission merchant, the late John Clay, when asked which breed of beef cattle he preferred, is said to have answered in these words: "The Hereford on the range, the Shorthorn in the feedlot, and the Angus on the table," which is another way of saying that each breed has its good points if we care to look for them. However, the cornbelt feeder of today who is depending upon the range country for his feedlot supplies has little choice as to breed, because the Hereford largely dominates the range country. The types within this breed, as in the others, vary widely, and it is up to the feeder to exercise care in making his selection.

GRADES OF FEEDER CATTLE

Although grades are used on markets to designate the difference in quality of feeder cattle, it is not ordinarily possible to buy strictly on grade alone. However, it is important to have an understanding of the different grades for the purpose of comparison. The term "grade" itself is used to designate the quality, conformity and condition which the cattle show. Following are the grades recognized on the principal feeder cattle markets:

- | | | |
|-------------------|-------------------|-------------|
| 1. Fancy selected | 3. Good | 5. Common |
| 2. Choice | 4. Fair or Medium | 6. Inferior |

Fancy Selected.—This grade is seldom found on the market; it is represented principally by purebred cattle showing extreme beef type. Such cattle are usually fed out by the individual breeder or sold as single animals to be fed out and fitted for show.

Choice.—Choice feeders represent the highest grade found on any market in carload lots and even these are extremely rare, few of them ever finding their way to the market. Instead, they are bought direct from range men or breeders

for delivery into feedlots. Such cattle would be represented by loads purchased for prospective carlot exhibits as finished cattle. Many carloads of this grade will be found on exhibit at western livestock shows. Following the show they are sold at auction. To come in this grade feeders must show all the markings of beef type as found in fancy selected feeders, with the possible exception that they differ in the amount of condition they carry. To come within this grade it goes without saying that the individuals should all belong to the same breed, and they may be either high grade or purebred.

Good.—Good feeders when fed out should develop into good to choice, fat steers. In conformation they lack somewhat in the makeup of the next grade above. They are grade range cattle that have not had as many top crosses of purebred bulls as choice feeders. Or, they may have been sired by bulls not showing as much beef type as the others. The amount of finish which they carry is usually



Fig. 4.—An increasing number of Ohio cattlemen are raising their own feeders. Part of herd belonging to Bernard Porter in Muskingum County.

only fair. Cattle salesmen frequently offer carloads designated as “good to choice.” This designation has been more common of recent years since direct range buying has been done on a larger scale. The feeder buyer under this condition must understand and appreciate that this includes two commonly recognized grades, and he must, therefore, expect a considerable variation. In this grade color markings should be uniform, indicating a predominance of one breed.

Fair or Medium.—As the term indicates, this group shows only fair beef breeding; they should be uniform in size, although some mixture in color is permitted.

Common and Inferior.—These feeders have little to distinguish them from each other with the possible exception that common feeders will carry more flesh than inferior feeders. Neither group shows much beef type or breeding, and they are made up primarily of off-colored animals and those of straight dairy blood. On the market they are frequently referred to as “dogs,” “yellow hammers,” or “tripe.”

WHICH GRADE OF FEEDERS TO BUY?

In deciding which of these grades a feeder should buy it will be necessary to consider many factors. Most farmer-feeders do not care to have anything on the place out of the lower bracket of these grades, and some who do handle them regularly are more or less ashamed of the class of cattle which they have in their lots. Nevertheless, in recent years somewhat of a change of attitude among many feeders has been noted in regard to the feeding of plain or common cattle.

First of all it must be recognized that such cattle are a factor in trade at all times, and if some feeders find it possible to make a profit out of them why should they be frowned upon? However, in feeding plain cattle it is well known that their best marketing season usually comes within the first few months of the year; that is, the late winter and spring months. The spread in price at this



Fig. 5.—Choice calves of his own raising on the farm of G. W. Rittenour in Pike County. The danger of shipping fever is eliminated when such calves are weaned off their mothers directly into the feedlot.

season between plain or inferior cattle and good cattle is much narrower than it is during the late summer, fall, and early winter months.

This situation can be easily explained by the fact that grass-fat cattle, which would necessarily compete with these lower grades, are very plentiful in the summer and fall months and relatively scarce or limited at other seasons of the year. Some markets available to Ohio feeders also demand and will use a higher proportion of plain cattle at a good price than will other markets. It is therefore important for each feeder to figure out about when his cattle will be fat, study his own market, and select his grades of feeders accordingly.

Regardless of the grade finally decided upon, the cattle should be bought worth the money. Plain cattle are occasionally bought too high, and the same may be said of the better grades as well: if cattle are laid in at too high a price the possibility of a profit is lessened accordingly. The old saying that "Well bought is half sold" still applies.

Feeding Tests with Different Grades.—Over a period of four years three grades of feeder cattle were compared in a series of tests conducted by Dr. Carl W. Gay and Paul Gerlaugh¹ at Ohio State University. The three grades compared were choice, medium, and common, and the cattle were bought for the test the first year at Chicago, second and third years at St. Paul, and for the final year's test at Kansas City. They were graded on the market where purchased, and in most instances the cattle were fairly close representatives of the grades to which they were committed, except for the fact that in the third test the choice cattle were a little below the usual standard for this grade. In buying cattle of the different grades it was not always possible to find them in the same relative degree of fleshing. This latter fact, according to the summary of the test, was probably responsible for some of the variation in feed required per 100 pounds gain and resulting costs of gain.

The 4-year period in which these tests were carried on saw a wide fluctuation in the cost of all feeder cattle. For example, in the first test the cost of the cattle per 100 pounds laid down in the feedlot was \$9.50 for choice, \$7.50 for medium, and \$5.50 for the common grade. The second year the respective prices on these same grades were: \$6.75, \$5.25, and \$3.75. At the beginning of the third year the choice grade cattle were still lower in price, costing only \$5.75 laid down in the feedlot, but the spread in cost between the grades was much narrower that year, which was in the fall of 1932. The medium grade feeders cost \$5.00 per hundred and the common ones \$4.25. The following year, which was the concluding one in the series of four, the cost of the three grades of feeders laid down in the feedlot was \$6.25 per hundred for choice, \$4.75 for medium, and \$3.25 for common.

In the following table the average daily gain and the feed cost per 100 pounds gain for each of the grades during the 4-year period is given:

Average Daily Gain and Feed Cost for Each Grade

	LOT 1—CHOICE		LOT 2—MEDIUM		LOT 3—COMMON	
	Average daily gain lbs.	Feed cost per 100 lbs. gain	Average daily gain lbs.	Feed cost per 100 lbs. gain	Average daily gain lbs.	Feed cost per 100 lbs. gain
1931.....	2.15	\$10.89	2.40	\$10.24	2.33	\$10.59
1932.....	2.35	5.35	2.43	5.35	2.30	5.40
1933.....	2.02	4.60	1.86	4.96	2.06	4.73
1934.....	1.97	8.47	2.02	8.29	2.08	7.96

In each yearly test all three lots received exactly the same feeds. Corn-and-cob meal was fed during the first 3 years, and this was used at the start of the fourth experiment, but at the end of 7 weeks all three lots were shifted to shelled corn. Other feeds to each of the lots consisted of silage, a mixed supplement, and hay. The supplement was not the same from year to year. For

¹ Ohio Experiment Station Bimonthly Bulletin No. 173.

THREE LOTS OF CATTLE IN OHIO EXPERIMENT STATION
TEST FED AT THE OHIO STATE UNIVERSITY, 1931

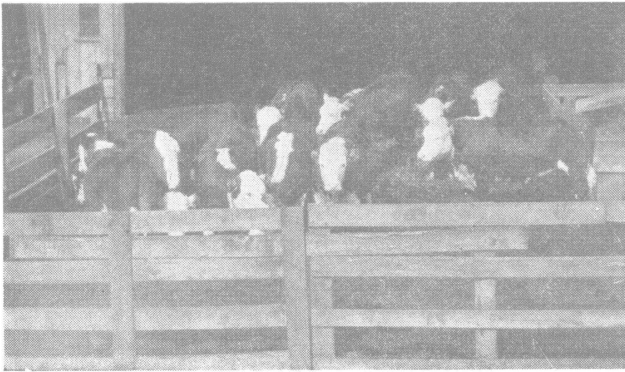


Fig. 6.—Lot 1 (choice) made an average daily gain of 2.15 pounds.

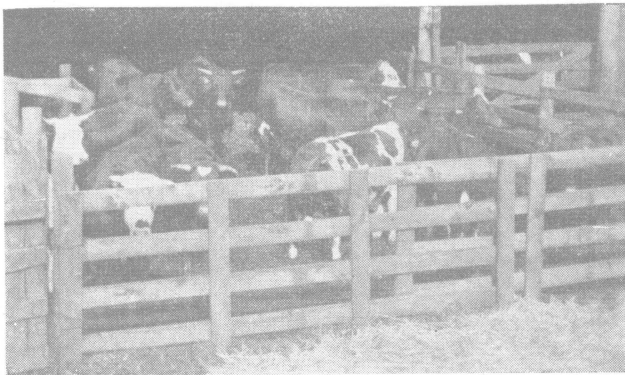


Fig. 7.—Lot 2 (medium) made an average daily gain of 2.40 pounds.

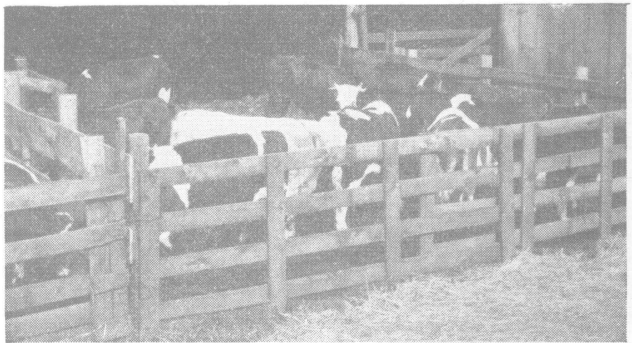


Fig. 8.—Lot 3 (common) made an average daily gain of 2.33 pounds.

instance, the first and third years it was equal parts of linseed meal and cottonseed meal. The second year it consisted of equal parts of linseed meal, cottonseed meal, and soybeans, and the fourth year it was made up of tankage 30 parts, soybean meal 30 parts, cottonseed meal 20 parts, linseed meal 15 parts, and minerals 5 parts. The cattle used in all of these feeding tests were of about yearling age.

For the first 2 years the test covered a period of 140 days, but the two latter tests were for 224 days and 211 days. A glance at the above figures shows that the average daily gain on the *choice* cattle during these 4 years varied from a low point of 1.97 pounds to a high of 2.35 pounds per steer. The cattle in the *medium* grade lot made their lowest average daily gain in 1933, at which time it was only 1.86 pounds per head. But in the two preceding years their rate of gain was the highest for any of the lots during the 4 years. In 1931 the medium grade cattle had an average daily gain of 2.40 pounds, and in 1932 the daily gain on this same grade was 2.43 pounds per steer.

The steers in the lot graded *common* made average daily gains very similar to or slightly above those made by the medium and choice grade cattle. Their average daily gain per head in any one of the tests was never below 2 pounds, but at the same time their highest rate of gain was not up to that of the medium cattle.

On the question of feed cost per 100-pound gain a glance at the figures of the four tests will show that none of the lots had much advantage over any of the others. To quote exactly on the matter of daily gains and economical use of feeds between the different grades Mr. Gerlaugh said:

"There was no great variation in the ability of any one of the grades to make gains more rapidly or more efficiently than another. It is probably true that had the condition of the three grades been identical the variation in the feed required to make 100 pounds of gain would have been less variable."

Judged by the cost of the feeders the man who grew the common grades had very little return on his investment when he sold them on the market as feeders. This would seem to indicate that so far as the producer of feeder cattle is concerned his return on the investment will be very nearly in proportion to the quality of the cattle he breeds.

The results of these tests bring out two other important facts: (1) That the feeder who expects to handle common cattle must ordinarily figure on a wider margin above the cost price than the man who handles good quality cattle; (2) that the time of year such cattle are sold is highly important. March, April, and May are usually the best months for having common cattle ready to market. On the other hand, this same period is usually a very poor time to have the better grades of cattle finished for market.

There is a prevailing opinion among many feeders that common cattle or those lacking in beef breeding will not gain as rapidly nor make as efficient use of their feed as will cattle of better breeding and quality. These feeding tests seem to show quite clearly that this is not the case. Both the gains and the costs for the lot grading "Common" showed little difference on the average from the "Choice" lots.

FEEDS AND FEEDING



PROTEIN FEEDS

Why spend money for a high priced supplement when there is plenty of corn, hay, and silage at home? With ordinary prices prevailing there is ample reason to buy such feeds, or, to trade corn or other home-grown feeds for them. Most home-grown feeds do not supply the need of the animal body for protein-rich concentrates.

In a general way proteins are known as muscle builders, but the muscles of the body are not the only parts that demand protein for growth and replenishment. In addition, the tendons, ligaments, internal organs, nerves, hide, hair, hoofs, and horns are largely protein so far as their dry matter is concerned. Also one-third of the dry weight of the bones consists of protein. These needs must be supplied while the fattening process is going on.

The common cereal grains contain some protein but the amount is low and it is of poor quality. The feeder who depends upon that source of protein to supply its need in the fattening ration is somewhat like the farmer who would attempt to build a fence in which he uses posts of soft pine instead of locust or cedar. If a strong and durable fence is to be built the posts must be of good quality and spaced at the proper distance; when set too far apart the fence is weakened and soon goes down. And so it is with protein in the ration; the underlying structure and framework must be properly nourished if fat is to be laid on efficiently and economically.

Naturally, there are some circumstances when the use of a supplement is unwise. For instance, when it is extremely high in price compared to grain in the ration, or when there is an abundance of low priced legume hay available. However, the times when its use is not warranted are very few compared to the cases where it could be used to financial advantage but it not.

Due to its increased supply and lower price, soybean oil meal has increased in popularity among cattle feeders. The old stand-bys, cottonseed meal and linseed meal, are still very popular when their prices are in line. The price of linseed oil meal of late years has been somewhat lower than formerly, making it more popular as a feed. Soybean oil meal and linseed oil meal are preferred by most feeders over cottonseed meal when prices of the three are about the same. A mixture of two or three of these vegetable proteins together is much more effective than any one alone. When such a mixture is used a little less can be fed per head daily, with about the same results, as when a single supplement is used.

For some years the Ohio Experiment Station has been demonstrating the increased value of protein mixtures, especially when such mixtures include an animal by-product such as tankage or meat meal. When tankage is available at a price not too high above the other proteins it should make up from 15 to 30 per cent of the protein mixture. When tankage is extremely high in price, its proportion can be reduced or it may be left out entirely. This will have to be determined by each individual feeder and the prices prevailing in his community.

The amount of such a mixture to feed per head daily is often a serious question in the minds of cattle feeders. Gerlaugh of the Ohio Station conducted a test using different amounts of such a protein mixture, to which minerals had also been added. The amount of the tankage supplement mixture which also included soybean meal, linseed meal, and cottonseed meal, varied with the different lots of cattle on test.

All other feeds to the cattle were the same except for the amount of this protein mixture which they received. Corn silage, hay, and shelled corn were the other feeds in the ration. The steer calves in lot 1 were given 0.8 of a pound of the protein mixture throughout the test; lot 3 received 2.4 pounds, and lot 5, 1.6 pounds.

The average weight of the calves in the different lots were all very close when the test started. Those in lot 1 and lot 5 averaged 404 pounds per head, while lot 3 had an average weight of 403 pounds per head. These steers were

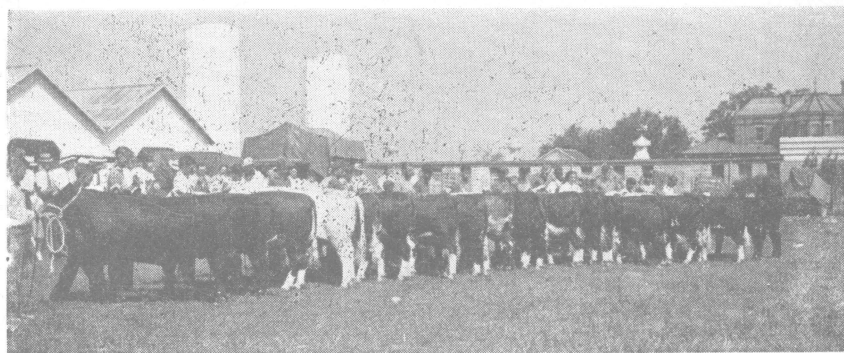


Fig. 9.—Fat steers shown by advanced 4-H club members at the Miami County Fair. To show in this class each club member must have had three or more years' experience in the 4-H steer feeding project.

kept on feed for a total of 308 days and at the end of that time the steers in lot 1, which had received the least amount of protein supplement, weighed 1059 pounds per head and had made an average daily gain of 2.13 pounds. Their gain had cost \$6.39 per hundred, with corn at 50c per bushel and silage at \$3.50 per ton.

Lot 3, receiving 2.4 pounds of the protein mixture per head daily, weighed 1121 pounds at the end of the test, having made an average daily gain of 2.33 pounds, and their cost per 100 pounds gain was \$6.46. Lot 5, fed 1.6 pounds of the protein mixture per head daily, which was just half way between the amounts received by the other two lots, weighed 1135 pounds at the close of the test. Their average daily gain was 2.39 pounds per head, and it was made at a cost of \$6.23 per hundred.

From these figures it can be seen that lot 1, receiving the small amount of protein, made the lowest daily gain, while the cost of gain was higher than that of lot 5 and slightly lower than that of lot 3. However, the selling price is

highly interesting in this connection, for in this instance lot 1 was penalized to the extent of \$1.00 a hundred below that of lots 3 and 5. The selling prices were \$11.75 per hundred for lot 1 and \$12.75 per hundred for lots 3 and 5.

Most feeders would not be interested in carrying their cattle for such a long feeding period as was indicated in the above test. In order to give such feeders further information on the value of these different amounts of supplement this test was summarized at the end of 168 days, and again at the close of 252 days, but it is interesting to note that at the conclusion of both of these periods the relative standing of these three lots was almost identical both in regard to costs and gains. In other words—lot 5, receiving 1.6 pounds of the protein mixture throughout the test made the highest average daily gain and made this gain at a lower cost per hundred than either of the other lots. Lot 1, on 0.8 of a pound of the supplement, made the lowest daily gain and its cost always ranged somewhere between the other two lots. Lot 3, at 2.4 pounds supplement per head daily, made a higher rate of gain than lot 1 but less than lot 5, and its cost of gain throughout the test remained the highest of the three lots.

At the conclusion of the test, Mr. Gerlaugh¹ made this statement: "Lot 1, getting 0.8 pound of supplement daily per calf, was not getting enough. Lot 3, receiving 2.4 pounds, was getting more supplement than was necessary from the point of view of economy." The following comment, also taken from the same summary report, is interesting to those who may be considering the use of such a mixture: "One-and-six-tenths pounds of the supplement used contained a comparable amount of protein to that contained in 2 pounds of a mixture of equal parts of linseed meal and cottonseed meal."

With increasing use of protein mixtures in cattle fattening rations, feeders are varying the kind and amount of the different ingredients, depending on their costs. If tankage is cheap, the amount can be increased to 50 per cent. This has been satisfactorily done in several instances by Ohio feeders. On the other hand, if it is extremely high the amount can be reduced or replaced entirely by cheaper sources of protein. More recently, soybean oil meal has been available to Ohio feeders at a lower price per ton than any other protein supplement. Under such conditions the amount of the soybean oil meal can be readily increased.

Cottonseed Meal.—Cottonseed meal, when added to rations otherwise lacking in the supplement, increases gains and reduces costs, and 100 pounds of supplement in the right proportion will usually equal 250 to 300 pounds of corn. When it replaces alfalfa in the ration at the rate of 1 pound per head daily to calves, it equals about 300 to 400 pounds of alfalfa hay in feeding value. Cottonseed meal is not constipating to cattle when fed in an otherwise properly balanced ration. It is deficient in vitamin A, and for that reason other feeds should be provided which will supply vitamin A. Corn silage and green leafy alfalfa hay will take care of this need when given in the proper amounts. In ordinary rations if cottonseed meal is fed as the only supplement, 1½ to 2 pounds per head daily will supply bodily needs for protein.

¹ Ohio Experiment Station Bimonthly Bulletin No. 179.

Linseed Meal.—Linseed meal is frequently preferred by feeders in connection with a non-silage ration. Cattle show a tendency to shed their coats a little earlier when this is the supplement, and showmen prefer it because of the sleeker appearance which it gives their animals. Linseed meal is usually preferred over cottonseed meal by most experienced feeders, but just how much more it is worth is difficult to say.

Soybeans.—When soybeans are used as the protein supplement for fattening cattle they should be fed whole, although this is contrary to the opinion held by many feeders.



Fig. 10.—Feeding big cattle is a specialty that includes more risk than feeding calves or other light-weight cattle. These heavy-weight steers of choice quality were seen in the feedlot of Bert Favorite, Miami County.

Tests at the Iowa and Purdue Experiment Stations show that the ground soybean is less efficient than the whole bean, or the meal after the oil has been extracted. The high oil content evidently causes the ground beans to become rancid very quickly, and cattle have a tendency to go off feed easily on them. In these tests more pork was produced with hogs following soybean-fed cattle than in the case of cottonseed meal-fed cattle.

Some feeders have reported trouble from cattle scouring when feeding beans rather heavily. If they are brought up gradually to a full feed and not given over 2 pounds per head daily there should be little trouble on this account.

Soybean Oil Meal.—The amount of this supplement available to Ohio feeders has increased in recent years due to increased acreage of the crop within the state, and its price has been favorable to increased use. Used as a single supplement in tests of various experiment stations it has proven the equal of

any other single supplement and is apparently superior to some. Some of the soybean oil mills have made a practice of exchanging a ton of soybean oil meal for each ton of whole soybeans delivered to them. Where such an exchange can be made within a reasonable distance it is considered advisable to do so for cattle feeding. Soybean oil meal has proven slightly superior to whole beans in a number of feeding trials.

Tankage.—Tankage used in various feeding tests has been mostly of the dry rendered variety, although steam rendered tankage has also been used in some instances and the results appeared to be equally satisfactory. When given the opportunity, cattle will eat either kind.

CORN

In this discussion of the use of corn, the reference is entirely in regard to corn as a grain. At this point, attention is directed to the discussion of corn silage on page 21, where reference is made to the amount of beef produced per acre of corn when fed as silage compared to shelled corn.

In feeding the grain the most common method is to get it to the cattle with the least labor involved, and with most cattle feeders this means shock corn. However, with the increase in feeding calves and light weight cattle, shock corn has not found as wide usage as it formerly did with big steers. In spite of this, it has been found that calves of good size and weight can make use of shock corn, especially during the early part of the fattening period, and many Ohio feeders are using corn in this way along with silage, feeding one in the morning and the other in the afternoon.

Ear corn, either snapped or husked, can also be made use of by calves and young cattle. They relish broken ear corn much more than whole ear corn, but here the cost of operation must be checked against the actual increase in returns that will be gained by the effort expended.

Some feeders prefer shelled corn for their cattle while others would rather have ground ear corn, and there are many supporters for both of those methods of feeding corn to cattle. In a series of recent tests by Gerlaugh and Rogers¹ ground ear corn and shelled corn gave very similar results when all factors were considered. Calves were used in three yearly comparisons and yearlings were used in two feeding tests.

For the corn-and-cob meal lots, the corn was ground to a moderate degree of fineness in a burr mill. In each of the tests with both calves and yearlings, the corn-and-cob meal cattle made slightly higher average daily gains than the shelled corn cattle. However, there was about twice as much pork produced from hogs following the shelled corn cattle as there was with the corn-and-cob meal lots.

“Keep the feed better than the cattle.” In plain terms, this means adding more preparation to the feed as the cattle advance in their degree of finish. According to this plan, shock corn would be fed at the beginning, followed by the feeding of ear corn or broken ear corn, then at the last using shelled corn or crushed corn. Corn should never be finely ground for cattle, but just coarsely cracked. It does not pay to grind shelled corn.

¹ Ohio Experiment Station Bimonthly Bulletin No. 179.

When hogs follow cattle, which is a practice in general use by all cattle feeders, the way in which corn is fed makes little difference because undigested corn is recovered by the hogs. If there are isolated instances where hogs cannot be had for this purpose, grinding the corn will pay.

Hybrid Corn.—Increased acreage of this high yielding corn has brought out the question of its feeding value compared to the more common varieties of corn formerly produced. During the winter of 1937-38 a feeding test was carried on at the Madison County Experimental Farm, comparing hybrid corn with standard varieties. While this involves only one year of record and will have to be substantiated further by additional tests, the results were satisfactory so far as hybrid corn was concerned. The feeding value of the grain proved to be quite similar to that of standard varieties, and the feeding value of a ton of silage from the hybrid variety was equivalent to that of a ton of silage from one of the standard varieties of corn.

WHEAT

In times of low prices wheat is used as a substitute for other grains in fattening cattle. When coarsely cracked its feeding value is about 5 to 10 per cent higher than that of corn, but there are certain limitations to its use, and with most feeders it should make up only half of the grain ration. However, the Minnesota Experiment Station¹ successfully fed an average of 10½ pounds of ground wheat daily to 400-pound calves for over 200 days. Linseed meal and sweet clover hay were the only other feeds in the ration and the average daily gain was 2.15 pounds.

Trowbridge and Moffett of the Missouri Station² made two trials with yearling steers in which wheat was fed in various forms, both with and without corn. The following quotations are from their summaries:

“Coarse grinding of wheat improves its value approximately 10 per cent. . . . Ground wheat fed to fattening cattle as a complete substitute for corn usually produces gain for about 10 per cent less feed, but the cattle frequently lack finish, and sell for less than corn-fed cattle. . . . If whole wheat is fed, cattle make less gain per bushel, but the gain on hogs following them is greater than when wheat is ground. . . . Cattle fed wheat should be put on feed slowly, since digestive disturbances such as bloat and scouring frequently follow its extensive use.”

BARLEY

Barley is not so widely used in the eastern section of the cornbelt as it is in the west and northwest, but many feeders occasionally find it to their advantage to use barley as a part of the fattening ration along with other grains. Whole barley when fed to cattle as the only grain is worth about 12 to 15 per cent less than corn, primarily due to its high fiber content; but, when cracked or crushed, it has a feeding value nearly equal to corn, pound for pound, according to results of many feeding experiments. In most cases it gives best results when making up about 50 per cent of the grain in the ration.

In the fitting of show cattle barley is sometimes cooked or steamed, and in this condition herdsmen are of the opinion that it gives cattle an added bloom and firmer fleshing.

¹ Mimeographed summaries, 1931.

² Missouri Experiment Station Bulletin No. 325

OATS

Because of their hulls the feeding value of oats is greatly reduced on a pound basis when compared to other grains. On an average price basis they should not make up any large part of cattle fattening rations if costs are to be kept down. As a rule cattle feeders like to use some oats in getting cattle, especially calves, started on feed. However, beyond this point in an ordinary price year they should not be included in fattening rations. Pound for pound, oats are about 15 to 20 per cent less valuable than corn when they are fed to cattle as the sole grain.

Feeders frequently make the mistake of comparing oats with corn on the basis of price per bushel, forgetting the fact that a bushel of oats represents a much smaller number of pounds than a bushel of corn. When the price of oats is sufficiently low they can be included in fattening rations, but for best practical results they should not make up more than one-fourth of the grain ration even under these low cost conditions. For best results they should be crushed or ground, but the expense of this latter operation in proportion to their value will determine whether or not they should be ground or fed whole.



Fig. 11.—For the spring market, plain or common cattle are the safest investment. These cattle, seen in the feedlot of Paul Dierksheide on the Wood County tour, showed a profitable feeding margin.

MOLASSES

In a feeding test at the Nebraska Experiment Station cane molasses proved to have a feeding value of approximately 85 per cent of that of corn. This was in a test with 500-pound cattle which were receiving approximately 5 pounds of molasses per head daily. Most feeding authorities agree that this is about the proper value for molasses in comparison to corn.

Molasses is generally too high in price to be fed economically under Ohio conditions, although there are exceptions to this. Cane molasses and beet molasses in the fattening ration for calves are equal in feeding value, according to a recent test by Paul Gerlaugh of the Ohio Experiment Station. In view of this fact there

are many sugar beet growing sections in northern Ohio where beet molasses is available at a much lower price per ton than cane molasses. Under these conditions it could frequently be used in the ration to good advantage. The price in comparison to farm raised grains should be the deciding factor in its use.

Molasses stimulates the appetite and causes cattle to eat more feed. In small amounts for this purpose it has an increased value in fattening cattle for show, or in getting a high finish on cattle for a special market. Molasses does not, however, cause cattle to drink more water when added to the ration except in proportion to the increased amount of feed which they eat. Tests at the Ohio and Iowa Experiment Stations both substantiate this point.

Both kinds of molasses have been safely fed to cattle in varying amounts, and individual conditions will have to determine the quantity fed. Gerlaugh of the Ohio Station self-fed cane molasses to calves with no bad results. Under this plan the calves consumed an average daily allowance of about 4 pounds per head, and it was interesting to note that with this lot of cattle, molasses still had the effect of stimulating total feed consumption even though it was not poured over the other feeds or mixed with them.

Molasses feeds frequently contain a high percentage of filler to absorb the molasses. Such fillers decrease the feeding value proportionately, therefore the analysis of such feeds should be carefully studied before making purchases.

CORN SILAGE

Silage has long been recognized for its value in cattle fattening. However, a recent test¹ by Gerlaugh and Rogers at the Madison County Ohio Experimental Farm added light to the information already known in regard to its value. A 13-acre field of corn was divided for this test, half of it going into a silo and the other half being husked and later shelled for feeding. Ten head of 600-pound cattle ate the shelled corn and stover from 6½ acres, while a second lot of 14 similar cattle were fed silage from the other 6½ acres. Aside from these feeds the cattle in each lot were given cottonseed meal and mixed hay in very similar amounts. In the silage lot more cattle had to be used than in the shelled corn lot, in order to have all of the feed consumed from 6½ acres and at the same time have both lots of cattle complete the test at about the same time.

During the 174-day feeding period the silage cattle made an average daily gain of 2.01 pounds per head compared to 2.24 pounds for the shelled corn cattle. But an acre of corn fed as silage produced 752 pounds of beef, compared to 372 pounds of beef per acre of shelled corn and stover. In other words, silage produced more than double the amount of beef per acre of corn in contrast to the amount produced by shelled corn and stover. Even with pork credit added, which was much greater in the shelled corn lot, the difference was still tremendously in favor of silage.

With corn figured at 45c per bushel, stover at \$2.50 a ton, silage at \$3 a ton, mixed hay at \$8, and cottonseed meal at \$35 a ton, the relative feed costs per 100 pounds gain were approximately \$5.52 on the silage cattle and \$8.28 on the shelled corn cattle. The silage steers sold for 75c per hundred less than

¹ Ohio Experiment Station Bimonthly Bulletin No. 151.

the shelled corn steers, but the profit per steer and returns per acre of corn fed, including pork, were greatly in favor of corn silage.

The steers in the corn silage lot ate an average of 47.4 pounds per head daily of silage, 2 pounds of cottonseed meal, and 1.2 pounds of mixed hay. The shelled corn steers ate 16.3 pounds of corn, 9.5 pounds stover, 2 pounds cottonseed meal, and 1.6 pounds mixed hay per head daily.

A later silage test was conducted at this same farm with a combination grain and silage ration replacing the straight grain ration, and its results would indicate that there was little choice between the two methods. In other words, the two tests seem to show that if the corn crop is to be fed to cattle, feed it in the form of silage first of all, then if more than enough is produced to fill the silo add some to the ration in the form of grain. But first feed silage. Both tests were with yearling cattle.

For several years Ohio cattle feeders have cooperated with County Agents and the Animal Husbandry Extension Specialists in keeping feeding cost records. A summary of these records for any single year or for a period of years indicates a lower cost of gain for silage rations against rations in which no silage was used. Formerly both packers and commission men discriminated against silage fed cattle when they were sent to market, but this prejudice is being gradually broken down and now it is not uncommon to hear men from both of these groups frankly admit that they were wrong in their earlier opinions regarding silage-fed cattle.

Contrary to the opinion of a few, silage does not have an unfavorable effect upon the teeth or the digestive tract of cattle. Its effect upon the digestive system is favorable, having a laxative tendency and keeping the animals in good physical condition.

Should corn be cut green for the silo or should it be mature? Well matured corn silage contains 18 per cent digestible nutrients per 100 pounds, while corn cut when the kernels are still in the milk stage contains only about 13.3 per cent digestible nutrients. Therefore, when the silo is filled with green corn it simply means that much additional water going into the silo instead of feed. It is generally agreed that the time to ensile corn is when it reaches the dent stage.

GROUND CORN FODDER

The desirability of grinding roughage for cattle feeding has been discussed among feeders for many years. Gerlaugh and Rogers of the Ohio Station conducted a test, using corn silage for one lot of steers and ground shock corn for another lot. Other feeds given, which were the same for both lots, were cottonseed meal 1.9 pounds per head daily and all of the clover hay they would clean up. The test covered a period of 153 days, during which time the corn silage cattle made an average daily gain of 2.03 pounds compared to 1.81 pounds average daily gain for the ground shock corn cattle.

On the basis of the gross return per acre of corn, the silage cattle gave \$44.25 and the shock corn cattle \$30.95. The cost of preparing an acre of corn to feed the cattle under these two methods was \$9.24 per acre for the silage lot and \$19.09 for the ground shock corn lot. The net returns per acre of corn

fed to the cattle by these two methods gave \$21.95 for silage against a loss of \$1.79 for ground shock corn.

Towards the end of the test the cattle receiving ground shock corn were not cleaning up the ground roughage, but were sorting out the grain from the bottom of the feed bunks.

HAY

Legume hay of some kind is the most important in fulfilling the need for dry roughage. Clover and alfalfa are the two most generally used. Alfalfa is more valuable than clover because of its higher protein content, especially when little or no protein supplement is available.

Feeding trials at the Ohio Station with larger amounts of alfalfa hay than were formerly used in fattening rations have proven satisfactory. Up to 8 pounds

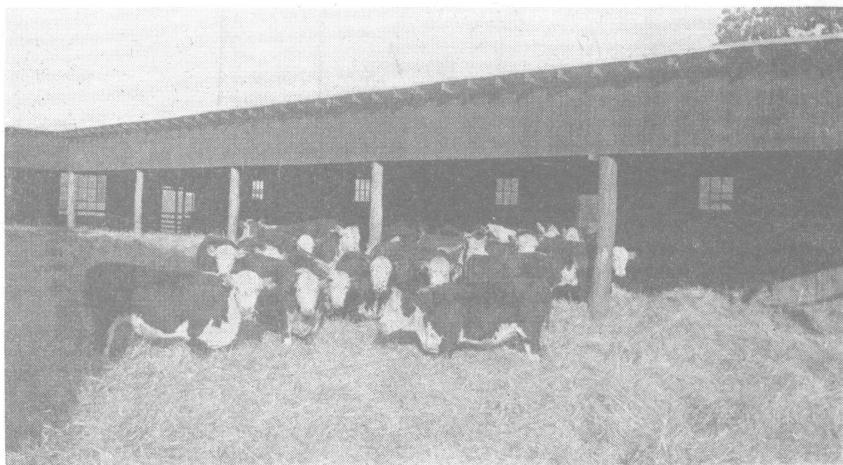


Fig. 12.—Choice fat heifers ready for market in the feedlot of Chas. J. Betsch, Ross County. The open shed provides good shelter at a low cost.

of hay per head daily has been fed to yearling steers. The rate of gain, degree of finish, and cost of gain did not vary greatly from other rations in which a much smaller amount of hay had been used. In an Ohio test comparing whole alfalfa, cut alfalfa, and finely ground alfalfa, both the whole hay and chopped hay showed a slight advantage over the finely ground hay. Cattle did not appear to relish the finely ground hay and they did not clean it up quite as well toward the end of the test as they did when it was fed whole or chopped.

Skinner and King of the Purdue Experiment Station¹ found that clover hay was equal to alfalfa hay when a liberal allowance of cottonseed meal was fed. All authorities agree that variation of quality in hay is of utmost importance.

Timothy hay as it is ordinarily harvested has little value for cattle fattening, but if cut in the early-bloom stage its protein content is higher and cattle relish

¹ Purdue Bulletin 314.

it. Corn stover and oats straw, although usually low in protein, are frequently used to good advantage.

The amount of dry roughage to feed daily will vary from 1 to 5 or 6 pounds. Where a liberal allowance of silage is fed 1 to 2 pounds of dry roughage is enough, but if no silage is fed the dry roughage will have to be increased for economy of gains.

Sweet clover hay, if properly made, has a feeding value almost equal to other good legume hays, but very coarse hay made from second year growth sweet clover will not be readily eaten by fattening cattle.

There are certain dangers in feeding moldy sweet clover hay, and at times this has been known to cause heavy death losses among cattle. For this reason any feeder using sweet clover hay would do well to be on the lookout at all times for the appearance of mold.



Fig. 13.—Feed bunks must be made of heavy timbers and solidly put together in order to stand up under hard use.

Soybean Hay.—With the increased growing of this crop in Ohio, soybean hay is finding a much more prominent place in cattle feeding rations, but its value depends largely on how it is made. Coarse, stemmy hay from which most of the leaves have fallen has a relatively low value. Also, if the beans are allowed to become fairly well mature before it is cut for hay it sometimes proves rather laxative. Where soybean hay is well cured and not stemmy, it has proven equal in feeding value to clover and alfalfa.

MINERALS

Cattle being fed in drylot need mineral supplements with most rations. Calcium and phosphorus are the two minerals most often lacking. Legume hay supplies calcium and protein supplements supply phosphorus, but as a rule fattening cattle do not get enough of either or both of these to take care of mineral

needs. Powdered limestone is the cheapest source of calcium for most feeders in Ohio, but pulverized oyster shell is an equally good source. Steamed bone meal is a good source of phosphorus. Do not feed rock phosphate or any feed containing it.

A good mineral mixture that will meet practically all needs has been developed by the Ohio Experiment Station. It consists of two parts steamed bone meal, two parts powdered limestone and one part salt. Place this in a box where the cattle can get to it at all times or feed it with grain and protein at the rate of two-tenths (0.2) of a pound per head daily.

Mature cattle getting 3-5 pounds of alfalfa per head daily probably receive enough calcium in their rations, but calves being fattened on a full¹ grain ration seldom eat that much hay. For that reason it is always safe to use the above mineral mixture in calf fattening rations. Many elevators and feed dealers have the above mixture already made up.

RATIONS

In regard to actual rations it is difficult to advise any hard and fast rule as to amounts of different feeds to use; the following are given merely as guides that may help in the more practical use of feeds available. These are some of the rations now in use by Ohio feeders.

RATIONS FOR CALVES

<i>No. I</i>		<i>No. II</i>	
Corn-and-cob meal.....	14 lbs.	Corn-and-cob meal.....	7.4 lbs.
Hay	5 lbs.	Silage	12.8 lbs.
Soybean oil meal }	0.75 lb.	Hay, Soybean.....	2.0 lbs.
Cottonseed meal }		Protein mixture ¹	1.25 lbs.

No. III

Shelled corn	4.4 lbs.
Silage	17.0 lbs.
Alfalfa	2.0 lbs.
Oats	2.0 lbs.

RATIONS FOR YEARLINGS

<i>No. I</i>		<i>No. II</i>	
Corn-and-cob meal.....	13.5 lbs.	Corn-and-cob meal.....	8.0 lbs.
Silage	20.1 lbs.	Silage	12.0 lbs.
Hay	2.5 lbs.	Alfalfa	8.0 lbs.
Protein mixture ¹	1.5 lbs.	Protein mixture ¹	1.25 lbs.

RATIONS FOR HEAVY CATTLE

<i>No. I</i>		<i>No. II</i>	
Corn-and-cob meal.....	19 lbs.	Corn-and-cob meal.....	12 lbs.
Alfalfa	5 lbs.	Silage	14.8 lbs.
Corn stover.....	.. lbs.	Alfalfa	1.5 lbs.
Palmo middlings.....	2 lbs.	Soybean oil meal.....	1.5 lbs.

¹ This mixture varies from year to year depending upon the price of the different ingredients. At present prices soybean oil meal and linseed meal make up the bulk. Cottonseed meal is also used but tankage, which formerly made up from 15 to 30 percent, is frequently left out because of its high price.

CHANGING FEEDS

All changes of feed should be made slowly and gradually. If the supply of one kind of feed is running low and the feeder knows that it must be replaced by something else, he would do well to begin at least 2 weeks in advance, adding only a limited amount of the new feed the first time, then gradually adding to this from day to day until the shift is satisfactorily made. This same rule will apply whether a change is to be made from one feed to another, or if adding an entirely different feed that has not been used up to that time. Sudden changes of weather either in winter or summer are quite likely to result in cattle going off-feed, particularly when such cattle are being fed to the limit.

In the last analysis the question of getting cattle on feed, keeping them on feed, and making them gain rapidly is a problem that must be worked out by

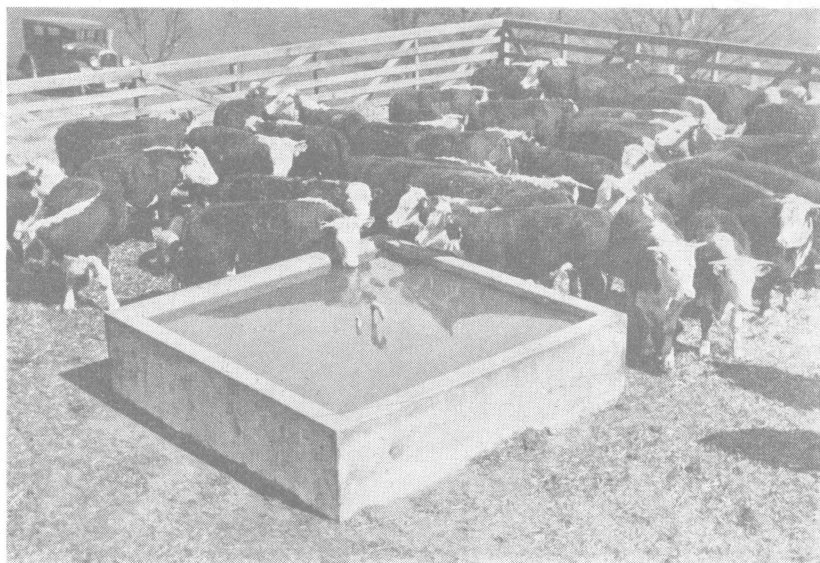


Fig. 14.—Plenty of clean fresh water convenient for cattle is necessary for rapid and efficient gains. U. S. Veterans' farm, Chillicothe, Ohio.

each individual. Some men are so constituted that they can gauge the appetite of a steer much more keenly than others, and the feeder who studies his animals and notes by various signs when they are doing well and when they are not will do much better than the feeder who comes in hurriedly, dumps feed into the bunks, shoves hay into the racks and goes on to some other task. Getting cattle on a full feed and keeping them going smoothly without getting upset or off-feed is something that cannot be worked out by mathematics or any set rule. It is largely dependent upon the individual in charge.

The late Tony Russ, that veteran feeder who coaxed steers to eat various concoctions at the Ohio Experiment Station for more than 30 years, said this to a group of cattle feeders: "I like to shove cattle along on feed to the point where

a steer will look up when I come through the gate with a basket of feed on my arm and the expression on his face seems to say: 'What? Is it time for you to be here again? Well, I'm not hungry but I guess I'd better get up there and get some before the others eat it all up.'

Tony was just repeating in different language the old legend: "The eye of the master fattens his cattle."

WATER

An abundant supply of fresh water is necessary for fattening cattle. Two-year-old steers need approximately 10 gallons per head daily, and others in accordance with their size. The drinking tank should be placed in such a way that hogs following the cattle cannot get into it (see Fig. 11).



METHODS OF FEEDING

FATTENING ON PASTURE

This method of fattening cattle during summer months has not been generally regarded with favor among feeders. This reaction is probably due in part to the fact that feeders depended too much upon the pasture for putting on finish. Grass alone or only a light allowance of grain on grass still leaves cattle in the grass-fat class, and they do not sell as high as dry-lot fed cattle or others that have been given a heavy ration of grain on grass. The grand champion carload of fat steers at a recent International Stock Show were grain-fed on grass throughout the summer, but while on grass they were given all they could eat of a good grain mixture and, of course, later were taken up and dry-lot fed for a considerable period of time before being shown.

Cattle that have been given a liberal grain ration during the winter and spring months and then turned on grass will lose their bloom, and the hair coat will take on a much rougher appearance. For this reason the wiser practice is not to grain-feed cattle too heavily that are to go out for grass feeding. When put on grass following this treatment they will show a greater relative improvement than will similar cattle that have been getting a heavy grain ration for some time before turning on pasture.

A test¹ at the Ohio Experiment Station throws considerable light on this subject. Two lots of 650-pound steers were used for the comparison, one being



Fig. 15.—Good pasture that is not overstocked produces cheap beef.

¹ Bimonthly Bulletin No. 140.

dry-lot fed on a ration in which they got corn silage while the other lot was on bluegrass pasture. Aside from this both lots received ground shelled corn and linseed meal. The dry-lot cattle also got approximately 2 pounds of mixed hay per day. The average daily gain on the pasture fed cattle was 2.36 pounds compared with 1.88 pounds as the average daily gain of the dry-lot steers. This was over a period of 147 days. Following are some of the conclusions drawn as the result of this test: "Steers fattened on bluegrass pasture made more rapid and efficient gains, shrank more en route to market, sold for less money on the market, dressed 1% less, but returned more profit than steers fattened in a dry lot."

The treatment of these steers before going on grass is also of interest. Both lots had been fed from December to June on a ration of corn silage, alfalfa hay, and linseed meal, and their average daily gain during this period had been 1½ pounds. After the summer feeding test was started the pasture fed cattle made more rapid gains, although their condition did not indicate this. This lot of cattle was much slower taking the grain ration, requiring about six weeks to get up to the same feed of shelled corn as the dry-lot cattle. During the entire feeding period both lots ate practically the same amount of corn. The nine head of cattle on pasture were limited to 5 acres. A final statement in regard to this test is quoted herewith: "The results of this test indicate strongly the advisability of full feeding corn to cattle on pasture and feeding long enough to obtain sufficient condition on the cattle to remove them entirely from grass cattle competition. A short feeding period on grass will not do this."

NUMBER OF FEEDINGS PER DAY

The Wisconsin Experiment Station has conducted two tests¹ on the feeding of cattle once a day compared to twice a day. In the first test the cattle fed once a day showed the best results in daily gains and return per steer over feed cost. Since most cattle feeders practice twice-a-day feeding, the subject was considered to be of sufficient interest for a second test which was concluded in June, 1930.

In addition to the lots which were fed once a day and twice a day, a third lot was self-fed. The cattle used in this test had an initial weight of slightly over

Comparison of Feeding Methods

	Twice a day	Once a day	Self fed
Average daily gain, pounds	2.79	2.72	2.80
Cost per cwt. gain.	\$10.95	\$11.21	\$11.95

700 pounds and they were fed 168 days. The average daily gains and the cost per 100 pounds gain are given in the table on the left.

From these figures it can be readily seen that there was

little choice between the three methods as far as average daily gain was concerned. On the cost per 100 pounds gain, twice-a-day feeding had a slight advantage. Since the previous experiment gave the opposite result, the logical conclusion would be that neither method has much advantage over the other. However, the cost of gain on the self-fed lot was exactly \$1.00 per hundred higher than the twice-a-day lot, but the self-fed lot outsold the other two lots, and when given the pork credit they showed a greater profit per steer above feed costs than either of the other lots.

¹ Mimeographed summaries.

SELF-FEEDING

Self-feeding is not widely practiced among cattlemen, but the above test indicates that it has possibilities and some feeders follow this plan with apparent good results. The self-feeding of cattle differs from that followed in hog feeding in that cattle cannot safely be turned directly on a self-feeder, but must be brought up to a full feed of grain by hand-feeding before giving them access to the self-feeder. Self-feeding on pasture is more widely followed in Ohio than self-feeding in the dry lot. As in all other grain feeding, hogs should follow the cattle, and the self-feeders must be constructed high enough off the ground so that hogs cannot get at the grain. When self-feeding is practiced the bunks or feeders should be cleaned out frequently and regularly.



Fig. 16.—Hogs following cattle in the feedlot salvage grain that would otherwise be a total loss.

HOGS FOLLOWING CATTLE

When cattle are fed whole corn in any form, or corn silage, pigs should be placed in the feed lot with them to consume the unmasticated and undigested portions of grain. If this is not done a tremendous waste occurs. Hogs following cattle that are fed unground corn will produce approximately $1\frac{1}{2}$ pounds of pork from each bushel of corn fed to the cattle, and when following cattle that are getting silage, the amount of grain salvaged results in about $\frac{1}{2}$ pound of pork for each bushel of corn in the silage.

The resulting economics brought about in this way frequently mean the margin between profit and loss for the cattle feeder and it should not be overlooked. Hogs make less pork when following calves and young cattle than they do behind older cattle.

FEEDING EQUIPMENT

SHELTER AND LOTS

Cattle that are fed a full grain ration produce a tremendous amount of body heat and because of this they do not need to be enclosed in barns or sheds. They do need shelter or protection from storms, but this is best provided by means of open sheds or covered barnyards. Cold air is not harmful but, if possible, cattle should have an opportunity to get in under a roof in time of storms. The cheaper such protection can be provided the less overhead expense the feeder has to contend with in his business. Experiments in different states all favor the open-shed plan of feeding in preference to closing cattle up in barns. Plenty of bedding should be provided so that the cattle can lie down in comfort.

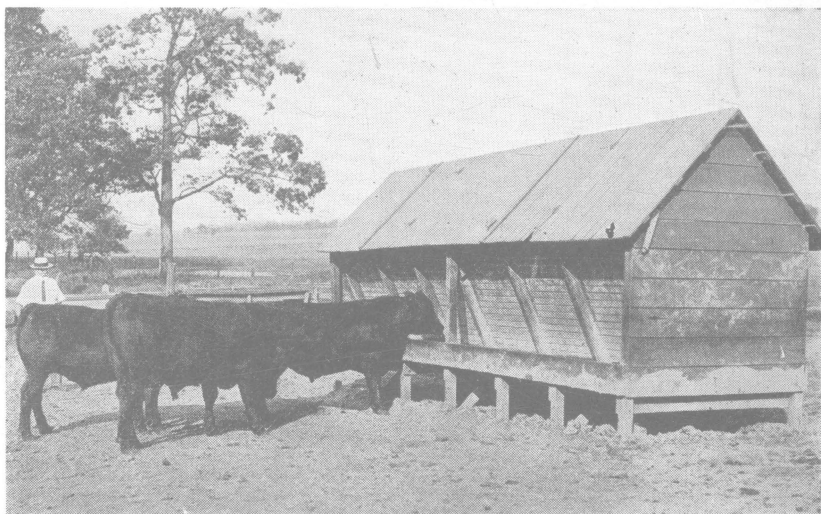


Fig. 17.—Self feeders like this one on the farm of the late A. E. Wildman, Clark County, are preferred by some feeders instead of hand feeding.

If cattle are confined to a closed barn or shed, proper ventilation is important. Overcrowding is always dangerous. In constructing open sheds, protection from prevailing winds and at the same time taking advantage of winter sunshine are important considerations. Drafts must be avoided in any kind of shelter. The L-type of open shed meets with popular approval in most sections of Ohio.

Allowing cattle a big yard or field in which they can romp is not an advantage in fattening. The more closely they are confined, provided the cattle have enough room to move about in comfort, the more efficient their gains will be from the feed eaten. Under comparatively close confinement the cattle also become more quiet and easy to handle, and they do not run off as much fat as when given more range. Also, in close quarters more manure is conserved,

FEED BUNKS AND RACKS

In the construction of bunks comparatively heavy material should be used and the legs especially must be made heavy. These legs should not be set in the ground but constructed so that it is possible to move the bunk about from place to place; also raise it up higher as manure accumulates. Some feeders construct their bunks on suspended timbers so that the bunks can be raised by means of pins as the feeding season progresses. In any event the bunk must be constructed strong enough to withstand rubbing and shoving of the cattle.

Bunks from 6 to 10 inches deep are most commonly used and the width can vary from 3 to 4 feet. Bunks that are placed so that cattle can feed from both sides are much more economical and satisfactory than those built or placed against the wall where the cattle can only feed from one side.

Various types of racks and mangers for feeding hay and roughage are found in common use, and the type of equipment that will best fit into one feed yard might not find practical use in another. Slatted racks are most widely used, so that the hay is thrown in from above and works down as the cattle eat. The slats must be far enough apart so that cattle can get their noses through and conveniently get at the hay. If built with a tight bottom very little loss of leaves will occur.



PARASITES AND SHIPPING FEVER

INTERNAL PARASITES

Cattle are affected by many of the stomach and intestinal parasites that attack sheep, and the same treatment and methods of control used for sheep can be followed with cattle. Veterinarians have stated that one of the most effective means of controlling parasites, especially in calves and young cattle, is to keep them so well fed that parasites never get a chance to gain a good foothold.

Heavy losses in Ohio feedlots from internal parasites have usually been traced to cases where calves have been shipped in from the range, placed on light pasture, or fed only a limited ration. This gives the parasites a chance to gain a good foothold while body resistance is low. In the opinion of competent veterinarians, these losses will be largely eliminated if such cattle are placed on good pasture or fed a moderate to heavy ration instead of being given only a light feeding.

WARBLES

Warbles cause a tremendous amount of damage to the cattle industry in this country every year. The holes made in the hide by these warbles seriously impair the value of the resulting leather. The application of repellents every 25 to 30 days during the grub season will help to effectively control this trouble. The best remedy for this is a wash made of cube or derris. This is carried by most druggists.

LICE

When lice appear on cattle they should be eliminated as quickly as possible. Many types of home-made and manufactured rubbing devices are used. The object of these, of course, is to get oil on to the cattle at the spots where the lice

have congregated. Poles or posts wrapped with burlap or old rope and kept soaked with oil are very effective for this purpose.

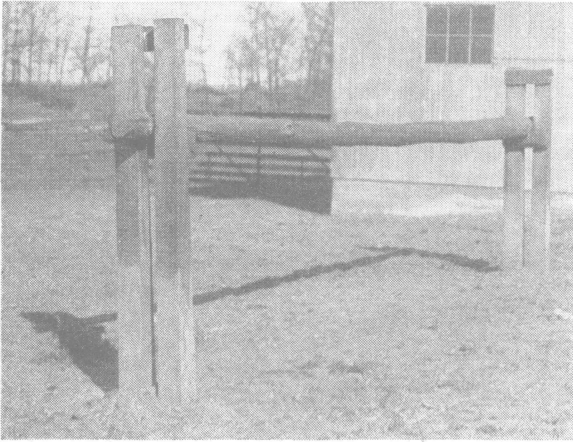


Fig. 18.—Rubbing pole that will raise or lower to suit the height of a steer. Built by Chas. Ackerman, Madison Co. Wrapped with sacks or old hay rope soaked with oil, it is an effective lice killer.

A home-made remedy for lice that can be applied with a power sprayer may be made up as follows: Place 3 gallons of water in an iron kettle and bring it to a boil. Add 1 gallon crude oil or cheap machine oil and chip a bar of soap into this. Boil this mixture 5 to 10 minutes. While it is still hot, add 7 gallons of water. This solution may then be applied directly to the cattle; it requires about 1 gallon per steer, but the amount needed will vary with the size of the cattle.

Lice treatments of any kind should not be applied to cattle on cold days because of the danger of pneumonia. A warm day should be selected for such applications.

SHIPPING FEVER

Perhaps there is no single topic in connection with cattle feeding that is more widely discussed and yet on which less relief can be definitely promised than on shipping fever. The only definite knowledge concerning a remedy for this ailment has little practical value because of the time it must be applied. Officials in the Bureau of Animal Industry have stated that if cattle are properly immunized a week or ten days in advance of being loaded at the point of origin this trouble can be largely controlled. However, any one who is at all familiar with conditions in the range country, from which most of our feeder cattle come, can realize that such treatment is out of the question in the majority of cases.

Many suggestions and remedies have been put forward to prevent shipping fever losses in feeder cattle after their shipment from the range or market. Most of these suggestions call for very light feeding during the first few days after arrival. There is some question as to the wisdom of this practice, since cattle are already low in their vitality after a long haul, and a continued semi-starvation period only has a tendency to keep their disease-resistance at a low point. A light feed of good quality hay should be their first meal. The following day a limited amount of grain may be fed.

Common baking soda added to the drinking water that cattle receive for a few days after they are unloaded has given encouraging results at the Ohio Experiment Station. Results would seem to warrant feeders giving it a fair trial.

If cattle develop symptoms of shipping fever a veterinarian should be called at once and his suggestions carefully followed.