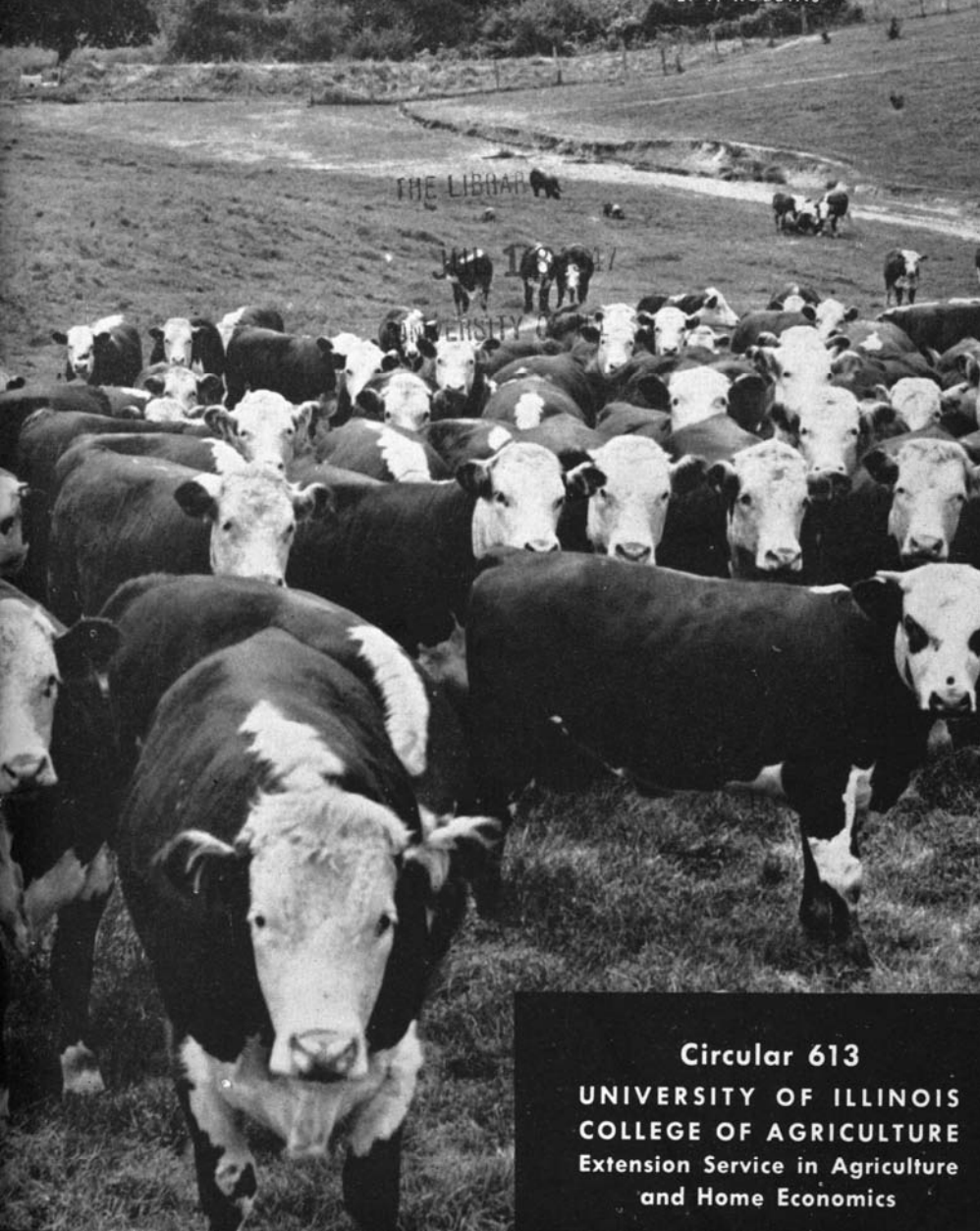


7.6c
7.4

Binding

RAISING and FEEDING BEEF CATTLE

E. T. ROBBINS



Circular 613
UNIVERSITY OF ILLINOIS
COLLEGE OF AGRICULTURE
Extension Service in Agriculture
and Home Economics

FOR twenty-two years Illinois livestock producers had the benefit of working directly with the author of this circular, Professor E. T. Robbins, now retired from active service as Professor of Animal Husbandry Extension. They have known him also thru thousands of articles on timely livestock topics and his noteworthy circulars, *Cheaper and More Profitable Pork Thru Swine Sanitation* and *Judging Livestock*.

As his last official service before retirement, Professor Robbins has set down here in more permanent form his ideas on beef production and feeding, gained from many years of intimate contact with the beef producers of the state, as well as from the research work of his associates in the Experiment Station. This contribution will, we believe, be welcomed by the livestock industry he has served so ably.

W. E. CARROLL

Head, Department of Animal Husbandry

CONTENTS

	PAGE
RAISING BEEF CATTLE	5
Raise Only High-Quality Cattle	7
Keep Cows on Pasture and Roughage	11
How to Manage Calves	12
SELECTING CATTLE FOR FEEDING	14
Cattle Are Designated by Grades	14
Experienced Buyers Are Cautious	20
Economic Considerations	21
SHELTER AND EQUIPMENT	24
Fine Buildings Are Not Necessary	24
Provide a Comfortable Place to Lie Down	26
Good Equipment Saves Feed	27
Good Water Is Necessary	33
Equipment Must Be Strong	35
PLACE OF FORAGE AND GRAIN	37
Pasture the Basic Feed	37
Good Roughage the Basis for Winter Feeding	39
Silage Helps Winter Feeding	40
Corn Is the Principal Cattle Grain	41
Other Grains Can Be Fed	43
Commercial Feeds	43
High-Protein Feeds Supplement Corn	44
Vitamins and Minerals	46
GENERAL PRINCIPLES OF FEEDING	47
Cattle Thrive on Whole Corn and Hay	47
Full-Feeding Gives Final Finish	49
Pasture Makes Cheap Gains	49
Good Management Saves Corn	50
Choose Calves for a Long Feed	52

CONTENTS, *Concluded*

	PAGE
FEEDING CATTLE FROM WEANING TO SLAUGHTER	53
Fattening Calves.....	55
Fattening Yearlings.....	55
Fattening Older Cattle.....	58
Getting the Right Degree of Finish.....	59
Fit Cattle Into the Farm Plan.....	60
EXAMPLES OF GOOD RATIONS	61
Rations for Show Carloads.....	61
Rations for Choice to Prime Steers Which Topped the Market.....	61
Rations for Good to Choice Steers.....	62
Rations for Medium to Good Cattle.....	63
Rations for Inferior to Common Cattle.....	63

RAISING AND FEEDING BEEF CATTLE

By E. T. ROBBINS, Professor of Animal Husbandry Extension

BEEF-PRODUCING FARMS are located thruout Illinois, but both the raising of calves and the fattening of steers are most prevalent in counties west of the Illinois river. The northwestern counties are especially favored for cattle feeding because they are bothered less with winter rains and mud. Cattle feeding is a prominent industry in several counties in the west-central part of the state. In southern Illinois there are scattered farms where beef calves are raised and some farms where cattle are fattened for market. The Dixon Springs Station has shown the possibility of further development of the industry in this part of the state.

Most farmers who raise beef cattle fatten them also, and some buy additional cattle for feeding. Many buy all the cattle they fatten, especially on prairie farms in central and northern Illinois.

RAISING BEEF CATTLE

Beef cattle thrive on grass. A beef-cow herd is excelled only by a flock of sheep in converting a maximum of pasture and roughage and a minimum of grain into human food (Fig. 1). Land which is too hilly or too poorly drained for successful cultivation may grow grass better than anything else. Such land is often stocked with beef cattle if there is not enough help on the farm for dairying.

Beef cattle are comparatively healthy and hardy, require but little care and shelter, do not injure themselves in barbed-wire fences, and are able to protect themselves from dogs which might kill sheep. Grass, water, and salt are all that is needed for the breeding herd or the drove of growing steers during the grazing season, which usually lasts about 6 months but sometimes extends the year around.

Diseases and parasites. Whenever these occur they are likely to cause disaster if neglected. Illinois Circular 557, "Fight Animal Disease!" gives suggestions for avoiding these troubles and for emergency treatment.



Land like this is well suited for a beef herd. The 53 cows in this herd lived on bluegrass pasture, stalks, straw, and a little hay and silage in spring. The timber was their only shelter. (Fig. 1)

Poisonous plants. Second-growth sorghum and short dark-green Sudan grass may be poisonous. After it is 2 feet high, Sudan grass is relatively safe. Cured for hay it is safe.

Dark or moldy sweet-clover hay may destroy the power of the blood to clot, so that animals may bleed to death from slight wounds.

Red clover often has rust and mold on the leaves in the fall and causes cattle to have sore mouths.

White snakeroot, a weed with broad leaves and having clustered white flowers in August and September, is often found in timber pastures. When grass is short after a drouth, cattle may eat enough of this weed to sicken or even die. The weed should be identified and eradicated, or the stock should be fenced out. Stock should not usually be allowed to enter woodland.

Other less common plants ordinarily cause no trouble. Corn smut and osage oranges (hedge balls) are not poisonous. For more information on poisonous plants, see Illinois Circular 599, "Illinois Plants Poisonous to Livestock."

Bloat often occurs in cattle pastured on rank-growing legumes. The best precautions seem to be: (1) mix timothy or other grass in legume seedings; (2) fill cattle with hay or grass just before turning them on

legume pastures; (3) leave them on such pasture continuously, day and night; (4) give free access to coarse hay or straw, and to water and dry loose salt; and (5) feed fattening cattle ground ear corn if they are on legume pasture. Chronic bloaters should be sold to the butcher.

Cost of raising and buying calves compared. It costs about as much to raise a choice beef calf as to buy one. In Illinois during several years of normal prices the total cost of raising a calf economically to a weaning weight of about 400 pounds in October averaged \$30 to \$40. This is about the same as the delivered price of similar range calves in the same periods.

In years of low prices it is cheaper to buy calves; in years of high prices it is cheaper to raise them. The principal reason for raising beef calves in Illinois is to have the cow herd extract an income from pasture and roughage that cannot be better utilized. Also raising one's own feeders eliminates much of the gamble in cattle feeding.

Calves bought by the University from southwestern ranges usually have a total cost, including shipping expenses, shrink, and death loss, of \$5 to \$6 a calf more than they cost on the range. Well-bred native calves from the University's Dixon Springs Station have been worth a little more than range calves at weaning time, as shown by economy of gains afterwards and market returns when fat.

Dual-purpose cattle have a place. Many herds are developed for both beef and milk. Some cows give milk enough for two calves for 5 months or more and perhaps one calf for another 5 months, while the cows not raising calves are milked.

Well-managed dual-purpose herds sometimes pay as well as strictly beef herds or even better, altho their calves will not sell so high when fat. Milking Shorthorn and Red Poll are the dual-purpose breeds common in Illinois.

Raise Only High-Quality Cattle

Purebred cattle are basic. Purebred Shorthorns, Herefords, and Angus are the foundation for the Illinois beef-cattle industry. These three are the most common beef breeds in Illinois. Raising purebred cattle successfully requires special aptitude, attention, salesmanship, and leadership on the part of the breeder.

Most cattle are "grades," resulting from several generations of calves produced by mating purebred bulls and unregistered females. Purebreds and grades need about the same amount of feed, care, and shelter. The principal difference is that many purebred herds are

kept relatively fat for advertising purposes, and the calves for sale are fed so as to grow and fatten as quickly as possible.

Suggestions on selecting purebred beef cattle are given in Illinois Circular 579, "Judging Livestock." Care, feeding, fitting, and showing are discussed in Circular 540, "Beef Manual," a 4-H club publication.

How to start a herd. Since most herds are kept to produce cattle for slaughter, cows of good beef type are best (Fig. 2). Altho a dairy herd



The fleshy cow in the foreground has just weaned a seven-months-old heifer calf weighing 430 pounds, born April 12. She was kept on redtop and lespedeza pasture. (Fig. 2)

can be changed to a beef herd merely by using beef bulls, it is quicker and cheaper to sell the dairy cows and buy cows of beef type. Many a herd has been started with choice heifer calves. Older heifers or cows cost more and may introduce disease.

Grading up gives quick results. When a good prepotent¹ beef bull heads a herd of inferior cows, the first crop of calves is a great improvement over the cows (Fig. 3). The change in succeeding generations is less marked but is so evident that four or five generations bring the cattle very close to purebred type. Some reversions, however, toward the type of the original cows will appear for many generations.

Select breeding cows with high earning capacity. Choose smooth, blocky, thickly fleshed, medium-sized cows. Insist on a short, wide head, straight back, long level rump, thick thighs, wide chest, and deep,

¹ A prepotent bull is one that has the ability to consistently stamp his qualities upon his offspring.

roomy body. Reject cows that do not have thick natural flesh and those with long legs, shallow flanks, and small or unsound udders. Select quiet, vigorous, thrifty, and healthy cows of feminine appearance.

Reject cows reacting to tuberculin and Bang's disease (contagious abortion) tests. If either of these diseases is encountered, see a competent veterinarian about establishing rigid control measures.

The diseases can usually be kept out of a herd. One man whose 200 cows weaned 182 calves said that his only precautions against con-



Purebred bulls are prepotent. The blocky purebred bull at the top sired the good calf produced by the inferior cow. (Fig. 3)

tagious abortion were good fences and buying his bulls at weaning time and keeping them away from neighbors' cows. And he bought no females.

Improve your herd by rigid annual culling. Keep only cows of good type that stay healthy, breed promptly, raise good calves, and stay in good flesh on pasture and roughage. Keep early, large, shapely, quick-maturing fleshy heifers raised by your best cows. Most records indicate that it pays best to let well-grown heifers have their first calves when 2 years old.

Discard cows which need help in calving and those which need grain when dry in winter. Sell all animals which are excitable, irritable, wild or cross. Every cow must raise a calf each year or she loses money for the owner. A barren cow can be fattened quickly for sale in the spring when the price is usually highest for butcher cows.

Buy a better bull each time. Use a good easy-keeping purebred bull of a locally popular breed. Always try to get a better bull than the one you had before, and one with considerably more merit than the cows. Big beef bulls are best. A bull can be big and still be low-set, smooth, and blocky in build, and sire market-topping calves. There is a saying, "A good bull is half the herd; a poor bull is all of it." An extra hundred dollars may be well invested in a superior bull.

The power to perform is inherited. In beef-production contests based upon the total gain of the calves in the herd the winners usually have been herds with large roomy easy-keeping bull and cows. Tests by the U. S. Department of Agriculture and the University of Illinois show big differences in the rate and economy of gains made by calves sired by beef bulls of similar appearance. Several years ago at the Dixon Springs Experiment Station in southern Illinois, one of four similar Hereford bulls sired calves that gained much more rapidly before weaning, fattened more rapidly in the feedlot, and made smoother, higher-priced steers than the calves sired by any of the other bulls. Pick a bull from a herd whose calves grow rapidly.

Cattle pass on to their calves the tendency to eat too little or too much, to stay thin, to scour, or to bloat. Do not pick bulls and cows that have any of these faults. Stay with cattle whose calves are of medium size at birth.

Cross-breeding produces cattle between the two parent breeds in size and shape. Most cross-breeding in Illinois is incidental to changing a herd from one breed to another. The white face of Herefords and the black color and polled head of Angus usually are transmitted to the

offspring. In one Whiteside county herd, however, of 23 Angus-Hereford calves, all were polled and had white faces, but only 11 were otherwise black; 12 were red.

A Shorthorn-Hereford cross results in some brockle (spotted) faces. Hereford-Holstein crosses usually have all white faces, horns, and black and white color. Angus-Holstein crossbreeds look like long-legged sharp-backed Angus with occasional white spots. Rice Brothers, Peoria county, raised 60 Angus-Holstein calves, of which 56 were black and polled, one had some white, one was a blue-gray, and two had scurs (rudimentary horns). Some dairymen use Angus bulls in years when they do not want to save heifer calves. These calves should be fattened as calves or yearlings. The older they get the plainer they look.

Keep Cows on Pasture and Roughage

Do not keep too many cows. Keep only as many cows as can live well on the pasture and roughage you can spare for them. If you need to feed corn, you have too many cows.

Your pasture should provide plenty of feed for six months or more. One acre of mixed alfalfa-brome pasture on prairie land, two acres of good bluegrass, or four or five acres of pasture on poor land may be needed for each cow. Overstocking a pasture results in thin cows, stunted calves, and injured pasture.

Economy is absolutely necessary. When grain is fed to dry cows in winter, the number or vigor of the calves is not increased, but \$5 to \$10 may be added to the cost per calf. The principal difference in the cows is that they are fatter in the spring.

Three or 4 pounds of alfalfa or clover hay supplies as much protein as 5 or 6 pounds of corn, and furnishes protective vitamins and minerals too. Any other green-colored roughage helps supply vitamins. Good fall pasture helps to prepare a herd for economical wintering. Remember that when you feed ordinary corn silage you include corn.

Cows can live on crop by-products. On tillable land at the University of Illinois, a herd of beef-breeding cows was successfully maintained for eight years on the stalks, straw, and sweet-clover pasture from a four-year rotation of corn, corn, oats, and sweet clover. There was one cow to each 4 acres of land. Old and new sweet clover kept the herd from spring to fall. Then they had the standing stalks of one husked field. After that the stover silage made from the other field of corn together with the oatstraw and 1 pound of cottonseed meal a cow daily kept the herd thru the winter. They were given no corn. They stayed vigorous and thrifty and raised good calves. Thus the

cheap and unsalable roughages from 4 acres of prairie land in crops maintained one cow a year with her calf to weaning time.

One University of Illinois herd of cows thrived on pasture and stalkfields for 9 months, and straw, clover hay, and 2½ bushels of corn a cow during the other 3 months. Another herd of 10 to 12 cows gleaned on a 240-acre prairie farm has paid well for several years.

Economical calf production is possible. Seven good Illinois cow herds in six counties averaged 26 cows which raised 25 calves. Three herds had timber and four had sheds for shelter. All lived entirely on pasture, stubble fields, stalks, straw, and a little legume hay, but no grain or silage. The pastures varied from 1½ to 4 acres of rolling permanent pasture a cow.

For many years one herd of 30 to 40 cows had a 60-acre bluegrass pasture, 20 acres of which had many trees. The only other feed was stubble fields, stalkfields, straw, and a little legume hay. In spring these cows were thin but vigorous and active. They produced strong calves.

How to Manage Calves

Spring calves pay best. Cost accounts show that calves born in the spring pay best. April is usually the best month for calving. The weather then will be mild enough for the herd to be out in a pasture away from filthy barnlots, and the grass will still be short and not make too big a milk flow for the little calves. Calves born earlier than April are better for creep-feeding. To have calves of even size, allow two months for breeding. The gestation period averages about 283 days.

A bull should be in good flesh at breeding time. Generally a mature beef bull is allowed to run with about 30 cows; a yearling bull should not run with the herd. Confining the bull and bringing cows to him requires much extra work and may result in a smaller percentage of calves. Artificial insemination of beef cows involves much more equipment, labor, and excitement of the cattle, and a smaller percentage of calves, so that it is probably better to buy another bull.

Calves can be dehorned with a stick of caustic potash when they are a few days old. It is dampened and rubbed on the horn button, after the skin is scraped thin at that place.

Castration causes the least shock and risk to the calf if it is done during the first month of life.

You can have calves always fat. To do so, start them on a full feed of shelled corn or corn and oats as soon as they will eat, at about

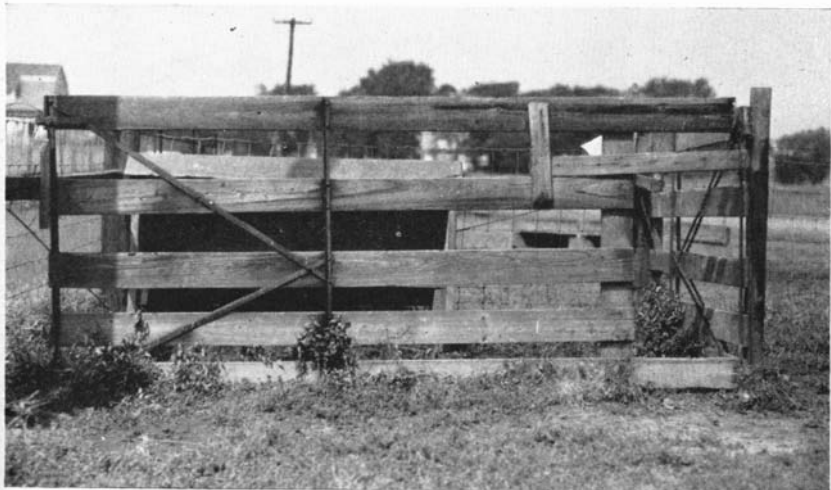
2 weeks. When a small herd is pastured near a barn, the common plan is to keep the calves at the barn or in a shady grass lot nearby and feed all the grain and hay they will eat. The cows come in, morning and night, for the calves to nurse. Full-feeding may be continued a month or two after weaning, with about 10 percent of some protein supplement added, such as linseed meal.

This plan usually produces a 700-pound calf ready for market at 8 to 10 months old. It has eaten about 20 bushels of grain, 75 pounds of protein supplement, and 125 pounds of legume hay. These results are about the same as with creep-feeding.

Creep-feeding suits big herds away from the barn. Calves are fed grain in a creep in the pasture and are with the cows all the time. This means less labor. Such calves should be born as early as March so some will learn to eat grain before going on pasture, or else they may eat very little grain until about August.

The "creep" is a small pen that keeps the cows out but lets the calves in thru an opening about 16 inches wide and 3 feet high (Fig. 4). The pen should be located near shade or water where the herd spends considerable time. The feed is put in a low trough daily or kept in a self-feeder.

Shelled corn, or equal parts by measure of shelled corn and whole oats, is usually fed. Grinding does not pay. Adding about 10 percent of a high-protein feed such as linseed meal or cottonseed meal has



A calf creep made of two old gates wired up in a fence corner. There is a small self-feeder in it. This creep is used at the University of Illinois. (Fig. 4)

increased the rate of gains slightly but sometimes not enough to pay until after midsummer.

By the time the calves are 7 or 8 months old each usually has eaten 15 to 20 bushels of corn or corn and oats, and should weigh about 600 pounds.

Calves intended for slaughter should be sold then or within one or two months afterward. They are old enough to wean and are fat enough to sell at the top of the market for cattle of that weight. Sometimes they bring the top price for all weights.

Each 100 pounds of gain on creep-fed calves requires less feed than on older cattle. Probably this system makes more beef with less corn and labor than any other plan. It does not pay to creep-feed calves that you are going to continue feeding until they are 12 months old or older before marketing.

Wean at six or seven months. That will be about October for a spring calf. The calf has a little more time on pasture while becoming adjusted to the change. This also gives the dry cow some grazing to fortify her against winter's hardships. She will gain considerable flesh quickly and cheaply on good pasture. If the calves are to get some grain during the winter, start to feed it at weaning time to avoid any setback.

Steer calves are heavier than heifers. Calf weights were studied for eight years at the Texas Experiment Station. Each year the steers were heavier. At a weaning age of 205 days, the 444 heifers averaged 411 pounds and the 419 steers averaged 443 pounds, or 32 pounds more than the heifers.

SELECTING CATTLE FOR FEEDING

When they are examining fat steers, most cattle feeders can pick out the best ones, but when selecting thin steers, many of these men accept a large proportion of counterfeits. Even the keenest judges make a few mistakes because they have to do some guessing about how the animals will turn out, and they do not always develop as expected. This is especially true of calves, which sometimes grow to be tall lanky yearlings because of inherited tendencies.

Cattle Are Designated by Grades

Feeder cattle are classified in several Government grades which correspond with similar grades of fat cattle. In general a feeder steer

of any grade is likely to be in the corresponding grade when fat, altho if very well fattened he may place one grade higher. A Good feeder steer, for example, that is given 1 to 3 months extra feeding may reach the Choice grade. If not fed long enough, that steer may grade only Medium. The same is true for other grades.

Grades are based on beef type and not on ability to gain. Low-grade steers may have deep roomy middles and gain as rapidly and cheaply as Fancy steers, but will grade low as slaughter cattle; fat animals having inferior type and less finish go into the lower grades. A full discussion of the characteristics of Prime fat steers is given in Illinois Circular 579, "Judging Livestock."

Government grades of feeder steers and of corresponding fat steers, as established before World War II, are illustrated in Figs. 5 and 6. The most distinguishing features of feeder steers of the different recognized grades are explained below.

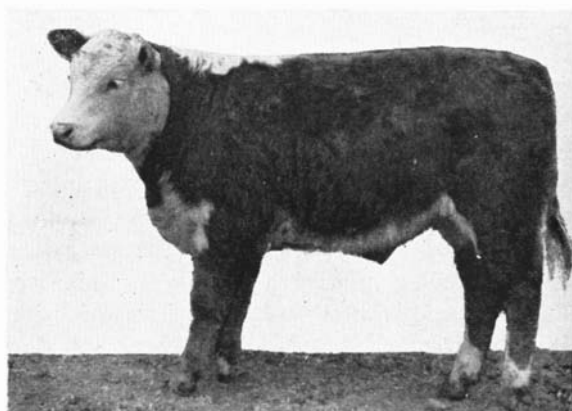
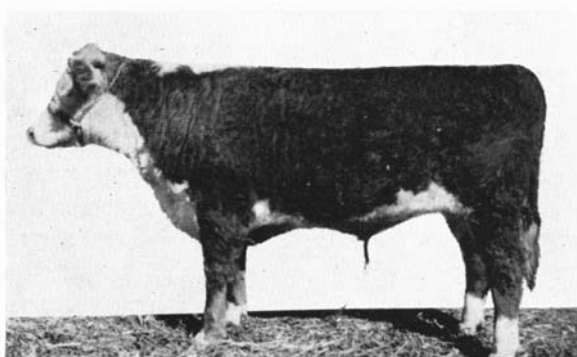
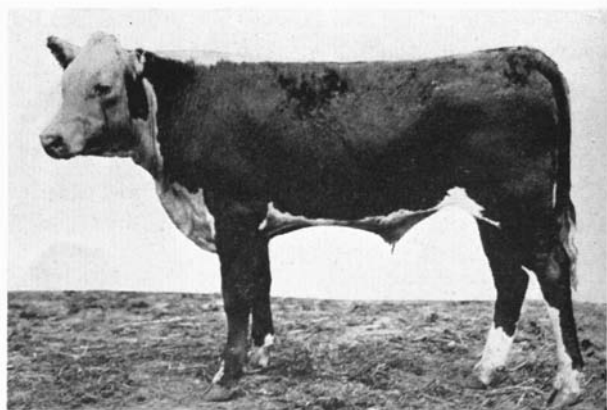
Fancy is the term used for the best grade of feeder steer. He has a beef-breed color and a short, wide head, short neck, and short tail bone, all of which are evidences of good breeding. He is blocky, compact, low-set, deep and wide, with straight level topline and nearly level underline, and he is muscular and smooth. When fattened, such a steer should make the Prime grade. Show steers develop from Fancy feeders. There are very few Fancy feeders or Prime fat steers.

Choice feeder steers are not quite so blocky or compact as the Fancy steers, and may be a trifle leggier, shallower-bodied, longer in head or neck, or lacking a little in some other detail of outline. When fat, these steers are similar but not quite equal to Prime steers. However, they will "top the market" when fat.

Good feeder steers are taller, usually shallower, and often not quite so straight in topline or so muscular as Choice feeders. Any serious fault, such as a drooping rump, low back, or rough hips may put an otherwise Choice steer into the Good grade. Similar faults characterize the same steer when fat and are usual in Good fat steers. It seldom pays to make them very fat.

Medium feeder steers are usually narrower and shallower than good feeders, uneven in top and bottom lines, often prominent in the hips, rather long-legged and light-muscled, or perhaps of an unusual color. When fat, they have these same general characteristics which put them in the Medium slaughter grade. They are suitable for a short feeding period.

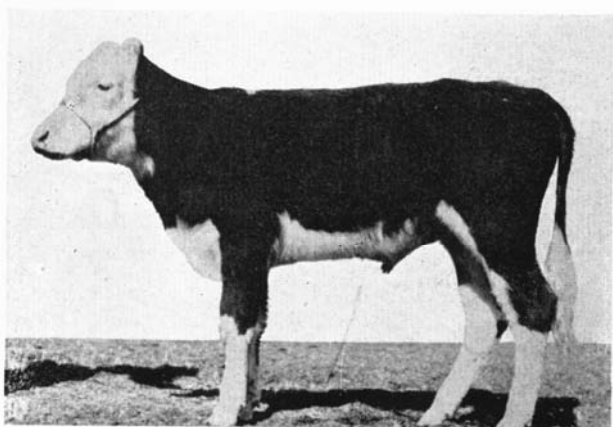
(Turn to page 20)

Fancy**Choice****Good****Government grades of feeder steers.****(Fig. 5)**

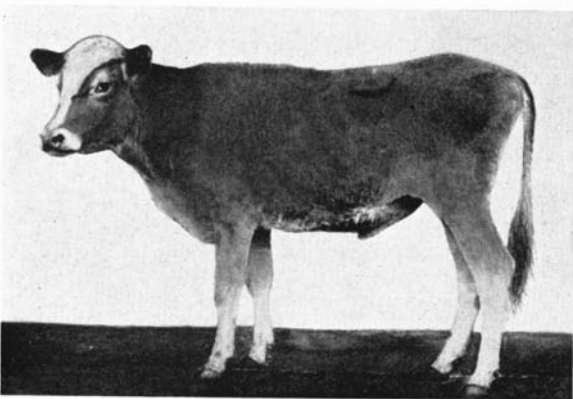
(Photos courtesy U. S. Dept. Agr.)



Medium

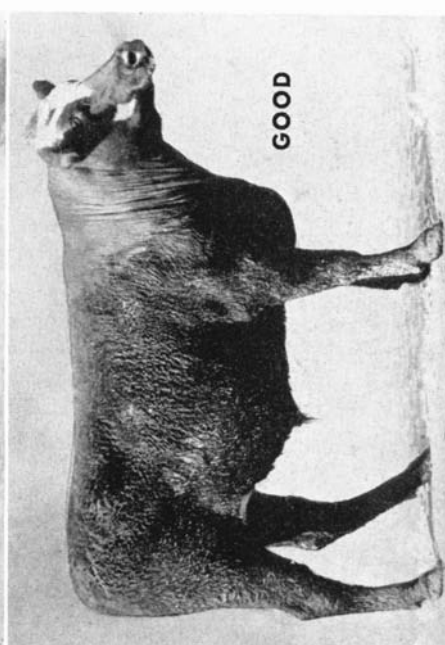
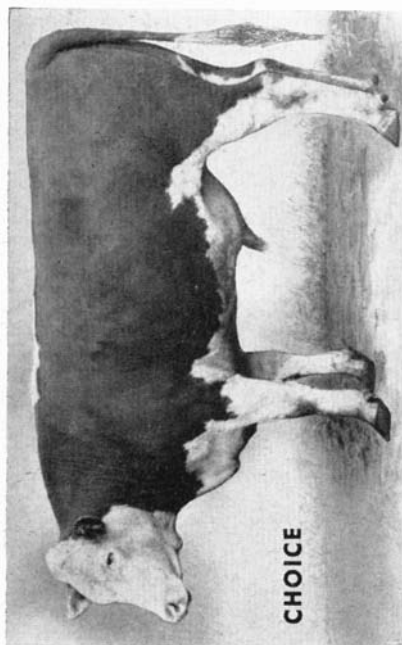
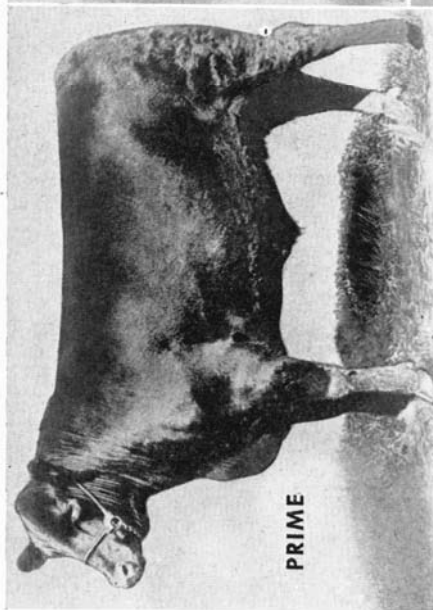


Common



Inferior

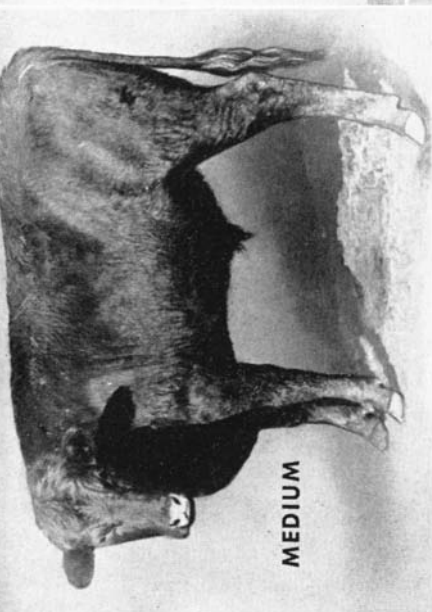
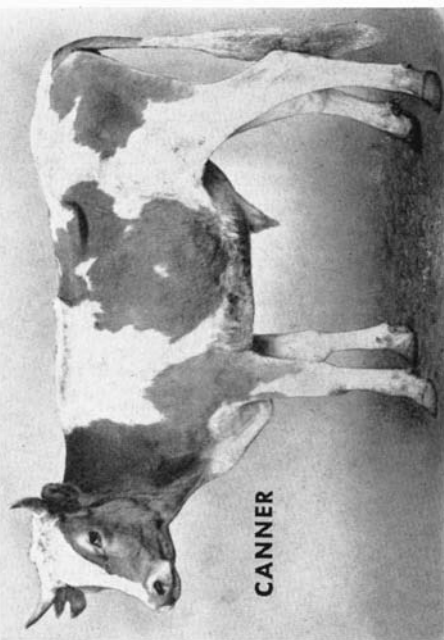
Government grades of feeder steers (continued)



Government grades of fat steers, in order of quality, are: Prime, Choice, Good, Medium, Common, Cutter, and Canner. The quality of your feeder steers will very largely determine the quality of your fat steers.

(Fig. 6)

(Photos courtesy U. S. Dept. Agr.)



Common feeder steers are still more scrawny with various serious faults of general appearance and conformation. They are often the color of dairy cattle; some have a crooked topline, long face, long crooked legs, and a rather bare bony frame. Common and Inferior steers have to be fed longer than the better grades to reach the same weight, and consequently require more feed for each pound of gain. It may be impossible to get such a steer very fat, and it does not pay to try it. The Common feeder sells finally as a Common or possibly Medium slaughter steer.

Inferior feeder steers are usually angular, very light-muscled, and small-boned. Often they are very leggy and shallow-bodied, built more for speed than for beef. They are often of dairy type and color, sometimes resembling the old-fashioned unimproved western cattle or the scrub cattle of the South called "yellow-hammers." They will seldom put on much fat, and they finally sell as Cutter steers, or if very inferior and thin, as Canner steers. Deep-bodied "yellow-hammers" feed well for men who know how to handle them, and often give good returns.

Cows and heifers are graded similarly to steers. Heifer calves usually may be bought about one dollar a hundred pounds cheaper than steer calves. When fat they sell somewhat lower, too.

Experienced Buyers Are Cautious

Beware of counterfeits. Many steers which were cut back on the range in the fall because they were of inferior type are sold in the spring for more than they are worth. A tall, gangling steer, with narrow head, shallow chest, shallower flank, sharp back and rump, "cat hams," crooked legs, and "spindle shanks," can never be transformed into a blocky, thick, smooth fat steer. Fat does little to shorten the legs or to deepen the chest, straighten the back, shorten the neck, or make the rump level. A thin steer will retain somewhat the same general outline and shape after he becomes fat.

A Good or Choice feeder steer never is very shallow-bodied, very thin in the thighs, or sharp at the tailhead, even when very thin. He never appears to be as thin as steers of lower grade often seem to be, and he usually has more bone as well as more muscle.

Buy by weight. Do not buy by the head unless you are very sure of your judgment. The time of day, the cloudiness of the day, irregularities of the ground, your distance from the cattle, whether they are

shown indoors or outdoors, the amount of bedding, mud in the yard or on the animals, cold, your desire for the cattle — any of these may affect your estimate of weight. The seller may know the real weight, and if so will have an advantage. Several years ago a northern Illinois feeder bought 83 two-year-old steers by the head, estimating them to be bigger and better than they were. He paid about \$2,000 too much for the drove.

Get expert help. The surest way for most feeders to get thin steers of the grade they want at what they are worth is to have a capable commission man or qualified buyer of feeder steers make the selection. Such an expert has keen discrimination in sorting out the unpromising steers and knows just what the cattle are worth on his market. So careful are these buyers that a market man who is purchasing on a strange market will engage a regular operator there to dicker on the price, because that man will know all local conditions affecting the deal, and can save money for the buyer.

To save the commission paid to the buyer one cattle feeder bought 28 steers at the Chicago stockyards without expert help and paid \$1.25 a hundred too much, or a total of \$300 more than the drove was worth. There are many such cases each year.

Economic Considerations

Buy thin cattle for grazing. Big thin steers will put on considerable flesh rapidly on pasture alone; corn cannot compete with pasture in putting gains on thin steers. After they get about half fat, however, they gain only slowly unless they are fed grain. Fleishy steers off good pasture will gain rapidly and fatten quickly if put right on a full feed of corn.

Feed according to grade. The better grades of steers are the ones to buy if you want to give a long full feed of grain and make them very fat. Good to Choice or even Fancy steer calves are often chosen for a long feed of seven months to a year. The feed that such little cattle will eat may come to more than their initial cost. Their high cost per pound, however, may be more than balanced by the fact that every pound of gain they put on also has a high value.

Lower-grade steers are often fed a large amount of roughage and then given a short finishing period of grain. Heifers are given a short full feed to fatten them before they appear "cowy" or show pregnancy.

It is a mistake to buy low-grade calves because all the gain they put on must sell at a low price. If Inferior and Common steers are

bought, they should weigh 750 pounds or more. Their price is then so low that they usually have been raised at a loss. Given plenty of good roughage at first, including silage if possible, and then finished with two or three months on a full feed of grain, such steers often make more profit than any others because of cheap gains and considerable advance in price.

Prices of lower-grade slaughter steers are relatively high in the spring, while Choice fat steers usually are relatively low at that time. Sometimes in late spring the spread between Medium and Choice fat steers is no more than one or two dollars a hundred.

Aim for high markets. Feeder-steer prices are usually highest in late spring and early fall and lowest in winter. It usually does not pay in the corn belt to pasture steers all summer without grain because the lower prices in the fall may mean they will be worth no more after a summer's grazing than they were before.

Average monthly prices for beef steers for the 19 years before World War II disturbed price relationships are shown in Fig. 7. Since feeder-cattle prices vary about the same as prices for Common beef steers, it is evident that if you buy Good to Choice calves in the fall and sell them fat the next fall you have bought at the time when feeders are low and sold at the time when fat cattle are high. Illinois 4-H Club calves usually show a profit because their owners follow this system. Cattlemen may find that buying or selling wisely will increase their profit as much as any feature of their business.

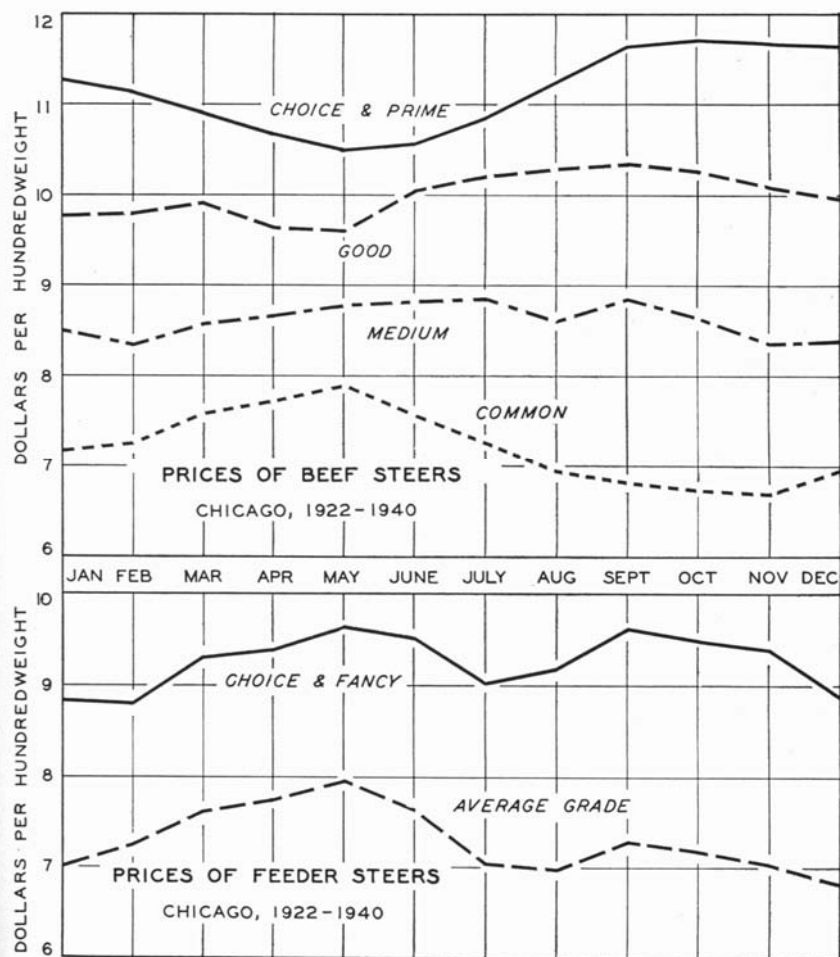
Good to Choice steers, finished for their grade, are usually best marketed in the fall. This involves full feeding during summer and early fall, either on pasture or in drylot. The best time to market cows, heifers, and Common to Medium steers, moderately fat, is in the spring; they are good cattle for winter feeding.

Prices vary over a period of years. In the past 45 years, cattle prices have been relatively high in 1902, 1919, 1928, 1937, and 1945. In between there were low prices in 1903, 1921, 1933, and 1938. Long-term cycles are very irregular because they are influenced by such factors as numbers of cattle marketed, level of business activity, average level of all prices, drouths, and wars.

When the number of cattle and market prices of cattle have both gone up for several years, a reversal in the price trend may reasonably be expected. It is easy to make money feeding cattle in years when prices are going up, but there is a good chance to lose money when prices are declining.

How to figure costs. Besides the cost of the feeder cattle there are other expenses, of which feed constitutes 80 to 85 percent and labor, shrinks, losses from death, freight, selling expenses, interest, and overhead about 15 to 20 percent.

Two incidental sources of income are the manure and the gain



Monthly variations in prices of beef steers depend upon the quality of the animals marketed. Choice and Prime and Good steers are usually highest during the fall months. Steers of Medium grade do not vary much in price from one season to another. Common steers are highest in late spring and early summer and lowest in the late fall months. Prices of feeder steers have averaged highest in late spring and early fall and lowest in late summer and in the winter months. (Fig. 7)

made by pigs from corn not digested by the cattle. The manure and gain by the pigs often pay for everything except the cost of the cattle and the feed.

A **feeding margin is desirable.** The difference between the price of feeder cattle a hundred and the increased price of the same cattle when fat is known as a feeding margin. A margin is wanted because the cost of a hundred pounds of gain is usually greater than the market price of the fattened cattle. An inescapable risk in cattle feeding is that this margin cannot be foretold because fat-cattle prices may go up or down while the cattle are on feed.

A margin of at least two to three dollars is very desirable. Often more is necessary if older cattle are fed or if feed is high. Calves gain cheaply and sometimes show a profit without an advance in price.

Contract feeding is sometimes done, especially when cattle are cheap. The owner of the cattle sets terms which he hopes will make more money for him than he would get in selling the feeder steers. Most experienced farmers prefer to borrow the money if necessary and buy the cattle they feed.

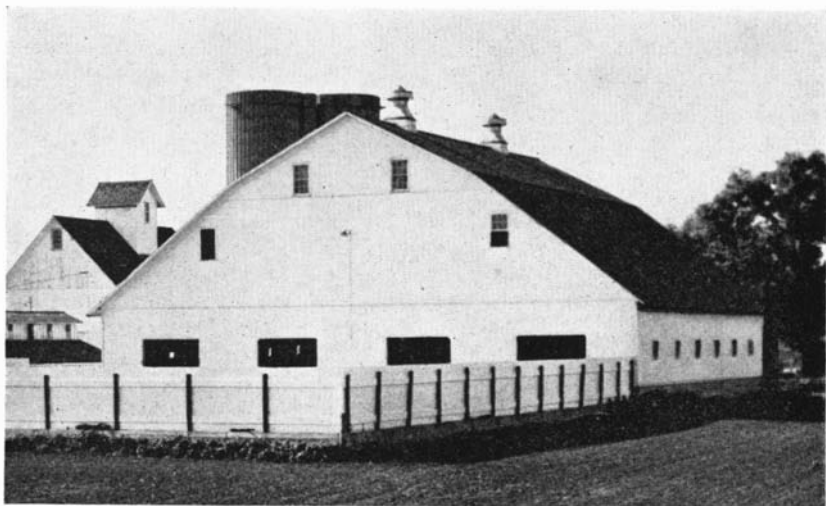
SHELTER AND EQUIPMENT

Fine Buildings Are Not Necessary

Beef cattle do not need warm barns. Many beef-cow herds have the protection only of hills, woods, high hedges, and stacks of straw or hay. Weanling calves and fattening cattle usually are given shelter,



A popular type of cattle barn. The middle section holds hay resting on the ground. Cattle are fed on the sides from racks surrounding the hay. (Fig. 8)



An excellent cattle barn on the Bert Kellogg farm, Kendall county. The barn is 80 by 84 feet, the feedlot is 100 feet square. Distance to the eaves is 14 feet (3 feet concrete and 11 feet siding). Distance to the track is 45 feet. The mow will hold 100 tons of loose hay or 125 tons of baled hay in the middle and 4,000 bales of straw on the sides. The owner can satisfactorily feed 300 heavy cattle. In a corner is a 5½-foot water tank with an electrically controlled float. With cattle in the barn, water does not freeze. (Fig. 9)

largely because protection from wind and storms saves some corn in feeding.

A popular and economical type of cattle barn has space for hay thru the middle from ground to roof with cattle sheds on the sides and sometimes on the end (Figs. 8 and 9). The hay is surrounded with racks for feeding. Grain troughs may be along the outside wall of the barn or more often are out in the lot. If there is silage, it is fed in the grain bunks.

Shelter and equipment can be cheap. When one Illinois grain farmer added a cattle-feeding project a number of years ago, the only extra building put up was a 40-by-50-foot gable-roofed open shed joined to the south side of the barn (Fig. 10). Each year this shed has held 100 steers from weaning time until they are sold the next fall fat at 1,000 to 1,100 pounds.

Most of the grain-bunk space is in this shed. There are no hay racks. Choice long alfalfa hay, as much as the cattle will eat promptly, is fed in the grain bunks. The shed is always well bedded. The part of the dirt lot leading to the water tank two rods away is graveled. The

cattle never need to step out in the mud. When the ground is solid, they spread out over the medium-sized dirt lot. Greater economy of equipment can scarcely be imagined, and the accounts show that the project has been profitable.



A cheap and satisfactory open-front cattle shelter. This 40-by-50-foot building shelters about 100 weanling steers until they are fat a year later. (Fig. 10)

An open shed is satisfactory. A good width for a long shed is 24 feet. Most sheds and barns have dirt floors, some are paved with 4 to 6 inches of agricultural limestone, and some are concrete. Concrete requires the most bedding, but it saves most of the liquid manure and is easiest cleaned. Except during a storm, fattening cattle often prefer to lie outside on reasonably dry stalks, straw, sod, or bare ground rather than in a shelter that is muddy.

Straw sheds are good and cheap. Native poles or old telephone poles are used for posts and framework on which to thresh the straw. Widths vary from 16 to 24 feet; they may be as long as needed. To keep cattle from eating holes thru the sides, some men have made ends and back from two woven wire fences about 8 feet high and 2 to 4 feet apart with the space between packed full of straw. Durable posts that will last many years and not fall down on the stock should be used.

Provide a Comfortable Place to Lie Down

It pays to provide bedding. The comfort of well-bedded cattle contributes much to their efficiency in converting corn and clover hay into beef. Some steers will stand until very tired rather than lie down

in deep mud and manure. Give them bedding and they lie down at once. Bedding also helps to absorb the liquid manure so that it gets hauled to the fields. Cattle do poorly and hogs get sick from sleeping in wet filthy quarters.

In Knox county, George M. Peterson acquired a reputation for getting cattle fat more quickly than most feeders using a similar ration. He bedded his steers deeply every other day. They always had a clean place to lie down. He explained that, "cattle fatten faster lying down than standing up."

During the years of transition from threshing to combining small grain there has been a serious shortage of bedding. Besides using the straw picked up after the combine, some farmers now mow grain stubble in August and bale it for bedding. In October they rake and bale soybean straw. Edwin D. Ioder, Bureau county, has broken corn-stalks down, raked them, and hauled them in for bedding cattle. Some men have had a corn binder follow the picker to gather up stalks. Cobs from corn shellers make first-class bedding, especially for cattle. The cobs do not need to be ground.

Shade helps. Cattle need shade in the middle of a hot day, altho they can live without it and some rotation pastures have none. A breezy grove of trees suits cattle best. Trees should be on high ground; most permanent pastures have trees, but many are along creek banks where manure from the cattle is washed away. The shade of a shed or a barn, if it has a breeze, is better than none. Cattle often prefer a breezy knoll in the sunshine to a sultry shed.

In some prairie pastures, high hedges, thickets along fence rows, or even a small group of trees has been left for shade. Bur oak, hard maple, black locust, hackberry, walnut, persimmon, and elm are often praised for their durability as pasture shade. Most trees eventually die if the ground beneath them is tramped continuously, as happens in a crowded feedlot.

Good Equipment Saves Feed

Good feed racks save hay. Many cattle are allowed to waste as much hay as they eat. They should eat all but the coarse stems. There are two types of racks which prevent waste. One is the manger type about 2½ feet deep, which is filled about level full of hay. Vertical 2-by-4-inch slats above the manger are spaced 12 to 18 inches apart. Cattle put their heads thru these openings to eat; they cannot root the hay out, and almost none is wasted.

The other type has a V-shaped rack made of slats having 4-inch

spaces thru which the cattle can pull only a "tongueful" of hay at a time (Fig. 11). There must be a manger beneath the rack to catch what hay shatters out, and then that will also be eaten. If it falls on the ground, it is wasted.



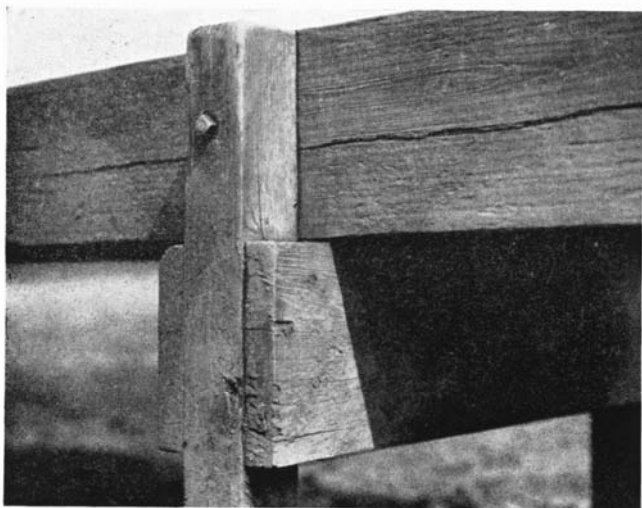
Cattle waste very little hay from this feeding rack. The rack is 16 feet long and 5 feet wide. Slats are $5\frac{1}{3}$ feet long, 4 inches apart. Top of manger is 32 inches high. (Fig. 11)

Grain bunks must be strong. They are usually movable and are made of 2-inch planks with 4-by-4-inch legs 30 inches long bolted on. These legs must be braced. Best and cheapest bracing seems to be 2-by-10-inch planks put horizontally, one on each side of each pair of legs, to support the floor of the trough (Fig. 12). Diagonal bracing adds unnecessary weight; it can catch a steer's leg, and it may anchor the outfit in the mud.

The trough of a grain bunk is usually at least 30 inches wide. A good trough can be made of 2-by-10-inch planks. Three planks make the bottom, and planks resting against the edge of the bottom make each side, so that the inside trough measurement is 30 inches wide and 8 inches deep. The ends are made of 2-by-8-inch planks 30 inches long resting on the bottom planks.

Operators with large herds usually prefer bunks 12 to 14 feet long with 4 legs. Sixteen-foot bunks with 6 legs are unwieldy. Each pair of legs is set at least 2 feet back from the end of the trough. Sometimes a narrow board, a smooth wire, or even a barbed wire is attached on the outside and at the top of the legs to keep hogs out.

You need at least 20 inches of feeding space for each steer so that all can eat at once.

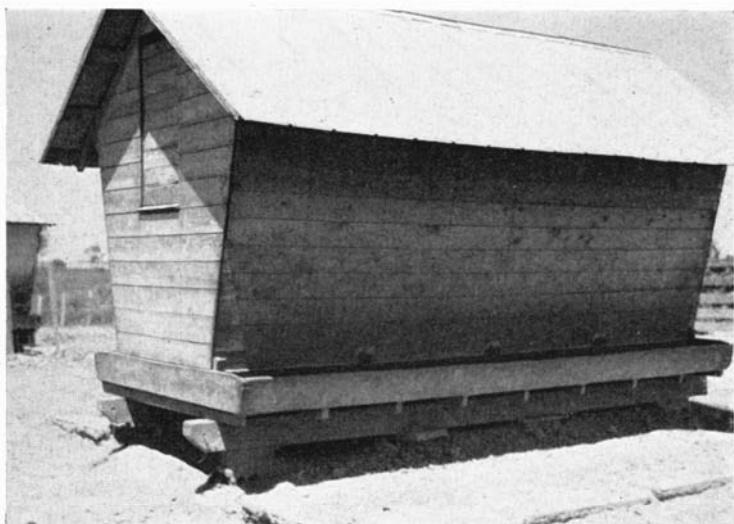


A good way to brace feed-bunk legs. The 4-by-4-inch legs are rigidly braced with 2-by-10-inch cross planks. No catching the legs of cattle; no sticking fast in the mud. (Fig. 12)

Self-feeders are practical. A self-feeder does a better job of feeding grain than a careless man does. Cattle that have been brought up to a full feed may be trusted to eat about the right amount from a self-feeder (Fig. 13). A few may eat too much and founder on shelled corn. This can be avoided by mixing 1 bushel of oats in 5 or 6 bushels of corn, or by mixing in some cut hay, bran, or ground ear corn. A good plan is to add some oats at first and then gradually withdraw them. Self-fed cattle usually eat a little more feed for each 100 pounds of gain, but make faster gains and pay better because labor is saved. There should at all times be feed in the trough of the feeder.

A 12-foot two-way feeder, having 24 feet of feeding space, is long enough for about 75 steers in a small lot. More space may be needed on pasture, or wherever the cattle do much waiting or pushing for feed.

Some self-feeders get too much feed into the trough and it becomes stale or even moldy. This damaged feed has been known to kill animals. Steers do not relish stale feed and will eat irregular amounts. Many troughs are too narrow, and the steer dribbles considerable feed onto the ground as he eats. To correct both faults the University

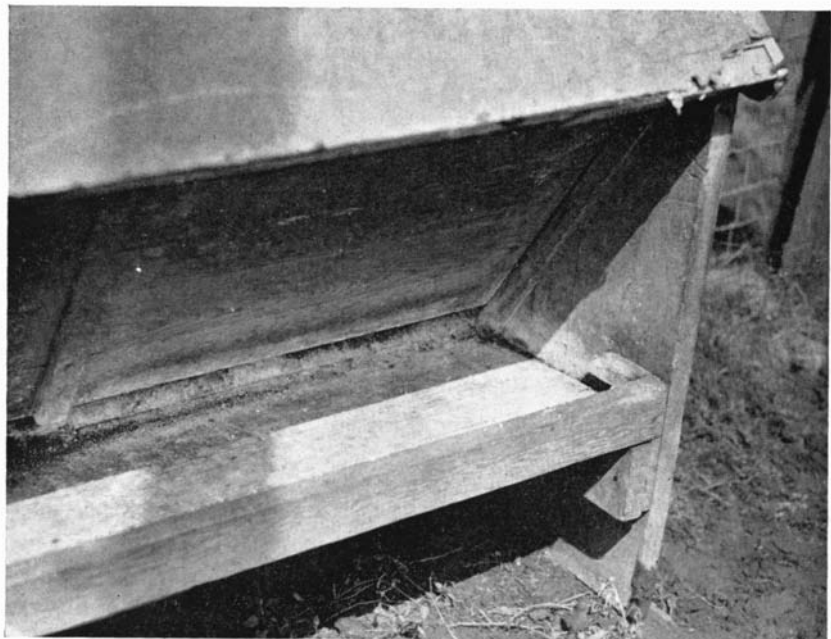


The self-feeder shown here has space for 100 cattle in drylot or 75 on pasture. It is 16 feet long and 6 feet wide. Feed troughs are 18 inches wide. Roof spread is 14 feet. The feeder holds 600 bushels of shelled corn and 2 tons of protein supplement. The supplement is mixed with the corn at filling time. Frank Kirkpatrick, Fulton county, owns this feeder. (Fig. 13)

uses a feeder with a trough about 20 inches wide and the bottom sloping down 3 inches to the opening (Fig. 14). The feed is all fresh and is next to the opening, which is narrow. If rain blows in, the damp feed must be eaten first. Almost no feed is dropped on the ground. This feeder seems to prevent founder by encouraging the animals to eat about the same amount of feed from day to day.

Feeders of this type are used by Russell Warren, LaSalle county. The troughs are 10 inches deep next to the feeder and 4 inches deep at the outside, giving a 6-inch fall. All feed gravitates to the opening.

If your cattle waste feed, or do anything else you wish they would not do, stand around and watch them awhile. You can usually determine just what habits they have which cause the trouble. Then you



A good self-feeder for calves. The trough bottom is 20 inches wide and slants down 3 inches toward the opening. No feed is wasted and none gets stale. (Fig. 14)

can figure out some little change in the equipment, or some change in your feeding program which will correct the difficulty. For example, one cattleman occasionally had a pig die while with the cattle. By watching the cattle eat, he noticed that quite a bit of cottonseed meal sifted down thru a hole in the feed bunk, and a few pigs had learned to gather there and evidently ate too much of it. He stopped the hole and ended the loss. Sometimes it is some one animal which creates a disturbance. If so, get him out of the lot.

Paved lots help cattle feeding. For several years Clarence Hart, Lee county, fed cattle in a flat dirt yard and the mud was deep; that slowed their gains. The cattle became badly plastered with mud; that hurt their sale. Now he has paving which rests right on the dirt which was first leveled off and tamped. The cattle are more easily fed and managed. They are more contented and comfortable, eat better, lie down more, keep cleaner, and gain more rapidly and cheaply. Hogs recover much more of the wasted grain. Soil fertility is saved too;

instead of being tramped into the mud during the winter, the manure is hauled to the fields frequently and spread where it will benefit the next corn crop. This experience is typical of hundreds.

University comparisons between mud feedlots and paved lots for a six-months period of winter and spring feeding show that paving pays for itself at the rate of \$4 to \$7 a steer annually, or an average of about \$5 a steer. This is the saving computed on the cattle and the hogs with them, and does not include the greater recovery and quicker use of manure from the paved lot.

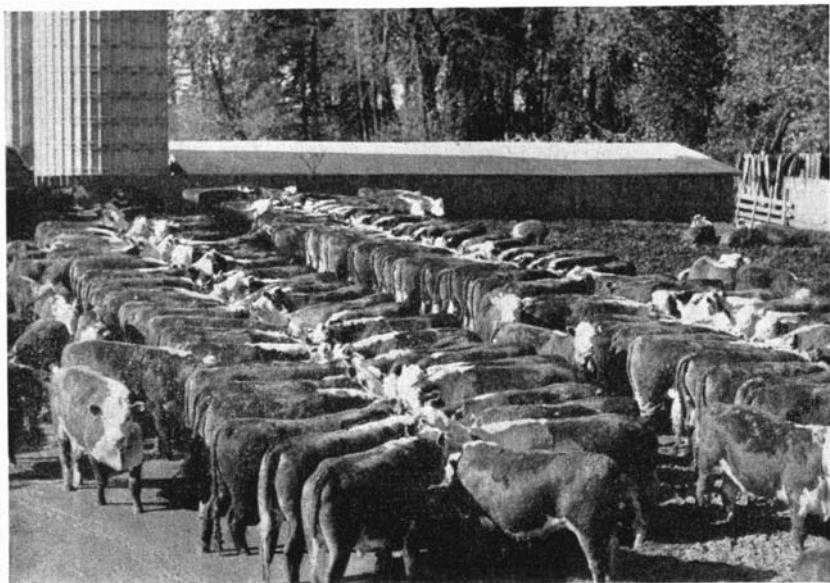
Available figures for farm feedlots show that the cost of paving may be only about \$5 for the 30 to 35 square feet per steer. Thus a pavement may pay for itself in one year. Most of the pavements have been put down by the farm help.

A dirt feedlot is best in summer. In each of three trials at the University, steers which did well in a paved lot during cool weather ate less and made slower gains when kept on the pavement in warm weather. Similar cattle which were in addition given access to a one-fourth acre dirt lot with two trees, stayed on the pavement for the most part until warm weather. After that they spent much time in the dirt lot. During this later period they ate more and gained $\frac{1}{4}$ to $\frac{1}{2}$ pound more per day. They sold higher when fat, and the average return above the cost of cattle and feed was \$5.09 more for these steers than for the steers kept all summer in the paved lot.

A good pavement lasts long. Over thirty years ago, in 1915, J. E. Wolf, Lee county, made a 4-inch concrete feedlot floor, 40 by 60 feet, using 1 part cement to 5 parts clean pit-run sand and gravel. This floor is still in good condition without repairs altho worn down some in places. Two years earlier on the Harry E. Fisher farm in Mercer county, a 4-inch pavement was laid in 4-foot squares. The mixture was 1 part cement to 4 or 5 parts of clean creek sand and gravel. This floor is still in good condition. Like nearly all these pavements, it has no reinforcement.

Paved lots are small. Twenty-two paved lots on farms where the cattle seemed to be moderately crowded but were contented and thriving had an average area per steer of 31 square feet (Fig. 15). The space under the shelter averaged 21 square feet. Usually the grain bunks or self-feeders were in the paved lot, and the haymangers occupied part of the shelter. Most of these lots were gradually filled to about this practical limit.

Long lots are convenient. For example, one paved lot 26 by 96



Cattle comfortably crowded on a pavement. The feed bunks are placed end to end so they can be filled rapidly. Cattle are contented and keep cleaner than in a dirt lot. (Fig. 15)

feet has a row of feed bunks thru the middle and holds 100 steers. In a long lot with bunks in rows, you can feed rapidly from a team and wagon, or a truck.

Various kinds of paving can be used. Most paved lots are concrete. Some are made of paving brick, or hollow building tile laid flat right on the smooth solid dirt, without any mortar but with a concrete rim around the outside. A few lots are paved with gravel about 6 inches thick. Some of these have about 2 inches of agricultural limestone on top. A very few lots are paved with 4 to 6 inches of agricultural limestone; this packs very solidly. Some of it gets hauled to the fields with the manure.

Good Water Is Necessary

Clean water promotes health. Where cattle have only filthy, muddy water to drink, unthriftiness or sickness may result. A clean spring-fed creek is an asset. Just as good but more expensive is water from a deep well. The problem then is to keep it clean.

Some stockmen empty and scrub the drinking tanks frequently. Some tanks have wood covers with open drinking spaces. This shading

keeps the green algae scum from forming. The scum may be prevented also by putting a handful of copper sulfate in a cloth bag and drawing this back and forth thru the water every few days when the greenery starts to show.

Tile drain can supply water. In many pastures stock drink water from a tile-drain outlet. Some Illinois farms have cheap and convenient drinking places made along the tile line. At a low point on his farm where three fields meet, Frank L. Stout, Sangamon county, dug down about three feet to a line of 10-inch tile and removed more than a rod of it. The tile was replaced by a concrete trough having removable iron grating over it to keep the hogs out. A sloping runway on one side gave the cattle and hogs easy access to it. Fences have been arranged so that stock in the three pastures drink from separate sections of the trough. There is plenty of water during most of each year and sometimes for the twelve months. It is as pure, clear, cool, and cheap as water from a spring. Stock thrive on it.

A tile-line waterer was put in forty years ago by A. C. Quinn, Peoria county, where a 6-inch tile 3 feet deep crosses a corner of the feedlot. A bronze grating keeps trash out of the tile. Stock go down a corrugated concrete slope to the concrete trough which replaces about a rod of tile. Stock have plenty of water there except after a long dry period or when alfalfa happens to be growing on the land drained by the tile.

Tank heaters cost money. So does the fuel and time to keep them burning. There is also some risk of fire. Heated tanks should be a safe distance away from any building, straw, or hay. The type of heater used considerably at the University of Illinois has the smoke pipe extending horizontally some distance from the firebox before it turns up for the smoke to escape. Electric heaters are used too. It is cheaper to warm water with fuel in a heater than with corn in a steer.

Covers check freezing in cattle tanks. Many Illinois cattlemen do not use tank heaters. Often locating the tank well back from the doorway inside the stable or stock shed gives enough protection. Some tanks are protected by covering the top with a flat wooden lid having an opening large enough to allow the stock to drink. This opening is enclosed on the underside of the lid by a rectangular rim made of four wide boards. The rim extends down into the water and effectively prevents circulation of cold air over the water. Straw or other packing around the tank and over the lid is another help. Some concrete tanks extend down in the ground a few feet so that the water draws warmth from the soil.

Equipment Must Be Strong

Fences must be strong. Most small feedlots are fenced with lumber, often tight to serve as a windbreak on the north or west. Larger lots and pastures are fenced with barbed wire, having woven wire below it if there are hogs. For a pasture with good grazing, 2 or 3 tight barbed wires may be enough; if the pasture does not carry enough grass, 4 wires are better. One electric wire, if inspected frequently, will do for large cattle or 2 if there are calves with the cows.

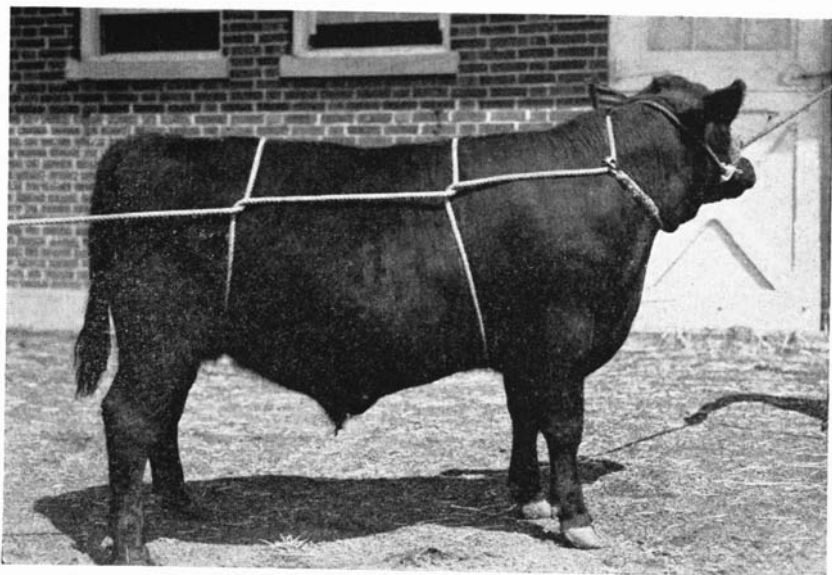
Movable loading chute is desirable. Usually such a chute is mounted on two old wagon wheels so it can be taken anywhere and used at the dehorning chute or in a gateway. Make it strong and about 3 feet wide. A dirt incline held in place by end and side walls of concrete makes a good stationary chute. Cattle go up a dirt runway more readily than up a plank one.

Other items of helpful equipment. A good chute to confine the cattle is needed for dehorning or treating for lice or grubs on the back. Fig. 16 shows a strong simple chute.

Stocks are built to hold show cattle, whose feet often need trimming. For an occasional operation on a foot, the animal may be thrown with a rope placed as shown in Fig. 17.



A good dehorning chute made with big posts and planks. The fence and the long gate are 28 inches apart. This gate and the stanchion are held shut by ratchets. While an animal is being dehorned, a rope halter is put on to hold its head still. (Fig. 16)



A show steer roped for gentle throwing. To throw the steer, pull on the long rope and swing its head to the side. (Fig. 17)

A large bull may be castrated standing up. Snub his body with a rope to the rigid side of the dehorning chute, open the side gate, and operate. The clamp is an efficient instrument when carefully used. Most operators have some skips. The knife is sure and is safe except in very cold weather or when there are screwworm flies in the locality.

Dehorning pays. Dehorned cattle fight less, cause fewer injuries to each other, are safer to handle, require less space at the feed trough and under shelter, and sometimes sell 50 to 75 cents more a hundred than horned cattle do. Clippers do quick work on calves and yearlings. Those which gouge do best on calves. The saw causes less bleeding, results in fewer "stubs," and is preferable for older steers and breeding stock. March and November are good months for dehorning, to avoid both flies and severe weather. Cattle bleed less if they are handled quietly before and after dehorning.

Steers like to have a place to rub. There are mechanical devices for scratching steers in the feedlot, which steers soon learn to use. A horizontal log chain does very well; fasten each end to a post so that the middle of the chain is about $3\frac{1}{2}$ feet above the ground. A thickly-branched tree 16 feet or more high cut down and pulled into the feedlot does very well but takes up space.

PLACE OF FORAGE AND GRAIN

Feed makes up about 80 to 85 percent of the cost of fattening cattle. Most of the feed used is forage and grain, which can be raised on the farm. Home-grown feed usually is the best and cheapest. In fact it is difficult to make the cattle business pay if all feed is purchased.

The best feed for beef cattle is grown on fertile land. University tests show that the big crop of grain or hay grown on rich land is preferred by cattle and is worth more a bushel or a ton as a feed than the small yield grown on poor land. The big crop has higher percentages of protein and of useful minerals which are expensive to buy separately. Illinois farmers who put limestone and perhaps rock phosphate upon their land to make it produce good legumes and large yields of grain need not worry about minerals for their cattle.

Part of the cost of the feed is returned in the manure. About 75 percent of the fertility taken from the soil by feed crops is excreted by fattening cattle and left upon the farm. When a well-balanced ration, including some purchased high-protein feed, is fed, there may even be a net gain in fertility.

The manure, including bedding, amounts to about a half ton a steer a month and is worth \$2.50 or more a ton in increased crops under average Illinois farm conditions and prices. This amounts to fully \$7.50 a steer over a six-months feeding period. Cattle feeding then may add to the total income of the farm by improving crop yields, even tho the net receipts from fat cattle barely return the cost of cattle and feed. For best results manure should be hauled and spread promptly. Much of the fertility may be lost in hilly or muddy feedlots.

Pasture the Basic Feed

Various pastures can be used. Grass pasture starts first in the spring and lasts latest in the fall. Bluegrass in northern Illinois and redtop in southern Illinois constitute most of the permanent pastures. Bluegrass, especially, often does poorly in late summer.

Timothy is hardy and the seed is cheap, so it is popular in mixtures with legumes. The commonest rotation pasture is timothy and red clover mixed. Bromegrass gets established more slowly than timothy, but later yields more forage, especially in late summer. Brome-alfalfa is becoming a popular mixture of great yielding power. Sweet clover, sown mainly for soil improvement, is a good pasture. Like all legumes, it should be sown with a grass such as timothy to give the cattle a satisfying variety and to help prevent bloat. Lespedeza makes good pasture in southern Illinois, and cattle thrive splendidly on it.

Cereal crops do for pasture. Green wheat, barley, oats, and rye make good cattle pasture. Cattle often prefer them to grass or clover. Wheat is seldom pastured in Illinois because it is sown late to avoid Hessian fly. Rye is hardier and makes earlier spring pasture, for which it is well adapted, but pasturing it when muddy injures the land.

Steers get moderately fat on rye pasture. In 1943 and 1944 the University turned 850-pound moderately wintered steers on rye pasture about mid-March without any other feed. Gains were nearly 3 pounds a day. In 1944 10 steers averaging 868 pounds when turned on 7.84 acres of rye March 24, gained 150 pounds a head during the next 8 weeks, while similar cattle full-fed corn in drylot gained only 140 pounds each. The steers pastured on rye were shipped to Chicago without grain feeding and sold at \$15.40 when the top price was \$17.15 a hundred. Five carcasses graded "Good" and five "Commercial." Compared with drylot feeding the rye pasture saved feed valued at \$26.60 per acre. It produced 191 pounds of beef per acre in the eight weeks.

The Haas mixture was designed by Ralph B. Haas, Woodford county, to make a direct change in the rotation from corn to pasture. Sow at the usual time 2 bushels of oats an acre with 2 pounds each of sweet clover, red clover, alsike, and timothy. Turn the cattle on it in May. The pasture is mainly oats at first, but the clovers make feed in late summer and fall. Usually on limed land you get a good stand of legumes, and the second year there is luxuriant mixed pasture. Total feed each year is about the same.

Pasture gains and feeding values compared. At the University of Illinois a five-year trial was run on yearling beef cattle without grain on pastures managed for maximum returns. The average gains an acre, calculated for the pasture season, were as follows:

Haas mixture (sweet clover, red clover, alsike, and timothy).....	416 pounds	Timothy	243 pounds
Alfalfa.....	383 pounds	Timothy-sweet clover-red clover.....	222 pounds
Green oats.....	368 pounds	Sweet clover (second year).....	220 pounds
Brome-bluegrass.....	291 pounds	Orchard grass, alfalfa.....	198 pounds
Bluegrass-timothy-red clover	273 pounds	Sweet clover (first year)....	170 pounds
Brome-alfalfa.....	259 pounds	Lespedeza	166 pounds
		Bluegrass	157 pounds

During the five years of the test the average gain on 27 pastures of various kinds was 236 pounds an acre. One acre of good rotation pasture or two acres of good bluegrass should carry a cow or two-year-old steer for 6 months. The steer will probably gain about 250 pounds on it.

Good Roughage the Basis for Winter Feeding

When alfalfa hay is worth \$20 a ton, feeding values of roughages are about as follows:

Alfalfa.....	\$20	Sorghum fodder.....	\$13
Red clover.....	18	Millet.....	12
Lespedeza.....	18	Sudan hay.....	8
Soybean hay.....	16	Corn silage.....	7
Oat or wheat hay.....	15	Corn stover (from normal crop without ears).....	7
Corn fodder (with the usual pro- portion of ears).....	15	Cowpea straw.....	7
Timothy hay.....	14	Soybean straw.....	6
Prairie hay.....	13	Oat straw.....	5
Redtop.....	13	Wheat straw.....	4

Whenever any of the nonlegume dry roughages are fed, it helps to feed a little alfalfa, clover, lespedeza, or soybean hay daily. Most cattle prefer long hay. Grinding or chopping hay adds nothing to its feeding value, as is shown by repeated tests, and is useless unless the ground or chopped hay is easier to store and handle.

Legume hay with some green color assures a supply of vitamins, and adds to the protein and mineral matter of the ration. Ordinarily fattening cattle may well have all the good hay they will eat without leaving more than the coarsest stems. Sometimes the allowance of choice alfalfa hay must be cut down in order to prevent bloat or scours. When this is necessary, cattle should have access to some timothy, straw, or corn fodder. Red-clover hay, lespedeza, red clover-timothy, alfalfa-timothy, or alfalfa-brome all give good results. Three pounds of legume hay supplies as much protein as one pound of high-protein supplement which otherwise would be needed.

Soybean hay is a special problem. Cattle prefer and do better on soybean hay that is cut when rather mature but before the leaves start to fall. The black-seeded varieties are best for cattle hay. The beans are so small that the cattle eat the hay along with the beans. When a variety with large-seeded yellow beans is fed, cattle often sort out many of the beans and eat them first, resulting in scours or bloat unless only a small amount of the hay is fed daily. Soybean hay is high in protein and is very satisfactory, aside from this inconvenience of usually having to feed only a day's supply at a time.

Grasses such as timothy, prairie grass, bluegrass, redtop, sorghum, millet, and Sudan grass make wholesome low-protein hays which are good for variety and to combine with legume hay. They tend to check bloat and scours. They are more nutritious if cut early before seed forms.

Straw is not equal to the grass hays in feeding value but is relished by cattle for variety, especially when the ration is laxative or when pasture is very succulent.

Sheaf oats and oat hay are good low-protein roughages, but should be fed with some green-colored roughage to supply vitamin A. It does not pay to thresh oats if the grain and straw are to be fed to the same cattle.

Shock corn is a desirable low-protein fattening feed for big steers. You can feed extra corn with it. If the corn is husked, the stover is a low-protein roughage approaching timothy and other grass hays in effects.

Silage Helps Winter Feeding

Corn silage has a big place. Its succulence benefits the cattle, the complete use of the corn plant is economical, and in dry years it has been a lifesaver for cattle. Corn makes the best silage when cut while the leaves are still green.

A corn crop usually makes nearly one-half more beef an acre when made into silage than when stored in any other way. Farm-bureau farm-management records, however, indicate that in recent years some silage-fed cattle have not paid as well as dry-fed cattle.

When silage was fed in the small amount of 8 pounds daily per calf in seven trials with fattening calves at the University, the silage-fed calves made slightly faster gains and at 52 cents a hundred cheaper; their dressing percentage was slightly higher; and they sold for about 25 cents a hundred more than the calves getting only dry feed. The silage-fed calves averaged \$5.08 more profit a head than the dry-fed calves.

Corn silage should not completely replace legume hay. When cattle get all the corn silage they want to eat, so that not much legume hay is eaten, a ton of silage may be worth only as much as one-third ton of hay. If a little silage is fed along with plenty of hay, a ton of silage may be worth as much as a half ton of hay. Cattle respond to some succulent feed and even 8 to 10 pounds of silage daily seems to help. University tests and some farmers' records indicate that, compared with feeding alfalfa hay alone for roughage, silage with the alfalfa adds about \$5 to the net income from each fat steer. Usually a ton of silage contains about 5 to 7 bushels of corn.

If corn silage replaces legume hay to a large extent, fewer acres on the farm will be planted to legumes. Without a generous acreage of

legumes, other crop yields are likely to decline, for corn grown for silage does not increase soil fertility as legumes do.

Ear corn silage containing most of the husks, some of the shanks, and all of the grain and cob was made at usual silo-filling time in a test at the University. Fattening calves made a little faster gains on this silage but a little less total beef an acre than they did on ground ear corn, with which it was compared. Following these tests some cattlemen have used their silos to store part of the corn crop and report good results.

Sorghum may well be stored as silage. The popular Atlas sorgo yields more silage an acre than corn silage does, but makes only about the same amount of beef an acre when fed.

Legumes and grasses can be made into silage. They may thus be saved during a rainy hay-making time. The quality of this silage is improved by allowing the green material to wilt partially before putting it into the silo, and by adding 60 pounds of molasses, or 150 pounds of ground shelled corn, or 200 pounds of ground ear corn to each ton as the silo is filled. Illinois tests show that a ton of such silage may not equal a ton of corn silage in feeding value. Cattle will do about equally well whether you feed some protein supplement or legume hay with corn silage or some corn with legume silage. Weather permitting, it is more profitable to make hay of legumes and grasses than to make silage of them.

Corn Is the Principal Cattle Grain

Grain puts on the final finish. On good pasture alone cattle may get about half or two-thirds fat. After that they make little progress without grain.

Altho corn is generally fed, other grains may be substituted in part. When grains are fed to cattle, their feeding values a bushel, assuming corn at \$1 a bushel, are about as follows: corn \$1, wheat \$1.05, rye 90 cents, barley 75 cents, and oats 50 cents. These figures allow for an extra cost for grinding the small grains when necessary and also allow for variations in gains of hogs following the cattle. All grains are short in protein, so combining them with such feeds as pasture, legume hay, or high-protein concentrates makes a more efficient ration.

Corn is chief fattening feed. Corn contains more digestible nutrients than any other suitable grain and yields much more an acre.

Cattle like it. No other grain is so satisfactory when fed as the sole concentrated part of the ration.

Big cattle eat whole ear corn. They waste less if the ears are broken. Hand breaking is slow; low-priced machines are available which break, cut, split, or crush the ears. Shelling corn is cheap and satisfactory.

Grinding ear corn or shelled corn is expensive and the material soon gets stale in storage. It is not necessary to grind corn unless there are no hogs to pick up what the cattle waste.

So far as experiments have shown, there is no real difference in feeding quality between hybrid corn and open-pollinated corn. Consequently, the practical thing for a farmer to do is to grow the corn which makes the best yield on his farm.

New corn fattens steers. Cattle which have been on a full feed all summer welcome a gradual change to new corn as soon as the ears start to mature. They like the flavor and respond with increased appetite. Many carloads of show cattle are finished each fall on new corn. The change is made gradually. At first the ears are run thru a cutter, later on they are ground, and still later they are shelled. Only as much as will be eaten before it starts to heat should be prepared at one time.

Corn cobs have some feeding value. In finely ground ear corn the cobs have been worth 63 percent as much as finely ground shelled corn in Ohio tests. Fine-grinding, however, is expensive, and finely ground shelled corn is not as good for cattle as coarsely ground corn.

Frosted corn makes satisfactory silage if cut as soon as possible after the frost and put in the silo in the usual way. Or the best way to store soft corn is to snap the ears off and run them thru the cutter; then the silo will hold a much larger acreage.

An extensive trial was made at the University with the frosted crop of 1924. The soft corn was fed in several forms. On the basis of the combined gains by cattle and hogs on an acre of soft corn, ear-corn silage came first, then shock corn, then corn left in the field and husked when needed, and last the standing corn pastured by cattle and hogs with them in the field.

A pound of dry matter in soft corn seems to be equal to a pound of dry matter in hard corn but the cattle eat less of the soft corn daily and gain more slowly. Soft corn should be fed out before warm spring weather if possible, altho some moldy corn usually does no apparent injury to the cattle.

Other Grains Can Be Fed

Wheat which is coarsely ground or cracked is a good cattle feed. Shrunken light wheat often is equal in feeding value to plump heavy wheat. Cattle are likely to go off feed if wheat is their only grain. If it is fed, a third to a half of the ration should be wheat, and the rest corn, barley, or oats. In the corn belt wheat is seldom cheap enough to replace corn for cattle.

Rye is seldom fed to cattle because of its scarcity or price. If fed, it should be free from ergot. When coarsely ground and mixed with other grain, it gives good results.

Barley is often grown for cattle. It should be coarsely ground. Sometimes there is trouble with scours on a full feed of barley. Like wheat it gives better results when mixed with corn or oats. Cattle will eat and thrive on barley that is so scabby that hogs refuse it or sicken on it. Often some barley is fed to show cattle in the belief that it helps to give them a smooth mellow finish.

Oats are often too high priced to feed cattle except for variety. Their bulk makes them best suited to starting cattle on feed; when fed in small amounts, they add bulk and variety to a ration half or more corn or about half wheat. It pays to grind the oats coarsely, except for calves or when oats are cheap. Oats seem to help prevent bloat and scours.

Commercial Feeds

If you make good use of your grain and legume crops, all that you need to buy is common salt and some high-protein feed. Legume hays, such as alfalfa, clover, lespedeza, and soybean hay, are all high in protein. Their use along with grain or inferior roughages helps very much to supply the necessary protein, vitamins, and minerals. Dry cows and creep-fed calves need only farm-grown feed and salt.

Bran has only 16 percent protein, but it agrees with cattle and often 1 or 2 pounds a head daily is mixed into a heavy ration to lighten it and help to keep cattle eating well during a long feeding period.

There is no magic in molasses. Molasses or molasses feed, which is a mixture of molasses and ground feed, when added to other feeds induces cattle to eat promptly, and to eat unpalatable feed which they might otherwise refuse. Sweetening the ration for show cattle may keep them eating better during hot weather. However, in repeated tests with fattening steers, adding molasses or molasses feed to an otherwise good ration has not increased the rate of gain or the selling price, but has

increased the costs. Molasses either in large or moderate amounts, or only toward the last of the feeding period in small amounts, has been shown to have no more feeding value a pound than corn and usually less. Illinois tests show also that molasses does not improve the quality of the beef.

Other low-protein commercial feeds. Many of these feeds have more protein than corn has but less carbohydrates and fat, and their feeding value may be only a little higher than that of corn. They are more useful in replacing corn than in combining with corn to add protein and make a balanced ration. For example, combining one ton of a 40-percent protein feed with 250 bushels of corn produces a mixture having 14 percent protein. But 2 tons of a 20-percent protein feed combined with only 120 bushels of corn also make a 14-percent protein mixture. Since farmers feed cattle to utilize corn, any purchased supplemental feed should be high in protein.

High-Protein Feeds Supplement Corn

Protein a good buy for fattening steers. It usually pays to buy high-protein feed if a ton costs no more than 100 bushels of corn. When corn is 50 cents a bushel, you can pay up to \$50 a ton for such feeds as linseed meal, soybean meal, or cottonseed meal. These feeds usually contain 37 to 43 percent protein and are relatively cheap for each pound of the protein. You get a better return for protein feeds from calves and yearlings than from older steers. Also cattle getting no legume hay need additional protein and will justify a little higher price. Cattle getting 1 or 2 pounds a day of a good high-protein feed gain more rapidly and get fat more quickly than others, and sometimes that is important from a marketing standpoint.

Three staple high-protein feeds are available. Linseed meal, soybean meal and cottonseed meal are all byproducts of oil-bearing seeds, and each is popular with experienced cattle feeders. The meals contain about 4 times as much protein as corn and nearly 3 times as much as legume hay. Only a small amount of the meal is needed to supply enough protein. Cattle like the pea-size meals and the flakes. These also mix with shelled corn better than the fine meals do.

Linseed meal is preferred. Linseed meal is worth a little more in the ration than soybean meal or cottonseed meal because it puts a smoother finish or "bloom" on the cattle. A mixture of one or both of the other feeds with linseed meal, in about equal proportions, gives about the same result as linseed meal alone. In trying to produce show

winner or market topper it is wise to stick to linseed meal unless it costs much more than the other two feeds.

Soybean meal can be fed to any class of cattle. It is rather new but has been rapidly increasing in quantity. University tests have proved there is no basis for the claims once made that even moderate amounts of soybean meal caused steers to scour and resulted in condemned livers.

At the University several experiments with steers in recent years have included rations having unusually heavy amounts of soybean meal. In all these tests the steers have stayed on feed well, made rapid gains, acquired a good finish, and yielded satisfactory carcasses.

In one test some 880-pound fleshy feeders were fed an average of 12.8 pounds of shelled corn, 6.4 pounds of soybean meal, 4.1 pounds of clover hay, and .1 pound of powdered limestone daily for 100 days. These steers made an average daily gain of 2.89 pounds, sold at \$15.40 when the top price was \$16.00, and yielded carcasses which suited the packer. There were no condemned livers.

Whole soybeans may replace meal if they are fed carefully to prevent scours, which are apparently caused by the large amount of oil in the beans.

Cottonseed meal is popular with those who feed silage. They think it checks any laxative effect of the ration. Cottonseed meal is thought to be a little more effective in a ration which will assure a supply of vitamin A, such as silage, pasture, or good legume hay, than in a ration having only low-grade dry roughages.

Pay in proportion to the protein in the feed. Altho there is some variation in the quality of protein and its effectiveness, total protein and its price are the chief factors to consider when buying. The percentage of protein marked on the sack indicates the number of pounds of protein in each 100 pounds of the feed. The price of 100 pounds of the feed divided by the number of pounds of protein in it equals the price of each pound of this protein. If you buy a feed which is suitable for the cattle, and which has a low cost for each pound of protein in it, you usually make a good investment.

You can sometimes buy staple high-protein feeds late in the summer at bargain prices for cash. This plan is far more profitable than buying feeds from time to time to be paid for when the cattle are sold, as many stockmen do.

Mix protein feed with corn, especially for self-feeding. A good plan is to fill a wagon box partly full of shelled corn, then spread over

the corn any oats or other grain to be included, and on top of that spread the protein meal. Then shovel the load into the self-feeder or the feed bunks. The necessary handling is all the mixing usually given, and the results are good.

Vitamins and Minerals

Vitamin A is associated with the green color and leafiness of roughages and with the yellow color of corn. It is abundant in pasture and alfalfa hay, but short in white corn, old yellow corn, and such roughages as ripe timothy hay, straw, and stalkfields.

A large herd of beef cows wintered on wheat straw and stalkfields produced weak calves most of which died; alfalfa hay, limestone, and bonemeal were added to the ration and later calves lived. Five hundred big steers were fed old shelled yellow corn, linseed meal and ripe oat hay for eight months. Several swelled in their legs, got down, looked wild, held their heads queerly. Ten died. Replacing the oat hay with alfalfa hay and silage stopped the trouble.

Other vitamins seldom if ever are a problem with cattle in Illinois. The vitamin-B complex is not a problem in cattle feeding. Fermentations in the paunch make this vitamin and even hogs following the cattle benefit from it. Vitamin D is supplied under normal management by direct sunlight and by sun-cured hay.

Minerals are a simple problem. Extensive research indicates that condiments, laxatives, drugs, or other medicinals or chemicals added to a balanced ration do not increase its nutritive value. Under common farm practice in Illinois, the most likely situation when there might be a shortage of minerals other than salt is when young cattle have no pasture or legume hay. Then extra calcium is needed. To supply this the cattle are fed finely powdered high-calcium limestone at the rate of 1 pound daily to 10 head, scattered on the grain or silage, or they may be given free access to ground limestone. The calcium increases thrift and rate and economy of gains.

Usually the only evidence of a shortage of limestone is some unthriftiness and slow gains. Extreme cases, however, can end in disaster. One Henry county feeder regularly fed steer calves in drylot from weaning time one fall until they were fat the next fall. The ration always was corn, cottonseed meal, silage, and oat straw. Each year one or more broke a leg. One year he fed 170 steers three months longer than usual because of low prices. Ten broke legs or backs at home and 20 more broke legs while on truck to Chicago, making a total of 30 accidents. Another year a load of agricultural limestone had been piled

in the feedlot. He said that the cattle "gnawed" at that daily. There were no broken legs that year.

All cattle need salt. When they have what salt they want, cattle are more contented, thrive better, and gain more rapidly and cheaply. Loose salt protected from rain suits cattle. Block salt lasts too long. Stock lick it continually because they cannot get enough. Even rains can hardly faze it. A cow in pasture was observed to make more than four hundred long licks in succession across the face of a "tombstone" that she had access to all the time. She craved salt. It is not the salt they look at, but the salt they eat that benefits the cattle.

Cattle crave dirt. They eat some dirt naturally when grazing. When confined for a long time on a pavement or in a small dirt lot they keenly crave clean dirt. Many successful feeders haul it to their fattening steers and usually report that each steer eats regularly about half a pint daily. Lack of good clean dirt to eat may help to explain some reports that steers confined in a paved lot for a year have fattened poorly and irregularly toward the last.

GENERAL PRINCIPLES OF FEEDING

Usually about 40 to 50 bushels of corn, 150 to 300 pounds of high-protein supplement, and $\frac{1}{2}$ to $\frac{3}{4}$ ton of legume hay are enough to fatten a steer that is in reasonably good flesh at the start. When some silage is fed, less hay is needed. If the feeding period is long drawn out or the ration does not contain enough protein, considerably more feed will be eaten. To put on only a moderate amount of fat less feed may be needed.

All cattle need roughage even when fed all the grain they will eat. Usually they should have all the roughage they want. It is sometimes desirable to limit the roughage if fattening cattle eat too little grain. If no roughage is fed, cattle become unthrifty and gain slowly after 2 or 3 months.

Feed requirements for fattening cattle are the same for those raised on the farm and those purchased.

Cattle Thrive on Whole Corn and Hay

Feed mills are overworked. The combined net income from beef cattle and the hogs following them is usually greater if the corn is fed without grinding. There is little profitable use for a feed mill on many Illinois cattle-feeding farms.

Grinding hay has not paid even when the ground hay was mixed

with grain. Tests show that grinding shock corn does not pay. Grinding is likely to pay only when cattle are fed corn without hogs following, when high-priced oats are fed to well-grown steers or old cows, or when wheat, barley, or rye is fed.

Wind blows some ground feed away. Also leaky feed bunks or faulty self-feeders, especially when used in muddy feedlots, may waste considerable ground feed dropped and trampled into the mud where even hogs will not recover it.

Ground ear corn is too bulky. This bulk reduces the amount of corn eaten. Some men feed molasses or "molasses feed" with it to tempt the steers to eat more. This is like spreading molasses on a corncob to make it taste better. It is a slow way to get rich. A more practical method is to feed shelled corn or coarsely ground shelled corn. The amount can be cut down somewhat if necessary, or some oats can be mixed in for self-feeding if the cattle eat too much.

Ground ear corn is more suitable for big cattle than for calves. Calves tend to grow rather than fatten, and unless they have a concentrated ration, they fatten slowly.

Hogs take the place of feed grinders. When hogs are turned with fattening cattle, they recover the wasted corn. Well-grown shotes are best. They should have a dry-bedded sleeping place nearby from which cattle are kept out. It pays to feed at least $\frac{1}{4}$ pound of tankage or similar feed daily per pig and as much corn as the pigs want. They will still clean up after the cattle. A good way is to self-feed tankage and corn.

Hogs that are not fed tankage may get the habit of biting heifers when they are lying down. For this reason, on some farms the corn is ground for heifers and no hogs are used. Sometimes on farms where necrotic enteritis is a problem, hogs are not kept, and the corn is ground for all cattle.

When hogs follow two-year-old steers on full feed they may recover about 4 percent of ground corn, 10 percent of shelled corn, 15 percent of ear corn, and 20 percent of shock corn fed to the cattle. In fact, a report on 42 droves of cattle fed a somewhat wasteful ration, including considerable shock corn, indicates that the hogs recovered about 25 percent of the corn fed to those cattle. Hogs seem to recover about two-thirds as much corn after yearlings as after two-year-olds.

University of Illinois cost accounts for 17 droves of cattle in farm feedlots in three years, 1942-1944, show that the value of the gains made by the hogs averaged 9.4 percent of the cost of all the feed given to the cattle.

Full-Feeding Gives Final Finish

It seldom pays to give a half feed of grain. Cattle may be fattened more cheaply by putting them on a full feed after they have become well fleshed on pasture or good roughage. On full feed cattle usually will eat about 1.75 to 2 pounds of grain and supplement daily for each 100 pounds the cattle weigh.

Cattle that are already on full feed in the spring should be continued in drylot if they are to be sold by July. If cattle are to be kept until late summer or fall, it is cheaper and better to turn them on pasture. If the cattle are turned out about April 1 on a pasture with some old grass left, they will usually keep right on eating corn and gaining weight. If they are not turned out until May 1, they may almost quit eating corn for a while and may gain little or nothing for a few weeks.

Night pasturing is best for full-fed cattle. Show cattle are often put in a small pasture at night. In a University test with full-fed steers, those in drylot all summer gained only 1.74 pounds daily; those on bluegrass pasture in daytime only, 1.99 pounds; those on pasture day and night, 2 pounds, and those on pasture only at night gained 2.2 pounds daily. The latter also made the most profit. When this test was run on legume pasture, the cattle scoured and bloated unless they were on pasture day and night.

Pasture Makes Cheap Gains

Thin cattle gain rapidly on pasture. The reason for not feeding much grain in winter is that a small winter gain is followed by a large pasture gain, but a large winter gain is followed by only a small gain on pasture. The combined gain for winter and summer is about the same for the two plans. The small winter gain and large pasture gain make cheaper average gains for the year.

Pasture saves corn and hay. The best way to economize on corn and hay when fattening cattle is to keep the animals on pasture as long as it is very good. Then in the fall many cattlemen start by cutting green corn when the ears are denting and running it thru a silage cutter daily as long as the stalks and leaves are green enough for the animals to eat them readily. They claim fast, cheap, continuous gains and easy rapid transition from grass to a full feed of new corn for cattle started this way.

High-priced hay does not worry those cattlemen who feed corn to cattle on pasture. Corn is self-fed or else fed each morning. Little or no protein feed is used until August. A 20-acre rotation pasture may

furnish enough grazing for 50 or more steers getting a full feed of corn. The choice yearling steers shown on the front cover ate grain from a self-feeder on good bluegrass pasture.

Small pastures favor fattening. When fattening steers have the freedom of a large pasture, they may walk so far each day that they gain slowly and do not get very fat. When these steers are confined to an area of about 30 acres or less they show prompt improvement.

At the University it was found that exercise is an expensive luxury for fattening steers. Those kept in a small lot made faster and cheaper gains than those allowed more exercise. The steers which walked 3.7 miles a day required 17 percent more corn and cottonseed meal for each 100 pounds of gain than those confined to a small lot, and the steers which walked 8.9 miles a day required 72 percent more of these feeds. Exercise had no effect upon the quality of beef except to make it more tender.

Pasture makes yellow fat. Graders discriminate against yellow fat in dressed beef, altho University tests on palatability and nutrition show no difference between beef from cattle fed corn on pasture and those fed in drylot. As grass dries in July and August, it resembles dry feed. If the cattle are removed from pasture a month before they are sold or by September 1, there is little if any discrimination in grade against them. Anyway the pastured cattle commonly make the most profit.

Good Management Saves Corn

Corn is the largest item of cost, so it must be used economically. To put a thin steer right on full feed wastes corn. Two or three months on good pasture alone cuts down by a month or two the later period of full feeding on corn. After a steer is about three-fourths fat, gains get slower, and more and more feed is required to put on each 100 pounds of gain. It pays best to sell before gains get very slow and expensive. Topping the market may prove to be a costly honor.

Some 750-pound steers, well fleshed on Kansas wheat pasture, were put on feed at the University, April 14, 1937. They received a full feed of shelled corn and soybean meal, mixed 7 to 1, with 20 pounds of silage, and 2 pounds of alfalfa daily a head. Their daily gains averaged for the first 60 days, 3.11 pounds; next 40 days, 2.55 pounds; and last 50 days, 1.76 pounds. The average for the 150 days was 2.51 pounds. These steers sold in Chicago at \$18.25 when the top was \$19.25. They ate only 34.7 bushels of shelled corn a head and 6.8 bushels of corn as calculated in the silage, a total of 41.5 bushels of corn. Their return

above the cost of cattle and feed was \$63.89 per head. They gained only .86 pound daily the last 2 weeks. At that rate it would have taken a long time and much more of the \$1.12 corn to have made them fat enough to top the market. It would not have paid to have done so.

Put cattle on full feed gradually. The safest and most economical plan is to start with about 2 pounds of corn daily a head. If the cattle will not eat corn, feed whole oats. As soon as all will eat, add more corn gradually until in 2 to 4 weeks they are getting all they will clean up before many leave the trough. Hand feeding twice a day gives best results when the cattle are fed only what they will clean up within about an hour. Feed at the same time each day, and at a time so the cattle can eat by daylight. Before turning cattle to a self-feeder get them on full feed.

Overfeeding may cause founder and scours (diarrhea). When cattle are getting too much corn, occasionally one may founder and his front feet get so tender that he becomes unthrifty and may best be sold. Too much grain may also cause the cattle suddenly to leave considerable of it or "go off feed." The remedy is to skip one feeding entirely and then feed a somewhat smaller ration. Sometimes appetites change with the weather; a warm day cuts down the appetite, a cold day increases it.

Scours usually result from too much succulent feed, too much legume hay, spoiled feed, too much grain, or a sudden change in feeds or in the feeding program. If the cause is not known, the best general remedy is to feed less grain. If using a self-feeder, add oats, ground ear corn, bran, or cut hay to the mixture to dilute the feed. Cattle on full feed are expected to stay rather laxative, but should not be allowed to scour.

Make the ration progressively better. Early in the feeding period use any low-quality feeds. Any change in the ration should be such as will appeal to the appetite and better satisfy the cattle. Perhaps you will start feeding ear corn, either cut or ground, then change gradually to shelled corn with perhaps a little oats included. Later on if you want to hurry the fattening of the cattle, you can grind the shelled corn and oats coarsely, altho it will add to the cost. Make any change gradually.

There is no hocus-pocus in fattening cattle. After the 4-H Club calves had been selected in Kendall county in 1935, Richard Johnson bought the culls that were left. He put them in a drylot with a well-bedded open shed, and fed ear corn run thru the silage cutter, soybean meal, and clover hay. He added silage during winter. The calves dis-

carded most of the cobs. By July 1, these calves were fatter than three-fourths of the Club calves and would have beaten half of them in the show ring. Comfortable quarters and plenty of nutritious feed did the trick.

Choose Calves for a Long Feed

Calves continue their rate of gain better than older cattle. In Nebraska tests the pounds of gains per head were as follows:

	<i>First 100 days</i>	<i>Second 100 days</i>	<i>Total</i>
Calves.....	205	195	400
Yearlings.....	251	191	442
Two-year-olds.....	264	177	441

During a short fattening period well-grown cattle make faster gains than calves.

The following table, based on averages of many representative lots of well-fattened cattle, shows that with reasonably good management older cattle gain faster but the gains are more expensive. The amount of feed for each 100 pounds of gain can be cut down somewhat by skilful feeding.

	<i>Three-year- olds</i>	<i>Two-year- olds</i>	<i>Yearlings</i>	<i>Calves</i>
Starting weight, pounds.....	1000	800	600	400
Length of feeding period, days.....	100	150	200	250
Total gain, pounds.....	275	375	450	500
Average daily gain, pounds.....	2¾	2½	2¼	2
Grain ^a per 100 pounds gain, pounds.....	900	800	700	600
Hay per 100 pounds gain, pounds....	500	400	300	200

(^a Includes protein supplement.)

Protein requirements vary. Calves need more protein than do older cattle. More protein is needed with such roughages as timothy hay, straw, and silage than with legume hay. Results from many lots of cattle indicate that cattle on full feed of grain need at least the following percentages of protein in the grain or concentrated part of the ration in order to make rapid gains:

<i>Kind of roughage</i>	<i>Two-year-old steers perct.</i>	<i>Yearlings perct.</i>	<i>Calves perct.</i>
All legume.....	10-11	11-12	12-13
Part legume.....	11-12	12-13	13-14
No legume.....	12-13	13-14	14-15

Provide plenty of protein. A lack of protein often results in some steers fattening much more slowly than others. If there is plenty of protein, the whole drove finishes more nearly together. Feeding an abnormal amount of protein is not necessary and may add much to the

cost of the gains. Some steers seem to have a special need for a well-balanced ration.

Cattle will eat enough clover or alfalfa hay or pasture to balance with protein the small amount of corn they eat at first. As they eat more corn, they eat less roughage, and additional protein is helpful. You can mix 1 part of a high-protein feed such as linseed meal with about 7 to 12 parts of corn or feed 1 to 2 pounds of it daily a head. The results are about the same for a short feeding period. Long-fed steers respond to extra protein toward the end of the feeding period. The protein helps to maintain appetite, increases rate of gain, makes the drove finish evenly, and improves the bloom or finish.

When he was fitting champion carlots of steers Ed Hall, Sangamon county, fed 2 pounds of high-protein feed daily during the summer and 4 pounds during the fall.

FEEDING CATTLE FROM WEANING TO SLAUGHTER

Shipped-in cattle need rest. Calves, especially if shipped from the range, are tired and weak upon arrival. Often they are put into the car right from the cows and the trip is a severe shock. Calves and even older cattle arriving in cold or stormy weather may develop "shipping fever." Vaccination before shipment is a fair preventive but is rarely used.

A good plan is to put such cattle under a well-bedded shelter as soon as they arrive, feed mixed hay, give them some water after an hour or two, and later give more water. Those that appear to be ailing should be sorted out and kept quiet. The others can have grazing added to the program after a day or two. Usually in a week or two they seem to be out of danger. Only very sick cattle have been treated with serum at the University; among over 1,000 range calves only 4 have died.

When range cattle are put in small quarters at first, they are more quickly tamed. If turned right out on pasture, some may stay very wild.

Some feeders give baking soda to shipped-in cattle. It is given at the rate of 4 pounds of soda in each 50-gallon barrel of drinking water for 10 days. There is danger of toxic effects if too much soda is given. While soda may be helpful, it cannot be relied upon to prevent shipping fever. Shelter, rest, and sensible care do more good than anything else.

Let steer calves get growth before fattening. It is needlessly expensive to give a full feed of grain to calves from weaning time until

they weigh 1,000 pounds or more and are fat enough for usual market demands. Such feeding may use 60 to 90 bushels per calf and the calves may be fat enough for market the next summer, when prices are usually lower than in the fall.

It is better to winter the calves with very little grain but all the roughage they want, fatten them the next summer, and have them ready for slaughter in the fall. University tests have shown it is cheaper to winter calves over than to buy calves that have been wintered; the wintering cost added to the cost of the calves at weaning time is less by spring than the cost of calves then on the market.

Let cattle glean the fields. Cattle which are being wintered lightly may be allowed to gather part of their daily fare from fields from which crops have been harvested. It does not pay to give the same freedom to fattening cattle.

Silage helps in wintering calves. At the University a ration of 20 to 25 pounds of silage daily, at least 2 pounds of legume hay, 1 pound of protein supplement, and 1/10 pound of finely ground limestone gives an average daily gain for weanling calves of about 1½ pounds. The calves keep thrifty but not fat.

Without silage, feed calves a little grain. Three or 4 pounds of corn or other grain daily, all the good legume hay the calves will eat, and no protein supplement will produce about 1¼ pounds daily gain. Calves can be wintered on good roughage without grain, but they may gain less than 1 pound daily and be thin in the spring. Calves which are wintered entirely on low-grade roughage, such as grass hay, husked corn fodder, and straw, lose weight and become very thin and weak by spring.

Winter pasture is a help. A number of feeders save some pasture near the barn exclusively for winter use. Steers bought in the fall are turned on this pasture and also given dry feed. The variety and succulence of the feed and the environment are helpful to both cattle and hogs.

November 4, 1944, J. W. Frazier, Coles county, turned 230 range calves averaging 380 pounds on 30 acres of such pasture. At the barn they had mixed alfalfa-timothy hay, oats for a while, and then three-fourths of a feed of cut ear corn and 1 pound daily a head of soybean meal until April 1. Then they were shut in the lot, shelled corn substituted, soybean meal increased to 2 pounds, and they were full-fed. The largest steers, averaging 400 pounds November 4, were sold July 5 to July 18 in Chicago averaging 890 pounds. They sold for \$17.00

a hundred for 6 carloads and \$16.85 for two loads when the top prices ranged from \$17.40 to \$18.00. The average gain between home weights when rested and filled and the sale weights was 2 pounds daily.

Only during hard cold rains would all the calves crowd into the barn. At other times most of them stayed in the pasture. The pasture saved much of the hay, bedding, manure, and labor. Mr. Frazier's account for a five-year prewar period for 400 western calves indicated that he made \$16 more per acre of winter pasture for the period than he would have made with wholly drylot feeding.

Fattening Calves

Fatten steer calves after wintering. There are three popular plans, varying according to how much pasture you want to use.

Plan 1. Pasture without grain until about July 1; then start full-feeding corn. About August 1 add 1 pound of protein supplement to each 9 or 10 pounds of corn. About September 1 remove to drylot until ready for market.

Plan 2. Full-feed corn on pasture for 4 to 5 months, add protein supplement when pasture begins to fail, and finish in drylot for one month or more. In drylot add about 4 pounds of legume hay daily.

Plan 3. To fatten calves in drylot after wintering them lightly, put them on full feed in the spring and continue 5 or 6 months. This should make them fat enough. If you have silage, give a full feed of corn and protein supplement, mixed 7 to 1 by weight. Also feed 8 pounds of silage and 2 pounds of legume hay daily per calf until about May 1. At that time the silage may well be discontinued and the hay increased to 4 pounds daily, which is about all the calves will eat.

Many years of tests at the University, involving over 1,000 steer calves, have shown that Plan 3 resulted in the fastest and cheapest drylot gains and the highest selling price for the cattle of any of the many rations tested. It has come to be known as the University of Illinois standard steer-calf ration.

To use this University standard ration without silage, full-feed corn and supplement to calves in the proportion of 8 to 1, and feed 4 or 5 pounds of legume hay daily.

At the University the corn is shelled because it is easy to do, the corn keeps well, it is easy to feed, and there is no waste because pigs are kept with the cattle. Calves fatten one or two months sooner on shelled corn than on ground ear corn. With older cattle there is less difference.

Steer calves are sometimes full-fed in drylot from weaning time in the fall. If you do this, a good ration is the one already described under Plan 3, the University standard ration. It may require 8 or 9 months for the steers to get big enough and fat enough for the steer trade. An exorbitant amount of corn and supplement may be fed in such a long period.

Full-feed heifer calves from weaning time. They will fatten in 5 or 6 months and be smooth and young-appearing at around 750 pounds. There is less possibility of loss from pregnancies than if the heifers are kept longer.

Feeding calves has little risk. Because calves may be bought in the fall and sold fat the next fall their feeding fits market fluctuations. If the price of the fat cattle is low, the price of the next lot of calves is also low, so prices balance well in a term of years. At the University during 14 years of feeding about 100 experimental calves a year, the calves fed the standard ration returned an average of 41 cents a bushel of corn above the cost of cattle and feed. During the average feeding period of 254 days the total feed per calf was 46.5 bushels of 55-cent corn and 349 pounds of protein supplement costing an average of \$34 a ton.

Fattening Yearlings

Yearling steers eat considerable roughage. They can be wintered satisfactorily on 35 to 40 pounds of silage and 4 or 5 pounds of good legume hay daily a steer. Gains can be increased by adding 1 pound a day of protein supplement. This is desirable if the steers are to be put on full feed in the spring.

Without silage, feed all the legume hay the steers will eat, and add 3 to 4 pounds of corn daily if greater gains are desired.

Yearling steers feed well on pasture. There are two common plans for feeding yearling steers on pasture:

Plan 1. Pasture the yearlings for 2 or 3 months without grain; then full-feed on pasture or in drylot for 3 to 4 months. Add 1 pound of supplement to 9 or 10 pounds of corn, and in drylot feed 4 to 5 pounds of hay daily.

Plan 2. Full-feed corn on pasture for 3 to 4 months, and then finish with one month in drylot. After about August 1 add 1 pound of protein supplement to 9 or 10 pounds of corn. While the steers are on pasture, a good plan is to feed enough corn each morning to last until the next morning, or use a self-feeder.

Legume pasture combines well with dry feed, as shown by many University experiments. Many farmers follow this plan. Ellis Perkins, Piatt county, received 60 heifers weighing 400 pounds May 1. They were kept in a drylot a week and fed 2 bushels of oats a day (about 1 pound apiece), along with straw and a little alfalfa hay. Then they



The steers on pasture (*below*) gained faster than those kept in drylot (*top*). Both lots were full-fed for four months after having made a winter gain of a pound a day. Besides speeding up gains, the pasture saved the protein supplement. (Fig. 18)

were turned on 20 acres of sweet clover pasture until August 1. Beginning July 10, shelled corn and cottonseed meal were added gradually, and soon after the heifers were shut in drylot, August 1, they were on full feed. Then oats were omitted but a small amount of alfalfa hay was fed. These heifers sold at the top price in Chicago in September. There was no bloat with these cattle. This program produced the quick finish desired in feeding heifers.

Yearlings are often fattened in drylot. The steers usually need 6 to 7 months to get fat. Yearling heifers get fat in 3 to 5 months and preserve their heifer shape better than heifers usually do on pasture. University tests reveal that when full-fed yearling heifers are bred within five months of slaughter neither the dressing percentage nor the market grade of the dressed beef is lowered.

If silage is fed, a good plan is to feed 20 pounds of it daily and 3 pounds of legume hay at the start. Gradually cut down the silage and feed more legume hay so that by about May 1 no silage is fed and 5 or 6 pounds of hay is being fed daily. Mix corn and protein supplement 8 to 1 while silage is fed and 10 to 1 after silage is stopped.

Without silage, full-feed corn and protein supplement, 10 to 1, and allow 5 to 6 pounds of legume hay daily per head.

Fattening Older Cattle

Good and Choice two-year-old steers fatten quickly. They should be allowed to put on considerable flesh on pasture or good roughage before starting on corn. These two-year-old steers are fed like yearlings, either on pasture or in drylot, except that they need less protein supplement. Corn and either pasture or legume hay are sufficient, but results are even better if 1 pound of protein supplement a head is fed daily during the latter half of the feeding period. Fleshy two-year-olds will finish fattening in 3 to 5 months.

One successful cattle feeder buys Good two-year-olds in the fall, winters them on old pastures, stalkfields, straw, legume hay, and sometimes a little corn. In the spring he grazes them on the very best bluegrass, starts feeding corn in July, and full feeds only 3 to 4 months, with the last month in drylot.

Feed cheap steers less grain. They must be fed cheaply in order to pay a profit. A standard plan is to buy in the fall plain, deep-bodied, bony steers weighing 750 to 800 pounds, put them on pasture and stalkfields, and later feed 35 to 40 pounds of silage with 3 to 5 pounds of legume hay and 1 pound of protein supplement daily for 2 to 3 months. If there is no hay, give 2 pounds of supplement. Common and Inferior cattle may get fat enough for their grade on this ration. Corn is usually fed also for the last month or two before such steers are ready for a spring market. Medium cattle need more flesh and may pay well for further feeding, if the silage is cut to 15 to 20 pounds daily and corn is added for 1 to 3 months. If silage is not fed, full-feed corn and legume hay without protein supplement.

Medium and Common steers and heifers make money for one feeder

who keeps a steady procession going thru his feedlots. New animals are on full feed within 2 weeks. The ration is ground ear corn, 2 pounds of linseed meal daily, a little silage, and plenty of mixed clover or alfalfa and timothy hay. They are fed 2 to 3 months, and sold as soon as they are fit for slaughter. The owner says that the liberal feeding of linseed meal promotes fast gains and a good, quick finish.

Getting the Right Degree of Finish

Fitting show cattle is an art. Usually show cattle are kept fat from birth. It is necessary to have them fat but still gaining at show time in order for them to have sufficient "bloom" or appearance of thriftiness.

The fitting ration used at the University is a mixture by weight of 5 parts cracked yellow corn, 3 parts whole or rolled oats, 1 part bran, and 1 part pea-size linseed meal. The roughage is about 4 pounds of clover or mixed hay daily, which is about all a calf or yearling will eat.

Alfalfa sometimes causes these cattle to bloat or scour. In hot weather appetites may decline. If so, sweeten the ration with dried beet pulp which draws fewer flies than molasses does.

4-H Club range calves usually need more corn to hurry them up for show in early fall. Suggestions for fitting and showing calves are given in Illinois Circular 540, "Beef Calf Manual."

Carloads of show cattle are sorted out from droves of Choice to Fancy steers near the end of a long period of full feeding to make them very fat. The selection has to be made from a number of cattle to get a carload of uniform size, type, condition, and quality.

Sell steers when fat enough for their grade. If you have more than one load of cattle to sell, it may pay to sort them at home. In a drove of Medium to Choice cattle, for example, there will be some which are not good enough to justify a long feed. They will be ready to be sorted out and sold a month or more before the others should go. It is a mistake to keep these lower-grade steers as long or longer than the best ones as some men do, because they never will sell high no matter how fat they get. Also in a big drove of uniform grade there will be some which fatten quickly and are ready to sell before equally shapely steers may be fat enough to go. In such a case it pays to "top them out" and sell the best ones first.

Prepare cattle for shipment. Fat cattle make a better appearance at market if they spend the last month on dry feed. The last feed before shipment may well be reduced, or no feed or water given for half a day before shipment. When handled in this way, they will ship

with a minimum of scouring and will take a good fill at market. In this condition they sell better than when they take an excessive fill. In offering prices, buyers allow for the amount of fill which the steers show.

Fit Cattle Into the Farm Plan

Labor-saving schemes. Watch for ways to save labor in handling your livestock. On many farms a good spring or creek serves as a waterer. Some farmers have clever watering devices along tile lines or along outlet pipes leading from fenced ponds.

Some stack their hay in the fields with little labor and feed it at the stacks with corn fed from temporary cribs nearby. Corn is sometimes shelled at the crib into overhead bins from which it is piped by gravity into feed troughs or self-feeders nearby. When feed is ground, time can be saved by conveying it directly into a self-feeder.

In general it pays to put feed at one handling right where the stock will eat it. You save the most labor by feeding cattle on rotation pasture. In this way there is no handling of hay, bedding, and manure. Try to fit your methods with the natural instincts and inclinations of the cattle so that they work for you instead of keeping you busy working for them.

Feed cattle to benefit the farm. A good example is the experience of Herman Radue, Henry county. The third week of April, 1940, he turned 46 two-year-old steers on 32 acres of mixed timothy, red-clover, and sweet-clover pasture. They were brought up to a full feed of ground ear corn which was continued. August 15 a high-protein supplement was added. The cattle were in drylot 3 weeks before shipment. October 31 they sold in Chicago at the market top of \$14.50, weighing 1,280 pounds. A drove of 28 sows and their 196 pigs, raised and sold, occupied this pasture with the steers. There was plenty of green feed. Mr. Radue's fields increased in productiveness under this system, which was followed for many years. He did not need to provide shelter, hay, or bedding, and the cattle and hogs spread all the manure where corn would be grown the next year.

Methods compared. Answers from about 2,000 Illinois cattle feeders reveal that 80 percent sometimes feed corn on pasture to fattening steers. Nearly half of them feed silage. A third use self-feeders. A third have paved feedlots, and the number of paved lots is increasing.

EXAMPLES OF GOOD RATIONS

The following rations, classified according to grade of cattle fed, are used by feeders from many counties in Illinois. The skill and success of these feeders, who regularly get fast cheap gains and a good finish, recommend their methods. Almost any feeder can find a ration below that will fit conditions on his own farm.

The University standard ration is given for comparison. Weights when stated are per steer daily.

University standard ration. By weight: 7 parts shelled corn to 1 part either linseed, cottonseed, or soybean meal, plus clover or alfalfa hay and a little silage.

University show cattle ration. By weight: 5 parts cracked yellow corn, 3 parts whole or rolled oats, 1 part bran, 1 part pea-size linseed meal, plus clover or mixed hay.

Rations for Show Carloads

1. Shelled corn, a little oats, 2 pounds of linseed meal, alfalfa hay.
2. Ground ear corn, cottonseed, soybean and linseed meals, mixed clover-timothy hay.
3. Shelled corn, coarsely ground barley, cottonseed and linseed meals, mixed clover-timothy hay.

Rations for Choice to Prime Steers Which Topped the Market

1. Ground ear corn, linseed, cottonseed, and soybean meals, mixed pasture, and the last month in drylot, mixed hay.
2. Shelled corn, 1¼ pounds of linseed meal, alfalfa hay, oat straw.
3. Shelled corn, a little oats, 2 pounds of linseed meal, alfalfa hay.
4. Ground ear corn, later ground shelled corn; linseed meal, alfalfa hay.
5. Ground ear corn, linseed meal, alfalfa and timothy hay.
6. Ground ear corn, linseed meal, clover hay; on pasture, too, until July 25.
7. Shelled corn and pea-size linseed meal, mixed 13 to 1, plus mixed alfalfa-timothy hay.
8. Shock corn, later ground ear corn, finally shelled corn; with cottonseed, soybean, and linseed meals, clover and alfalfa hay.
9. Shelled corn and soybean meal mixed 7 to 1, alfalfa and clover hay, a little silage.

10. Shelled corn, cottonseed and linseed meals, alfalfa hay.
11. Ear corn, later shelled corn; cottonseed and linseed meals, clover and alfalfa hay. (One feeder reported a sale weight of 1,472 pounds from this ration.)
12. Twenty pounds of shelled corn, 2 pounds of linseed meal, clover and alfalfa hay, a little silage. (Sale weight, 1,550 pounds average for 176 head.)
13. Twenty-five pounds of shelled corn; 1 pound of soybean meal; mixed alfalfa-timothy hay; limestone, bonemeal, and salt, 2:2:1; and clean clay.
14. Shelled corn, 1.2 pounds of linseed meal, alfalfa hay.

Rations for Good to Choice Steers

1. Shelled corn, $1\frac{1}{2}$ pounds of oats, $1\frac{1}{2}$ pounds of mixed cottonseed and soybean meals, sweet clover hay.
2. Nine parts shelled corn, and 1 part of a mixture of cottonseed and soybean meals, on bluegrass and clover pasture.
3. Shelled corn, 1 pound of oats, 1 pound of cottonseed meal, 1 pound of linseed meal, silage, alfalfa hay, on pasture.
4. Shelled corn, $2\frac{1}{2}$ pounds of oats, $1\frac{1}{2}$ pounds of soybean meal, alfalfa hay.
5. Shelled corn, alfalfa hay, sweet-clover pasture; later, cottonseed meal.
6. Ground ear corn, soybean cake, alfalfa hay, on sweet-clover and timothy pasture.
7. Cut ear corn, 2 pounds of cottonseed meal, alfalfa hay.
8. Shelled corn and pea-size cottonseed meal mixed 7 to 1, plus alfalfa hay and a little silage.
9. Shelled corn, soybean meal, alfalfa and soybean hays.
10. Three parts shelled corn, 1 part ground ear corn, cottonseed meal, clover hay.
11. Twenty-two pounds of cracked shelled corn, $2\frac{1}{2}$ pounds of cottonseed meal, alfalfa hay, a 10-acre bluegrass pasture. (Used for 400 heavy steers.)
12. Shelled corn, cottonseed and soybean meals, alfalfa hay.
13. Ground shelled corn, $1\frac{1}{2}$ pounds of soybean meal, alfalfa hay.
14. Shelled corn and soybean pellets mixed 8 to 1, alfalfa hay. (Used for 362 head.)

15. Broken ear corn, 3 pounds of cottonseed meal, hay, some silage.
16. Shelled corn, 2 pounds of soybean meal, clover hay.
17. Ground ear corn, 1 pound of soybean meal, alfalfa and clover hays.
18. Ground ear corn, shelled corn, 2 pounds of linseed meal, mixed clover-timothy hay.
19. Shelled corn, cottonseed meal, soybean and alfalfa hays.
20. Shelled corn, 1 pound of cottonseed meal, 1 pound of linseed meal, soybean hay, a little silage.
21. Shelled corn, 2 pounds of soybean meal, alfalfa pasture.
22. Shelled corn, 2¼ pounds of cottonseed meal, 20 pounds of silage, alfalfa hay, oat straw.
23. Mixed shelled corn and pea-size linseed meal, plus hay.

Rations for Medium to Good Cattle

1. Ground ear corn, 1 pound of linseed meal, alfalfa hay, a little silage.
2. Shelled corn, 1½ pounds of soybean meal, silage, alfalfa and soybean hays.
3. Ear corn silage, cottonseed meal, alfalfa hay.
4. Twenty pounds of shelled corn, 1 pound of linseed meal, sorgo silage, soybean hay.
5. Ground ear corn, 2 pounds of cottonseed meal, mixed clover-timothy hay.
6. Ground ear corn, silage, soybean hay.
7. Cut ear corn, oats, 1 pound of cottonseed meal, silage, alfalfa hay.

Rations for Inferior to Common Cattle

1. Cob-and-husk silage made from cannery sweet corn, 1 pound of cottonseed meal, a little soybean straw; limestone, bonemeal, and salt, 2:1:1.
2. Cob-and-husk silage made from cannery sweet corn, 4 pounds of cottonseed meal.
3. Cob-and-husk silage made from cannery sweet corn, 2½ pounds of cottonseed meal, some hay and straw.
4. Ground ear corn, silage, clover hay.
5. Silage, 2 pounds of cottonseed meal, last two months add ground ear corn and hay.

SHREWD BUYING, SKILFUL FEEDING, and wise marketing determine the profits of cattle feeding. This means that a successful cattle feeder must follow the A, B, C's of the business, which are:

Buy the cattle low.

Fatten them cheaply.

Sell them high.

The beef-cattle enterprise is an effective way to save soil fertility and to make a farm more productive, even tho sometimes the business is not very profitable directly. On many farms beef cows offer the most practical means of getting an income from untillable permanent pasture and unsalable roughages.