

op. 3

HANDLING SILAGE AND CONCENTRATES FOR BEEF CATTLE IN DRYLOT

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HANDLING SILAGE AND CONCENTRATES FOR BEEF CATTLE IN DRYLOT

MANY ILLINOIS CATTLE FEEDERS HAVE found ways to cut down greatly the amount of time they spend on feeding. They have accomplished this by using methods that save time and effort, by putting in machinery and equipment to do part of the job, and by designing and locating their structures to save time and travel and to make it possible to do more of the work with equipment. This circular contains suggestions for ways of doing these things. The recommendations are based on a study of 36 Illinois

farms where cattle were fed in drylot and on observations of practical feeding operations on other farms.

This circular deals mainly with the problems of handling silage, because where it is fed, silage usually makes up three-fourths of the weight of the feed handled. Also, most farms handle concentrates in about the same way as silage and use the same equipment. If a good system is worked out for silage, the biggest feed-handling problem is solved.

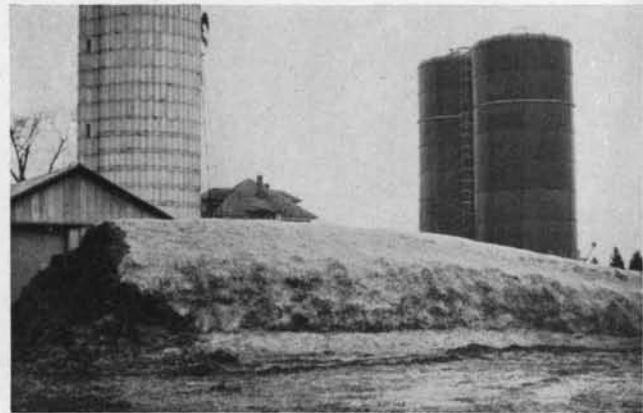
TYPES OF SILOS

The kind of silo you have may determine the method of operation you must follow. You may be limited to a choice of one or two methods that are not necessarily the most effective. The four types that were found on the farms included in the feeding study were:

Upright masonry silos. These were conventional types, usually the oldest silos on the farms studied. Sizes varied from 12 by 35 feet, with a capacity of about 85 tons, to 18 by 60 feet, holding 365 tons.

Airtight steel silos. These were manufactured steel structures, usually either 14 by 40 feet or 17 by 40. Besides being airtight, they had a power-operated mechanism for removing silage from the bottom.

Trench silos. Some of these were simply unfloored earth excavations. Some were floored and lined on



On this farm the stack (foreground) was used for grass silage, the airtight steel silos (right) were used for shelled corn and oats, and the upright masonry silo (left) was not filled.



Good drainage and a paved floor are essential for a trench silo. It is desirable to line the sidewalls, but earth sidewalls can be used if they have enough slope to prevent crumbling. This trench has a good floor and drainage, but the sidewalls should have been given more slope.

the sides with concrete. The size of a trench silo can be varied to suit the need of the farm.

Stacks. Silage stacks were built in a variety of ways. As a rule, stacks should be relatively large and built on a concrete slab. A large stack has a smaller proportion of the silage exposed at the surface and the percent of spoilage is therefore likely to be less.

Another possibility, though not found on the 36 farms, is to combine a stack on a slab with concrete or plank-and-post sidewalls. This can give above-ground "bunker" storage that has some advantages over either a trench or a stack.

CHOOSING AND BUILDING A SILO

For less than 100 tons of silage, the upright masonry silo has the advantage of being permanent and attractive and of keeping spoilage lower than small trenches or stacks. Losses may be as low as 5 percent but often run much higher if the silo is small, the rate of feeding is too slow, the walls are not smooth and tight, or the filling is irregular and uneven. The cost of a masonry silo is relatively high.

The airtight steel silo protects best against spoilage because of its top seal, bottom unloading, and wall materials. It can be used for chopped and shelled corn and feed grain as well as for silage. But it is the most expensive of the silos studied.

Stacks and trenches cost the least and often permit the most efficient handling, but they must be large or too much of the silage will spoil. Losses depend on the proportion of exposed surface, the care used in spreading and packing, the amount of moisture, and the treatment of the surface. In a well-built stack of average size — around 200 to 300 tons — spoilage may run about 10 percent. In a 100-ton stack it may be about 25 to 30 percent, but in a 400- to 500-ton stack may be as low as 5 percent, especially if the stack is floored and a protective covering is placed over the fill. You may prefer to accept some spoilage rather than to take the time and labor necessary to cover and uncover the silage.

The amount of spoilage often depends more on the way the silage is made than on the type of storage.

Location. Upright masonry and steel silos should be located so you can get to them with silage wagons and other filling equipment and so that carriers or feed wagons can be gotten to the chute or loading elevator. Locate a trench, stack, or bunker so you can handle the silage with a power scoop or possibly self-feed it.

Construction. The airtight steel silo is a commercial structure that is sold as a unit and put up

by a specially trained erection crew. Most upright masonry silos should be built by a silo contractor to assure an adequate, responsible job.

You can do most or all of the work yourself for a trench silo, an above-ground bunker, or a concrete slab for a stack. Ask your farm adviser or write to the University of Illinois College of Agriculture at Urbana for the newest recommendations about these "homemade" types.

Attached shelter. An upright silo should have an attached enclosed building to cover the space at the bottom of the chute or the operating mechanism of the airtight silo. Such a building can also shelter



A shelter conveniently located with respect to the silo and feedlot for an overhead-carrier feeding system. A wagon or truck can be backed into the room for unloading ground feed and supplement.

carts, carriers, and equipment; you can throw down a day's supply of silage at a time and know it will be protected until used. If you haul silage in a wagon, the shed is a good place for the wagon while it is being filled or between feedings. If you feed by hand or use a carrier, you will probably want to store supplements in the shelter so they are near at hand.

Special considerations for grass silage. Many upright masonry silos designed for corn silage are not strong enough to withstand the pressure exerted by high-moisture grass silage. Usually stave silos can be made stronger by putting additional steel reinforcing bands on them. Consult an experienced engineer familiar with silos for recommendations on reinforcing and other needed alterations, or hire a silo contractor.

Grass silage is more difficult to remove from storage than corn silage. It will be easier to get it out of the silo if it is cut as short as possible. (See pages 4 and 5 for comparison of rates of unloading grass and corn silage.)



A drive-through arrangement for the shelter and location of the silos far enough from other buildings make it easy to get to the silos with mechanical equipment.

COSTS FOR STORING SILAGE

A stack is the cheapest means of storing silage. A concrete slab for a stack costs only about \$1 for each ton stored. The annual cost chargeable against the slab amounts to about 10 cents per ton.

At the usual cost for excavation, a trench can be built for less than \$1 per ton of capacity. Adding a concrete floor brings the investment up to \$2 to \$3 per ton of capacity, and with concrete sidewalls the investment goes up to about \$6 per ton. The overhead cost for a concreted trench silo approximates 50 cents per ton per year.

Upright masonry silos vary in cost according to size and quality. A 10-by-24-foot silo costs about \$1,100 including roof and chute, or somewhat more than \$30 per ton for 35-ton capacity. A more typical

size, 14 by 40, holding about 135 tons and costing \$1,800 or more, requires an investment of \$14 per ton. A large silo, 18 by 60, holds nearly 375 tons and requires an investment of about \$3,300 or \$9 per ton. The investment per ton ranges from \$30 down to \$9, and the estimated annual cost from \$2.50 to as low as 72 cents for each ton of capacity.

Airtight silos, not including the concrete base and mechanical unloader, cost \$2,900 and \$3,500 for the two common sizes. Adding \$250 to \$350 for the concrete base, brings the cost per ton of capacity to about \$23 for the 135-ton size and \$19 for the 200-ton silo. Annual costs, calculated at 8 percent of the first cost, would be \$1.85 and \$1.50 respectively per ton.

REMOVING SILAGE FROM STORAGE

The method you want to use to unload silage from storage, and what it will cost you in time and money, will of course depend on the type of silo you have, what kind of equipment you use, and your own ability. On the 36 farms studied four methods were examined: mechanical unloading from the bottom of airtight silos; hand-forking and power-operated surface unloading from upright masonry silos; and tractor-scoop removal from stacks and trenches.

These are not the only methods that might have been used. Self-feeding in particular offers possibilities for saving time and labor.

Mechanical unloading from bottom of silo. This equipment removed corn silage at an average rate of 120 pounds per minute and grass silage at a rate of 50 pounds per minute. Labor was negligible, normally from 2 to 8 minutes per day, although a few men stayed with the equipment throughout the 30 to 40 minutes it was in operation each day. Estimated costs for removing a ton of corn silage were \$1.43 for the smaller silo (135 tons) and \$1.24 for the larger 200-ton silo. These costs included electricity and annual overhead (interest on investment, depreciation, and upkeep) for the unloading equipment, which was valued at \$1,075 for the smaller silo and \$1,400 for the larger, plus a \$150 elevator for each.

Costs of unloading grass silage were higher—\$1.78 and \$1.52 per ton—because of the higher estimated depreciation (grass silage is thought to be harder on unloading equipment than corn silage) and because the low rate of unloading means that twice as much electricity is used.

These equipment costs might have been reduced by using a two-silo arrangement requiring only one unloader.



A self-unloading wagon is filled with silage by a mechanical silo unloader and elevator. Grain and supplement are added before moving to the feed bunks.

Surface unloaders in upright silos. For six farms the average rate of removing corn silage with a surface unloader was 60 pounds per minute; grass silage was removed at the rate of 40 pounds per minute on three farms. Labor was not a consideration in routine operation since the unloader required an attendant for only a minute or two each day. The investment in equipment ranged from \$800 to \$1,500.

Based on power costs, annual overhead, and tonnage handled, the costs varied from \$.73 to \$1.34 per ton of silage removed. The cost per ton declines as greater amounts are handled in a year.



A mechanical surface unloader, using a screw conveyor to move the silage to the blower and conveyor pipe.

Power-scoop removal from stacks and trenches. Silage was picked up and loaded on wagons at rates of 300 to 400 pounds per minute. A tractor and scoop can take about 500 pounds of silage at one load.

Power and equipment costs were estimated at 15 to 20 cents per ton of silage handled. These costs were low because the fixed charges (depreciation and interest) of the tractor and power scoop were distributed over several hundred hours of operation on various jobs.

Hand-forking from upright silos. Equipment is a negligible item in hand-forking, and labor accounts for almost the entire cost. The time required per ton and the value the operator puts on his own or hired labor determine the cost of removal.

For corn silage the rate for hand-forking was 190 pounds per minute, or about 11 minutes for a ton, plus the time needed to climb up and down the silo or to loosen frozen silage. With grass silage the removal rate was 130 pounds per minute, or 15 minutes per ton.



This farm-built power scoop (above and below) carries about 900 pounds of corn silage at a time. The scoop is loaded and dumped into the wagon rapidly and with little effort.



DISTRIBUTING SILAGE TO FEED BUNKS

The best method to use to get silage to the feed bunks may depend on several considerations — location of silo, size and arrangement of yards, feedlots, gates, and fences, size of herd, and amount of labor available. On the 36 farms studied, four methods were used: self-unloading wagon; common farm wagon, tractor drawn; overhead carrier; and baskets.

Costs and comparative values for these methods are somewhat difficult to determine, for much depends on the arrangement of yards, distance to be covered, and size of herd. Which method is the most economical may depend on the hourly rate allowed for labor.

Self-unloading wagons. The better self-unloading wagons, designed to handle both concentrates and silage, cost \$1,500 to \$2,000 and can unload 1,000 to 1,500 pounds of silage per minute. Operators using these wagons averaged 15 minutes to drive to the feedlots, unload a ton of feed, and return. Tractor and wagon costs averaged about 41 cents per ton — 23 cents



In this arrangement a self-unloading wagon delivers feed into the fence bunks from outside the lot. There are no gates to open and close during the feeding operation. One man can distribute feed for 200 to 300 cattle in only a few minutes with this system.



Fence bunks are the most important part of a good wagon-feeding system. The bunk slopes with the lot for drainage and has no cross members to hinder cleaning. A lot with an irregular shape permits enough fence space without making the area of the paved lot larger than necessary.

charged against the wagon and 18 cents against the tractor.

With a better arrangement of feedlots and bunks and with a fairly large herd, perhaps 200 head, the time could have been much less. The best record on any of the farms studied showed that it took 12 minutes to deliver a ton of silage, but with a bunk arrangement such as shown on page 11, this operation could probably have been done in less than 6 minutes.

Even with a smaller herd, a self-unloading wagon may be justified in order to cut down on the amount of labor or to cut out some of the hard work.

Farm wagon. A tractor-drawn wagon requires little investment in special equipment, since the tractor and the wagon are also needed for other farm work. Another advantage is that it can be used satisfactorily for herds of almost any size. With a farm wagon, distance from silo to feed bunks is not ordinarily important if the travel routes are unobstructed.

On 16 farms studied, it took an average of 30 minutes to move a ton of silage or a mixture of silage and grain to the feedlot and scoop it into bunks. Power and equipment costs for handling a ton of feed averaged 32 cents. Under the most efficient conditions, the time was cut to 20 minutes and equipment costs went down to 21 cents. This does not include any time for loading the wagon if silage was moved directly from the silo to the wagon, as when a power scoop was used to load the wagon at the trench or stack. In such event the time was charged against removing silage from storage.

Time can be saved by loading the wagons by gravity or with an elevator or power scoop, where possible. It will also help to arrange travel routes and bunks to save unnecessary stopping, turning, backing up, or opening and closing gates.

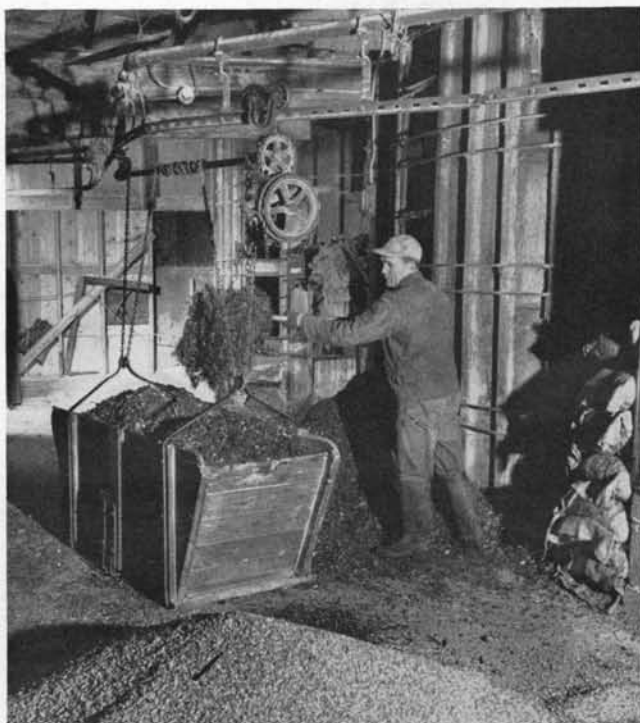
Overhead carriers. The carrier method is one of the best for herds of 20 to 100 head. It can be adapted to most building and yard arrangements. It requires less time and labor than hand methods. And the investment is low enough to justify its use with small and medium-sized herds, yet it can take care



This farm-built carrier box has an adjustable opening in the bottom for feeding grain. The bottom is hinged at each end so that half or all of a load of silage can be dumped at once. The operator walks in the bunk to distribute feed.

of 100 head or even more. A wheeled cart which runs on a track system above the bunks has many of the same advantages as these overhead carriers.

For most effective use of the carrier method, set the feed bunks in a straight continuous line and anchor them firmly to the track supports to keep them in alignment. Arrange your layout so that you need not go through the feedlot to get to the silo and so you can walk in the feed bunks to unload the carrier.



With a 20-bushel carrier box, feeding can be done in less time and with fewer trips than with smaller carriers. This man has his silage, grain, and supplement within easy reach, but he could save some hand labor if he had the grain in an overhead storage and the silage in a holding bin.

To avoid scooping silage from floor level, build a holding bin with a sloping bottom below the silo chute. Make it high enough above the floor so the carrier can be filled with a rake when it is in a lowered position.

A carrier system for handling 75 cattle can be installed for about \$350, with operating costs running about \$32 per year. Carrier equipment averaged just over \$500 on six farms averaging 140 cattle. Annual cost was estimated at about \$45 and cost per ton for the amount handled was about 15 cents. For the farms studied, rate of feeding with a carrier averaged about the same as with a farm wagon, but under the best arrangements a wagon system can handle twice as much feed in a given amount of time as the

best carrier system. Half again as much feed can be moved with a carrier as with a basket in the same amount of time.

Basket feeding. Most feeders who use baskets do so because of a small herd or a bad feedlot arrangement, or because they have labor that can be used to save an investment in equipment. Equipment cost is negligible, but time and travel increase greatly with added numbers of cattle. Since neither a carrier system nor a tractor-drawn farm wagon requires much expense for new equipment, it is often best to replan the feeding layout to avoid basket-carrying altogether.

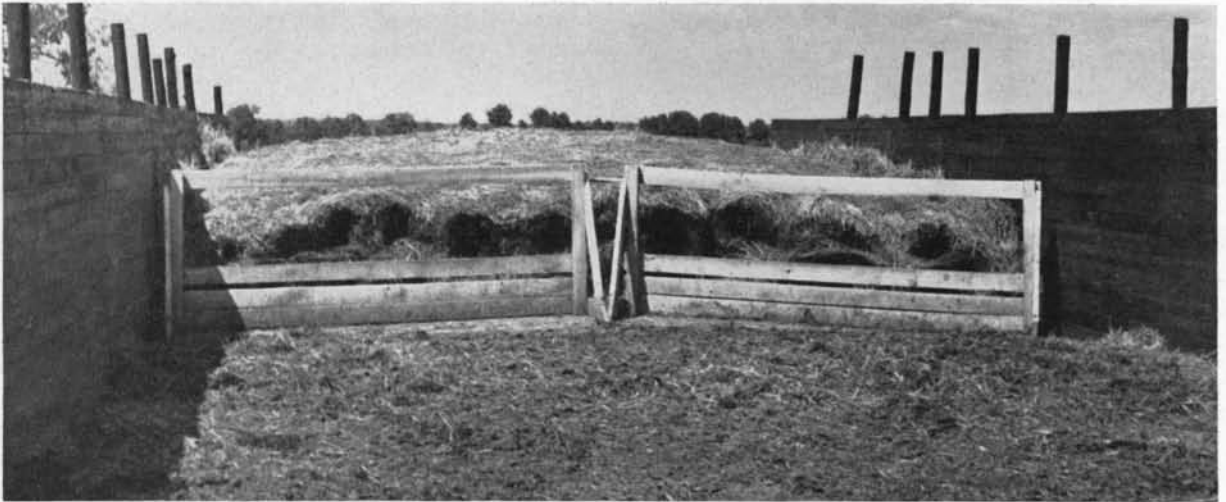
Power-scoop feeding. Silage can be taken from stacks or trenches directly to the feeding area by a tractor scoop. The travel distance should not be very great, ordinarily no more than 50 to 60 feet. The best

arrangement is to have the bunks or rectangular rack feeders in the lot fence.

Self-feeding silage. Self-feeding can be done from trench, stack, or bunker silos with only about a tenth of the labor ordinarily needed with other methods of feeding. The silo should be near the feedlot and the access to the silage paved.

Make the stack or trench at least 15 feet wide. Place a movable manger or feeding fence across the end of the trench or stack. Allow 3 to 6 inches of feeding space for each animal.

Experiments indicate that upright silos can be specially built so that a self-feeding arrangement can be used with them, although so far this is not a common practice.



A bunker-type silo built on top of the ground. The framing poles for the walls are left long so that the wall can be made higher if wanted. The feeding fence is moved forward as the silage is eaten.

WAYS TO IMPROVE FEEDING EFFICIENCY

Barns and sheds

These should be one-story structures, enclosed on three sides with most or all of the south or east side open. They may be rectangular or L-shaped and of pole-frame, masonry-walled, or typical wood-frame construction. Pole-frame buildings are popular because they are easier to build and are less expensive than most other types. Using full-span roof trusses will avoid the need for interior supports and will leave a post-free floor area for handling manure. Provide 30 to 35 square feet of space per animal, exclusive of the storage areas for hay and bedding.

Storing hay and bedding

Store hay inside at ground level so it can be moved directly into sheltered racks or so that

movable racks can be used for self-feeding. Store it near the open side of the barn to reduce trampling of bedding or in a separate shelter in the lot.

Place bedding in the back of the barn close to where most of it will be used.

Feedlot and feeding areas

These should be paved. Allow about the same amount of space per animal as in the barn — 30 to 35 square feet. Use gravel or crushed rock to obtain an all-weather surface on travel routes outside the feedlot.

Feeding devices

Bunks. The best arrangement for distribution by basket, carrier, or cart is to have the bunks inside the feedlot. Cattle can feed from both sides, thus keep-

ing length of bunks and walking distance to a minimum.

If you use a farm wagon, self-unloading wagon, or power scoop, build the bunks into the feedlot fence. Travel routes are shorter and more direct than with bunks inside the lot. Fence bunks are less likely to be damaged than are lot bunks, and the feedlot is left clear for handling manure.

Do not put bunks inside the cattle barn or shed. With such an arrangement feeding is usually limited to hand methods. They also take up needed space and more manure accumulates in the barn.

Bunk space of 20 to 22 inches per animal is needed in order to feed all the cattle at one time. To provide this much feeding space and at the same time keep the paved area to the 30 or 35 square feet needed per animal, the feedlot may need to be irregularly shaped, probably either L- or U-shaped.

Some operators allow only 3 to 6 inches of feeding space per head. They manage this by using large fence bunks, or other types of fence feeders, and keeping feed before the cattle all the time, essentially as in self-feeding. It is usually necessary to mix the concentrates and silage thoroughly so the first cattle to the bunk cannot get more than their share of the grain. This can be done either with a hand scoop or a self-unloading wagon.

Rectangular feeders, spaced at intervals along the lot fence, can be filled with a power scoop (see illustration). A pyramid, cone, or some other form of spreader in the center of the feeder causes silage to fall within reach of the cattle. One of these feeders can hold enough feed for 30 or more cattle. They are better suited to power-scoop feeding than are ordinary fence bunks.

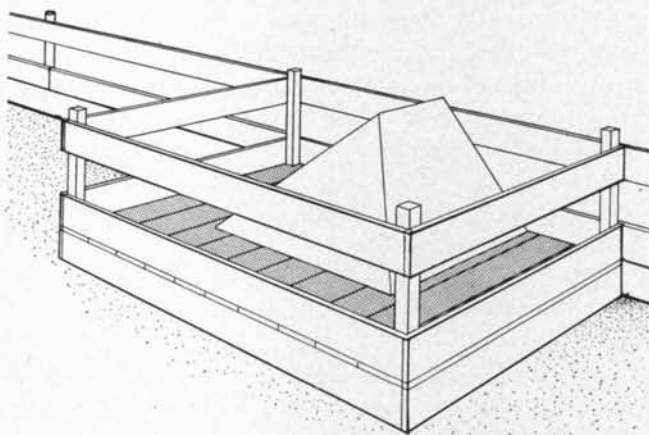
Grain and supplement should be fed in the open, either in weathertight self-feeders in the lot or in standard open bunks or fence bunks.

Some of the good features of this arrangement are: a 1-story barn, open to the south; hay and straw stored at ground level; a paved lot; and fence bunks which are filled with a self-unloading wagon. The operator handles 150 to 200 cattle in this setup.



Arrangement of feeding plant

The key to an efficient system is often the way the feeding plant is laid out. On the following pages are shown four different arrangements, developed for different sizes of herds and for four distinctive methods of feeding. They are based on the most



This feeder for direct feeding of silage from a trench or stack with a power scoop will hold three to four scoopfuls, or about 1,200 pounds of silage. If built about 7 by 10 feet, 10 to 15 cattle can eat at one time. A pyramid or cone is needed to spread the silage toward the sides of the feeder.

effective systems used on the 36 farms in the feeding study and on the results of research and experience.

The arrangements shown are quite specific, but they can be modified to make use of different types of structures, to fit a particular farm, or to be used for different numbers of cattle.

Such items as loading chutes, veterinary pens, and sorting pens are not shown in these layouts but may be added where needed, either as permanent or movable installations.

WAGON DISTRIBUTION OF SILAGE AND GRAIN FOR 200 CATTLE

Either ordinary wagons or self-unloading wagons can be used in the arrangement shown at right and on the next page.

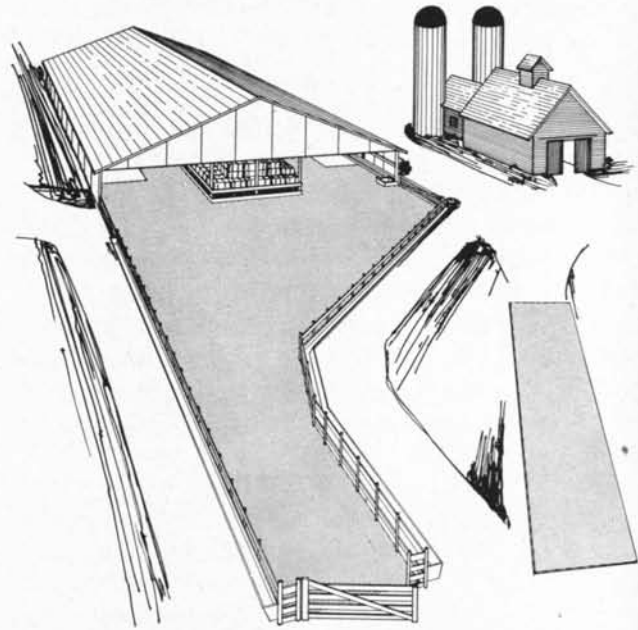
The arrangement provides a continuous feeding route with little waste of time. The wagon is first loaded with silage from the silos located at the north end of the crib. Then the load is taken to the crib, where the concentrate ration, which should be stored in overhead bins for convenience, is placed on top. The wagon is taken to the bunks for unloading and then the empty wagon is driven around the barn and back to the silo. With large operations such as this, it may be desirable to grind feed and spout it onto the wagon at each feeding.

The position of the silos and crib in this design is such that only two doors have to be opened and closed.

The lot is shaped so there is enough bunk space for all the cattle to feed at once without making the paved lot any larger than necessary for the stock. The narrow part of the lot should be about 20 feet wide. This width gives room for two rows of cattle at the bunks and a passageway between them.

This lot can be rectangular and not require too much paved area if large fence bunks such as described on page 15 are used. With such bunks, less length is needed but the feed must be well mixed.

The bunks should slope with the lot for drainage, and be free of cross-members for ease in cleaning out

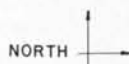
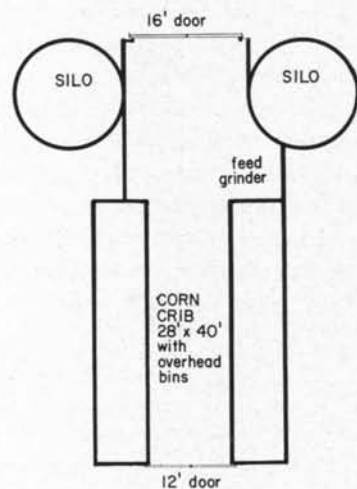
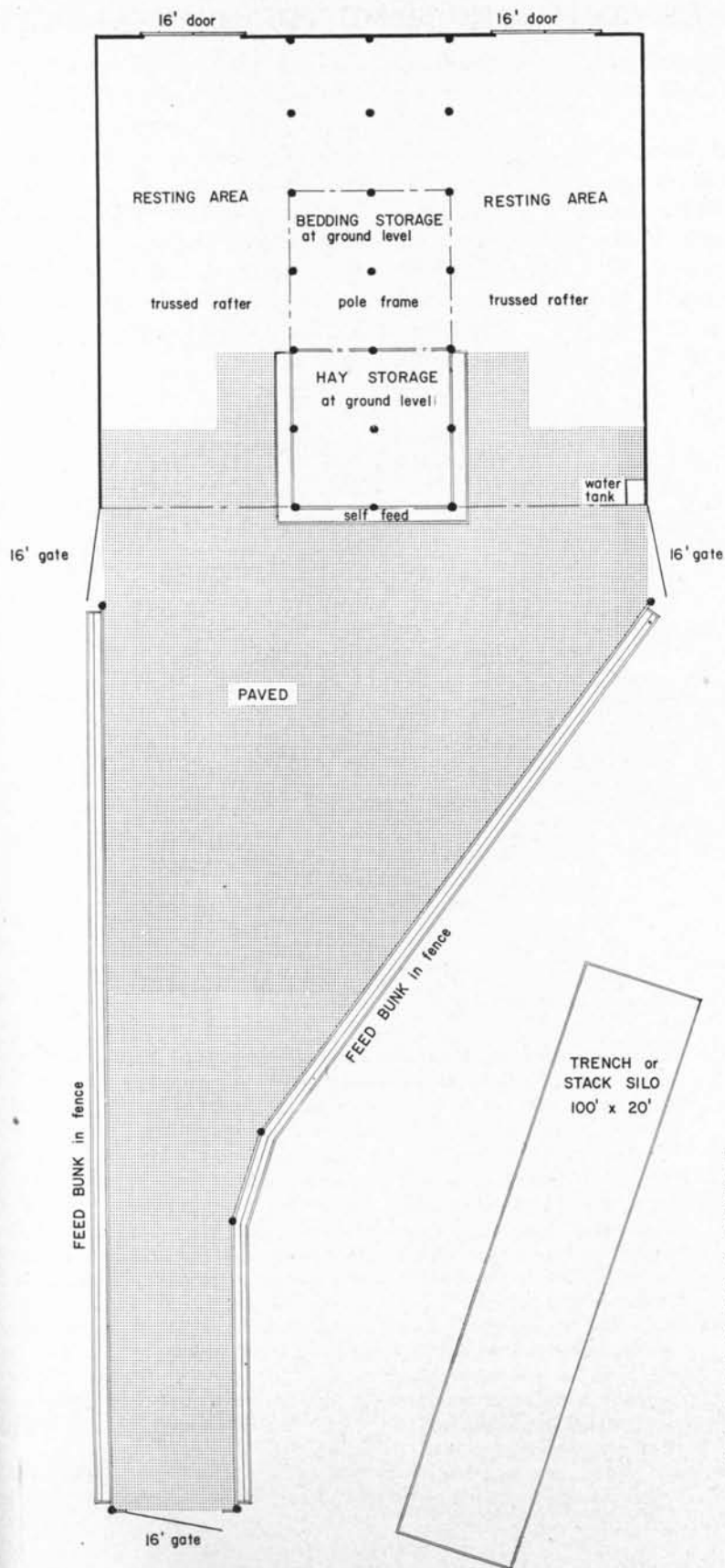


trash. Gravel or crushed rock is desirable on the driveway alongside the bunks.

A stack or trench silo might be used with this arrangement, either to supplement or replace the upright silos. Silage could be hauled to the bunks with a wagon or moved direct with a power scoop. Self-feeding might be practical.



Grinding directly into the feed wagon is often best in large feeding operations. Portable equipment is not too expensive and cuts out hand labor in cribs that do not have built-in elevator and drag equipment. Also, it can be taken to where corn is stored temporarily, avoiding the need to haul the corn to a central location to be ground.



The operator can drive completely around this layout during the feeding operation. All feeding, except hay, is done from outside the lot. The trench or stack silo can be either the principal silage storage or used to supplement the upright silos. The bedding is centrally located to reduce the labor in bedding. Storing hay at the open side of the building helps to keep the resting area clean. It is a good idea to pave the area around the hay so it can be scraped with a tractor-mounted blade. (This layout was developed by rearranging the buildings and lot shown on page 9.)

CARRIER DISTRIBUTION OF CONCENTRATES AND SILAGE FOR 50 TO 75 CATTLE

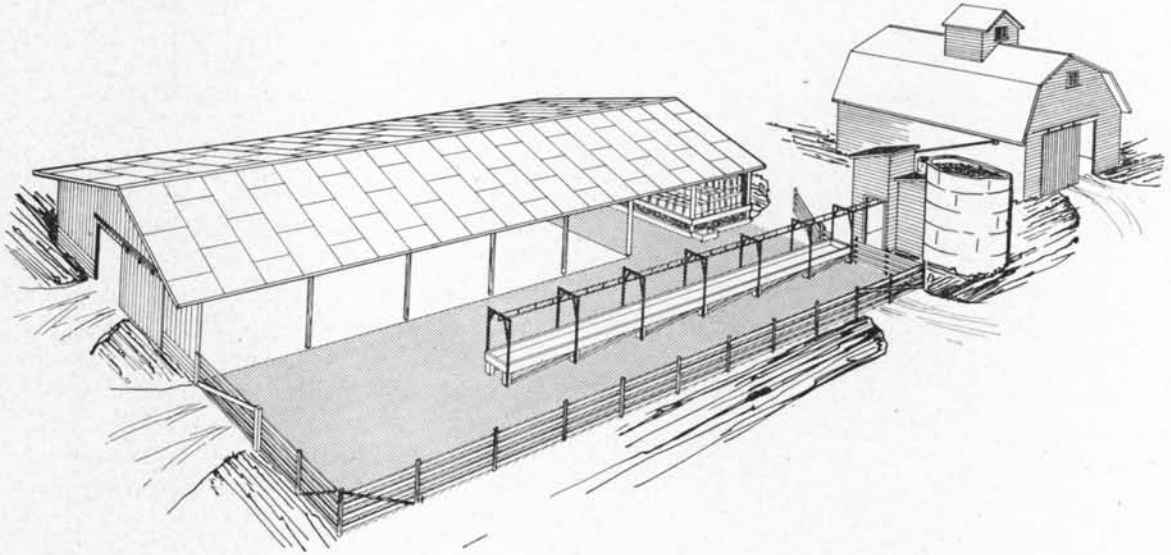
The overhead carrier system shown on these two pages uses little equipment but permits fast and easy feeding. Silage is removed from the silo, either by hand or with a mechanical unloader, and dropped into a holding bin with a sloping bottom. Silage can be raked into the carrier from this bin faster and more easily than it can be scooped from floor level.

In this arrangement grain is ground at the crib and blown to an overhead bin in the feed room. The bin should be large enough to hold a four- to five-day supply of feed. With the bin shown, the carrier

can be filled in raised position. Supplements are added during the grinding operation.

Steps at the edge of the lot make it easy for the operator to get into the bunks. It should not be necessary to walk in the lot.

The silo is located to accommodate the feed-delivery pipe and to enable the operator to get a wagon up to the chute if he wants to distribute feed from a wagon. The crib in this arrangement is 45 feet from the lot fence to permit use of an outside elevator at the crib.

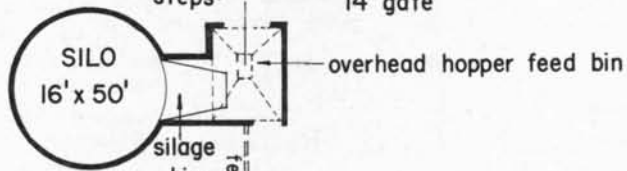
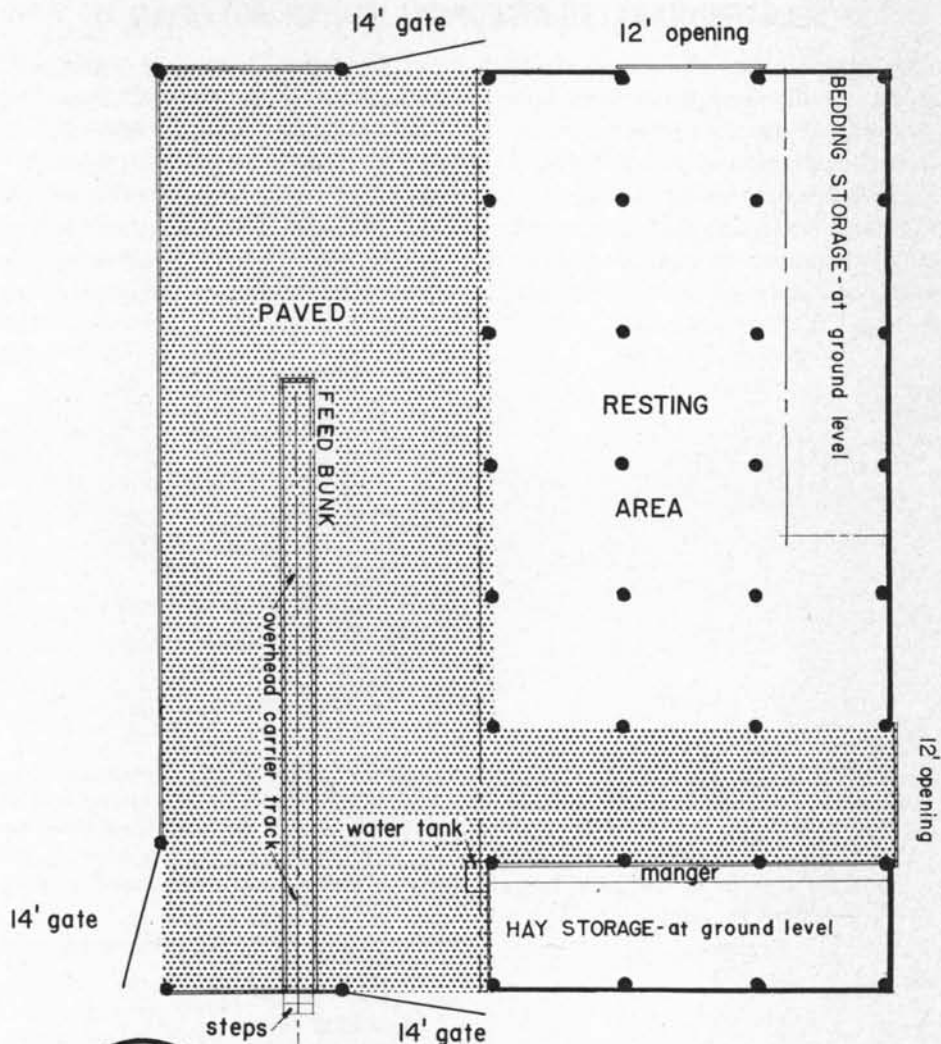


In the arrangement shown above and on the opposite page, grain is blown to an overhead bin in the feedroom from the grinder at the corn crib. The distance of 30 feet from the crib to the feed bin permits free driving around the crib and silo, yet is not great enough to lower the efficiency of the blower. The sidewalls of the hopper feed bin should be sloped 65 to 70 degrees to assure free flow of ground feeds. Sometimes an electric vibrator or agitator rod is also needed. The carrier does not have to be lowered to load grain. Silage is dropped into the holding bin, which should be large enough to hold a day's supply, and then raked into the carrier. The carrier must be filled in the lowered position to keep the silo side of the holding bin as low as possible.

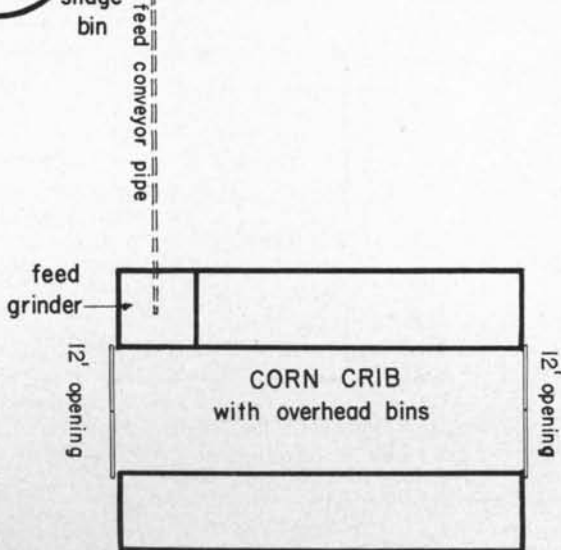
The two steps at the edge of the lot make it easy for the operator to get into the bunk to distribute feed. To make walking and cleaning easier the bunk has no cross members.

As in the other arrangements, hay is stored separate from the resting area to help keep the bedding clean. A drive-through alongside the hay storage permits "stair-step" unloading.

Cattle can feed from both sides of the 60-foot bunk. This gives the cattle enough space and keeps the walking distance for the operator low.



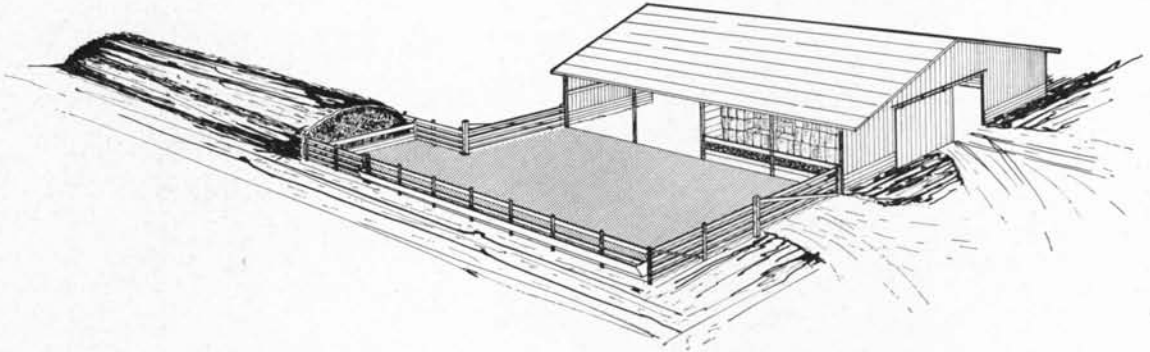
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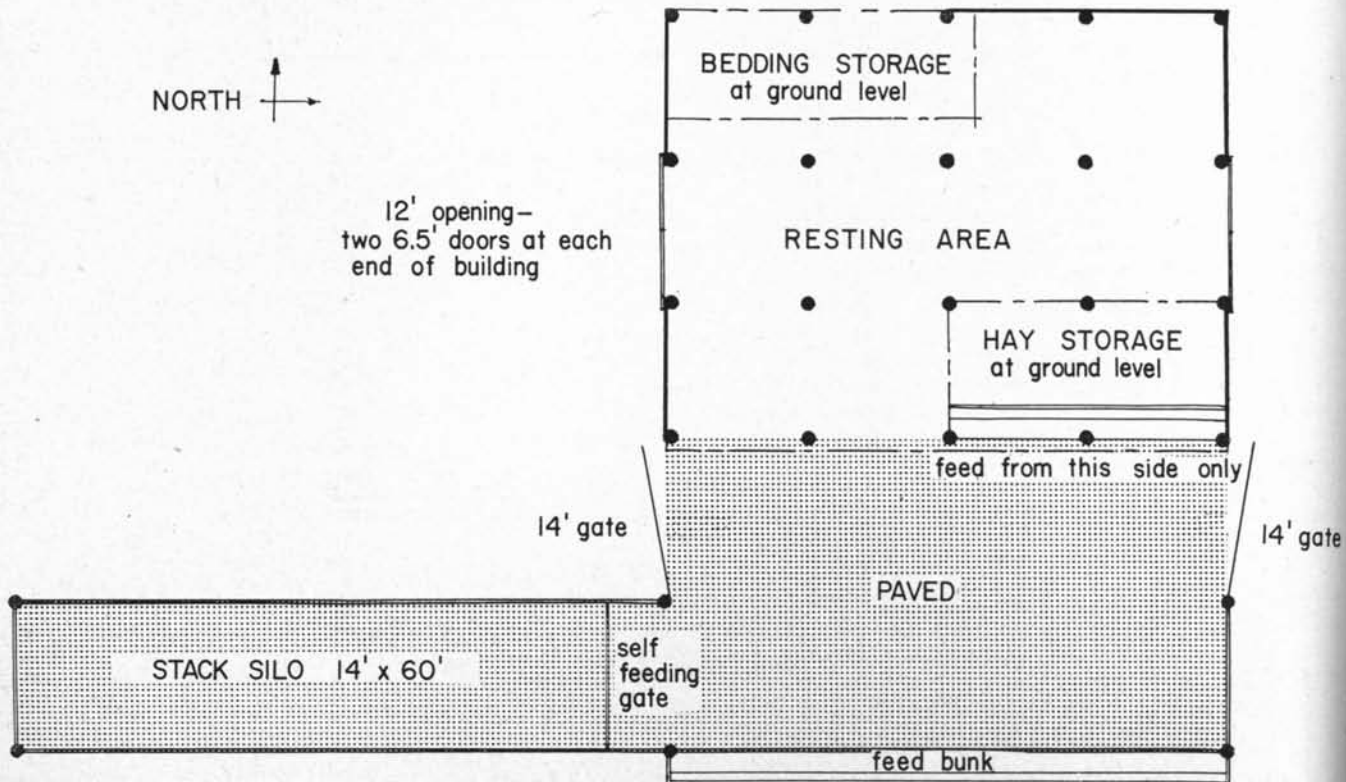
SELF-FEEDING SILAGE FOR 35 TO 40 HEAD

The layout shown below is for self-feeding silage from stack, bunker, or trench. Any of the three can be used, but the bunker is probably best because the sidewalls help to reduce spoilage and also serve as a fence. An arrangement like this provides for a minimum of investment in both structures and equipment for a small-scale operator, but can be expanded either to the right or the left to take care of larger herds.

The self-feeder can be made by placing a movable manger or feeding fence across the end of the silo and pushing it forward with a tractor as necessary. A fence is needed around the stack to keep the cattle in the lot. A four- to five-day supply of ground feed can be stored in a wagon and hauled to the bunks as needed. Or it can be hand-fed from a covered wagon parked by the bunks, to save starting a tractor.



Only 3 to 6 inches of feeding space per animal are needed in this self-feeding arrangement. The movable feeding fence can either be placed on the floor or, with a bunker silo, supported by a cross pole. Hay is fed in the barn and concentrates in the fence bunk from the outside of the lot. The wide gates and doors provide a drive-through for easy handling of manure and for convenient storage of hay and bedding. Baled straw can be used as a temporary back wall of the barn.



SELF-FEEDING GRAIN FOR 125 CATTLE

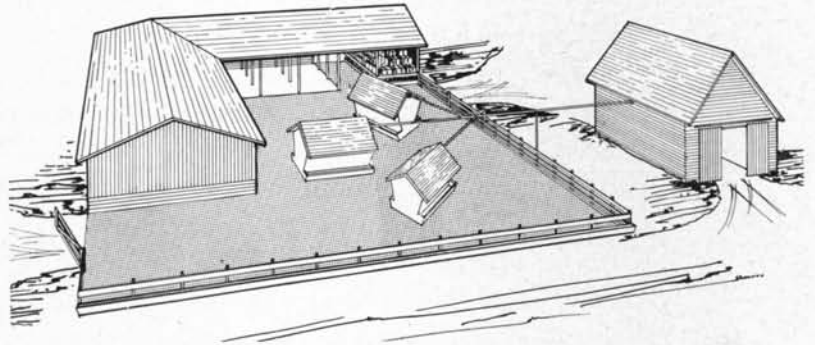
In the arrangement shown below, three self-feeders, each 6 by 16 feet, are used for feeding grain. The grain is ground at the crib and blown to the feeders in the lot. It can be piped to any one or all three of the feeders by the use of valve controls in the conveyor pipes. Distance from the grinder to the farthest feeder is only about 50 feet to allow efficient use of a blower. With a smaller herd, a single self-feeder might be built alongside the crib and filled by gravity.

During the periods when grain is not self-fed, one of the self-feeders can be used for storage and the grain handed from it into the troughs on the sides of all three. For extra space during this time, some feed can be ground into a wagon and scooped into the fence bunk along with the silage.

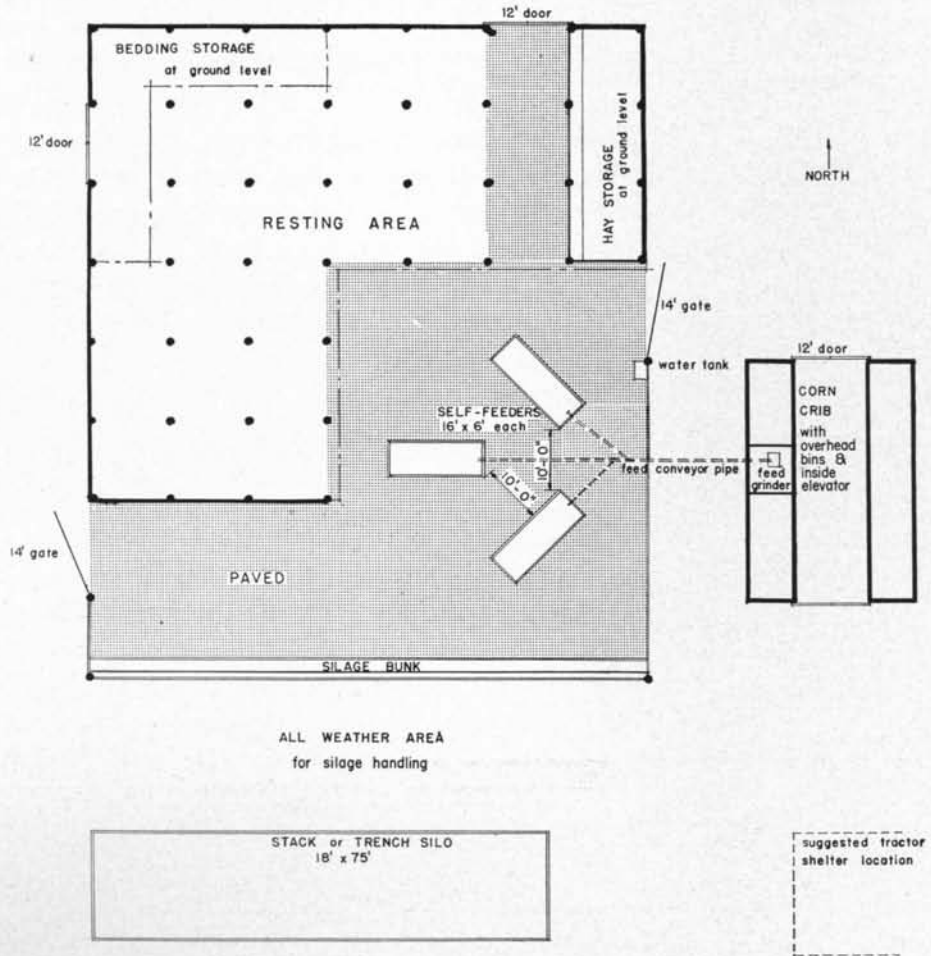
In this arrangement the fence bunk is about 2½ feet wide at the bottom and 4 feet wide at the top, larger than the bunk shown in the plan for 200 cattle.

With this larger bunk, 9 inches of space per animal is enough because the bunk can be filled with silage and the cattle can use it much the same as in self-feeding.

A large-capacity bunk such as this shortens travel routes and simplifies the arrangement of the lot. Four rectangular feeders can be used in place of the continuous bunk. They can be used for extra grain-feeding space, the same as a continuous bunk.



In this layout all concentrates are blown from the grinder in the crib to the self-feeders in the lot. Silage can be stored in a stack or trench close to the lot and fed with a power scoop, or an upright silo can be located at one end of the bunk and the silage fed either with a carrier or a cart. An L-shaped barn as shown here gives added protection against weather and can be just as convenient and serviceable as a rectangular barn.



ILLINOIS CATTLE FEEDERS AVERAGE 10 TO 12 MAN-hours of labor to feed and care for one beef animal. Yet many feeders spend far less time than this and do a good job.

To find ways of feeding cattle with less labor, the Illinois Station and the U. S. Department of Agriculture made a study of 36 Illinois farms where cattle were an important part of the farm enterprise. Farms were chosen on which silage was fed, because the use of silage adds to the work of cattle feeding. These farms differed greatly in the type of silo used, feeding arrangements, size of herd, equipment used, and method of operation. From the study of these farms and from observations of practical feeding operations on other farms, the recommendations reported in this publication were developed.

On many farms the feeding plant can be made more efficient with only a few changes and with the use of equipment already on the farm. On other farms a real improvement would mean rearranging buildings and yards, changing or adding facilities for feed storage and handling, and buying new power tools and equipment. The practical thing to do on any one farm will depend on what is already there, the size of the herd, the feeding and management system, and the balance that has to be maintained between investment cost and labor expense.

The recommendations in this circular deal mainly with ways of getting feed out of storage and distributing it to the animals, and with the arrangement of the layout for most efficient work. Information on other phases of the beef cattle enterprise can be obtained by writing to the University of Illinois College of Agriculture at Urbana.

This publication was prepared by R. N. Van Arsdall, Agricultural Economist, Bureau of Agricultural Economics, and Thayer Cleaver, Agricultural Engineer, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture. The authors are indebted to *Successful Farming* for the use of photos taken on some of the 36 farms studied.