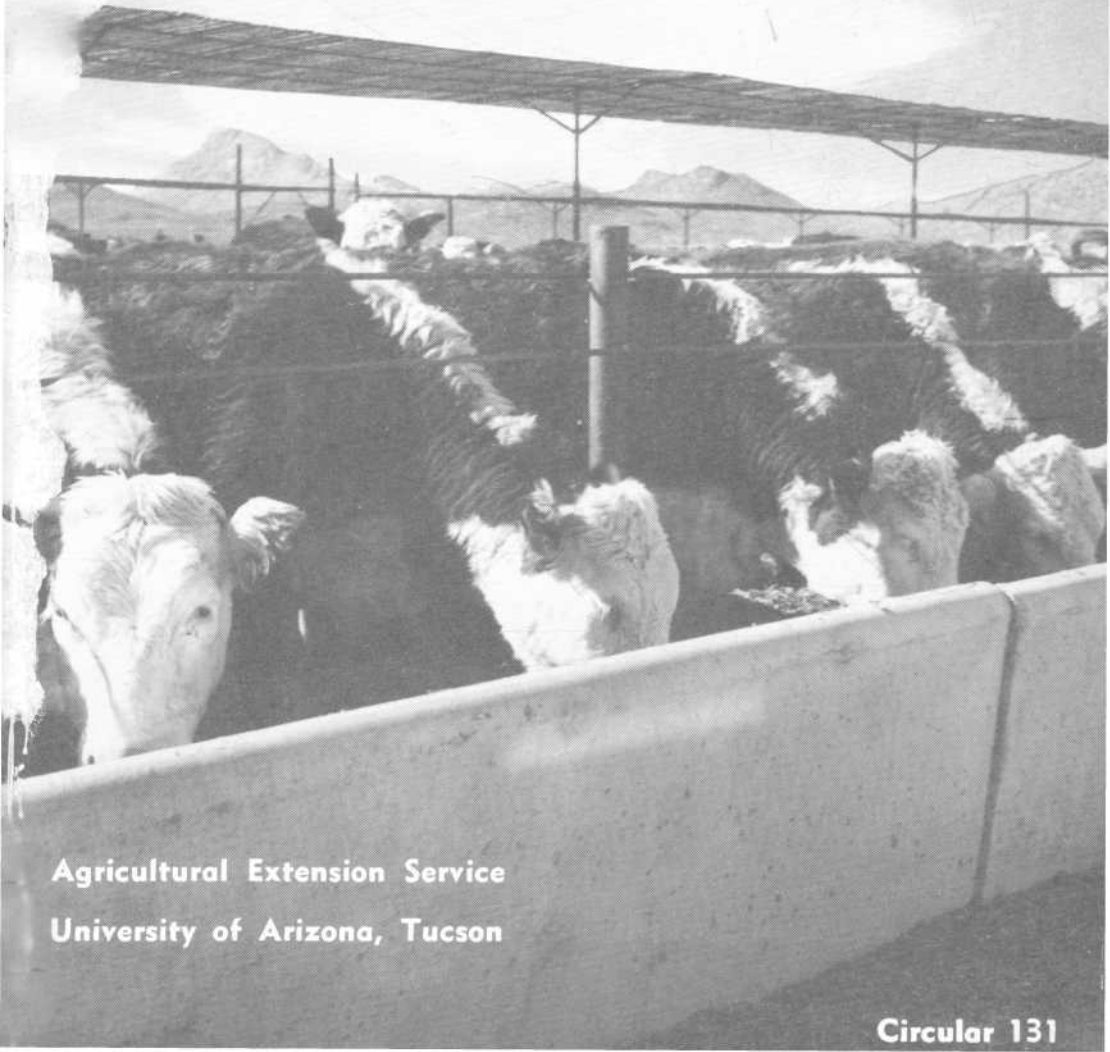
CATTLE FEEDING IN ARIZONA



Agricultural Extension Service
University of Arizona, Tucson

Circular 131

For Reference

Acknowledgment is hereby given to T. P. Jardine, assistant animal husbandman for the Agricultural Experiment Station, for assistance in compiling information in this circular. Also, helpful contributions to the subject matter of this circular have been made by many Arizona cattle feeders.

University of Arizona
College of Agriculture, Agricultural Extension Service
Ches. U. Pickrell, Director

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CATTLE FEEDING IN ARIZONA

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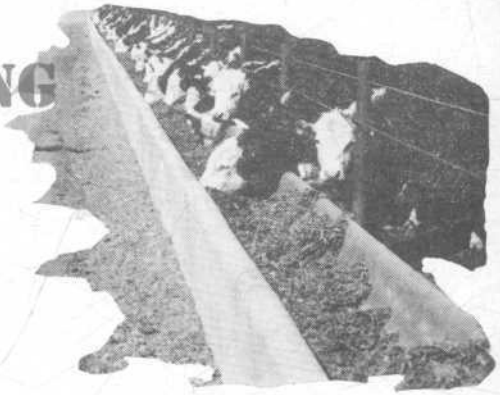


Plenty of roughage is the backbone of Arizona feeding.

Why Feed Cattle?

Cattle feeding fits with Arizona farming. The irrigated valleys of the state are ideal for the economical production of beef. With a wide selection of feeds, mild winter climate, and rapidly expanding markets, unexcelled opportunities for growing and finishing cattle exist here.

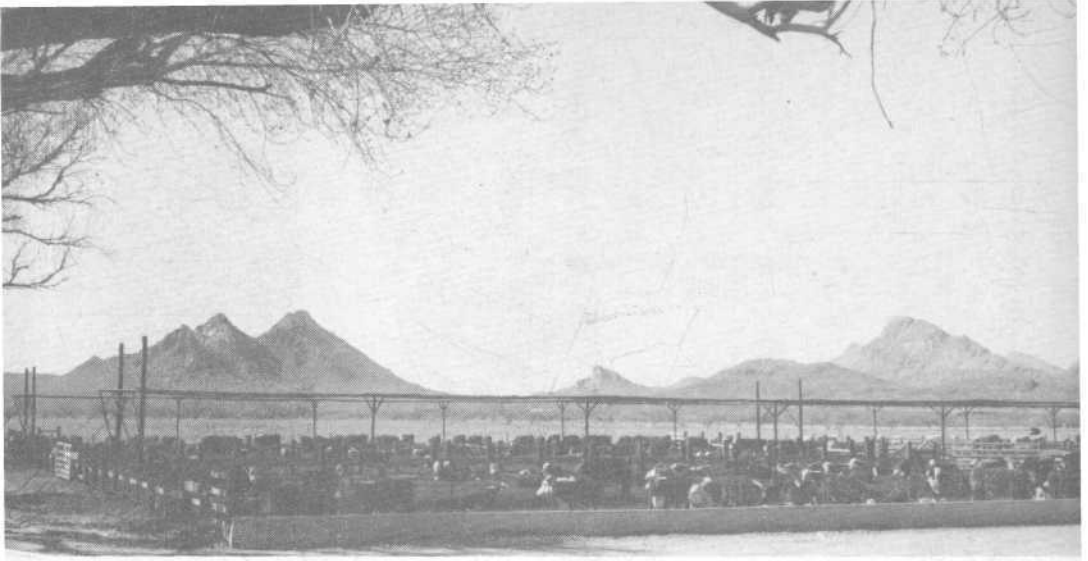
Many feeders, both large and small, are using cattle as a market for home-grown feeds. Feed crops are produced in abundance throughout the year. High crop yields produce many pounds of beef per acre.

The manure from feeding, coupled with crop rotations, assures even greater returns on other crops. Many waste and byproduct feeds can be used that otherwise would have little value.

Successful cattle fattening requires a margin above the cost of the cattle, and a processing cost in line with the selling price of the finished animal. Normally, a $2.00 to $4.00 per cwt. spread between the cost and selling price is necessary in most cattle-fattening operations.

Frequently costs per cwt. gain exceed the selling price, necessitating a wider margin on the purchase weight to absorb the added cost. Feed will approximate 80 percent of the total cost, with labor, death loss, interest, equipment depreciation, etc., accounting for the other charges.

The farmer-feeder, who combines crop raising and cattle feeding is in a stronger position to withstand a loss — and likewise to realize a greater return—than the feeder dependent entirely upon purchased



Cattle feeding fits with Arizona farming.

feed. Such an operator is assured of a ready market for his feed crops and is afforded the further opportunity of a supplemental return from the feeding operation. This practice is less speculative than the outright purchase of both feed and cattle.

Cattle feeding involves a thorough and comprehensive knowledge of cattle, of farming, of feed values, of feeding methods, of marketing and selling. The new feeder will be confronted with many questions pertaining to these various phases of agriculture.

How many cattle?

The answer to "how many cattle" depends on facilities and amount of feed. A farmer choosing to feed certain of his crops might feed only a small number of cattle, perhaps no more than 100 head.

How many cattle per lot?

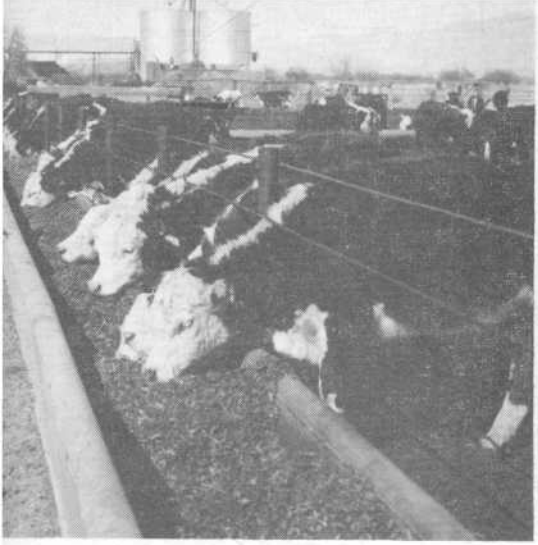
The proper number of stock per lot depends on age, size, and whether or not the cattle are horned or dehorned. Cattle on feed should be separated on the basis of these same factors as well as sex. Sometimes it is desirable to maintain separate records on cattle coming from different ranges or owners.

If segregation into lots on the basis of these factors creates any crowding, a cut should be made to about a maximum of 100 head in lots 240 by 60 feet. If only 100 to 150 head are being fed, better management can be exercised by using 2 or 3 lots of 50 head each.

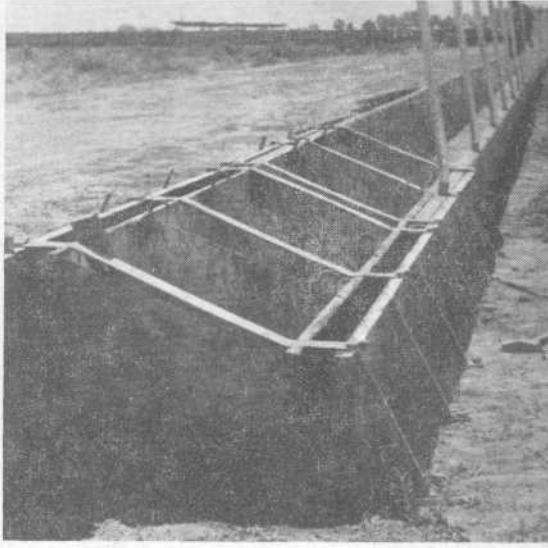
How much space per animal?

Allow 140 to 150 square feet of corral space, and 2 to 2½ feet of trough space per animal. Horned steers should have about a foot more trough space per animal than dehorned cattle.

Morrison's "Feeds and Feeding" recommends a minimum of 90 square feet including 30 square feet of shed room per animal. In Arizona most cattle are fed in the warmer valleys and shed space is not needed.



Concrete manger-type troughs will last indefinitely.



These forms are used in concrete trough construction.

Equipment Needed

Equipment and its layout require careful consideration. The layout will be governed by the local situation.

One layout is a simple yet workable type that does not require a large capital outlay. Another is the "push button" type layout that reduces labor, handling, and repairs. This normally is used where greater numbers of animals are fed and the additional cost prorated over a longer period of time.

Each feedlot operator must decide what will serve his needs most efficiently.

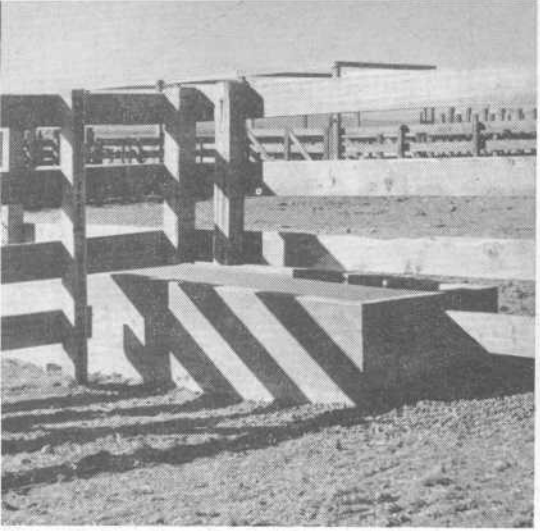
Other equipment items are essential, such as water troughs, feed wagon, loading chutes, squeeze chutes, shade, storage sheds, and storage space. Platform scales, silo, feed grinder, and dipping vat or sprayers also are useful.

Troughs

The old "bunk" type feeder used inside the feeding pen has been almost eliminated from new construction because of difficulties in supplying feed to such bunks.

Troughs may be either concrete or wood. The concrete troughs, of course, last longer and require less repair. Forms for pouring this type of trough are available, made up in a unit. (See pictures above.)

The cost of such construction varies from $3.00 to $4.00 per running foot of trough. The only reinforcing is in the outer wall of the trough where a ¼ inch steel rein-



Water troughs need to be easy to clean.

forcement rod is used. Usually with concrete, a 1¾ or 2 inch steel post 5 feet long is used to hold the neck yoke. This yoke often is pipe of about 1½ inch diameter or strong cables that are run through "eyes" on the upright posts.

Wood troughs are much cheaper to build than concrete and can be satisfactory for a number of years. As a rule they are 30 inches wide at the top and 20 to 24 inches at the bottom. They are 8 inches deep on the corral side. The back is about 16 inches above the floor of the trough. The floor should be 6 inches above ground level.

These troughs should be made of 2 inch lumber and fitted tightly together. Some are lined with tongue-and-grooved lumber on the inside, some with galvanized sheet metal.

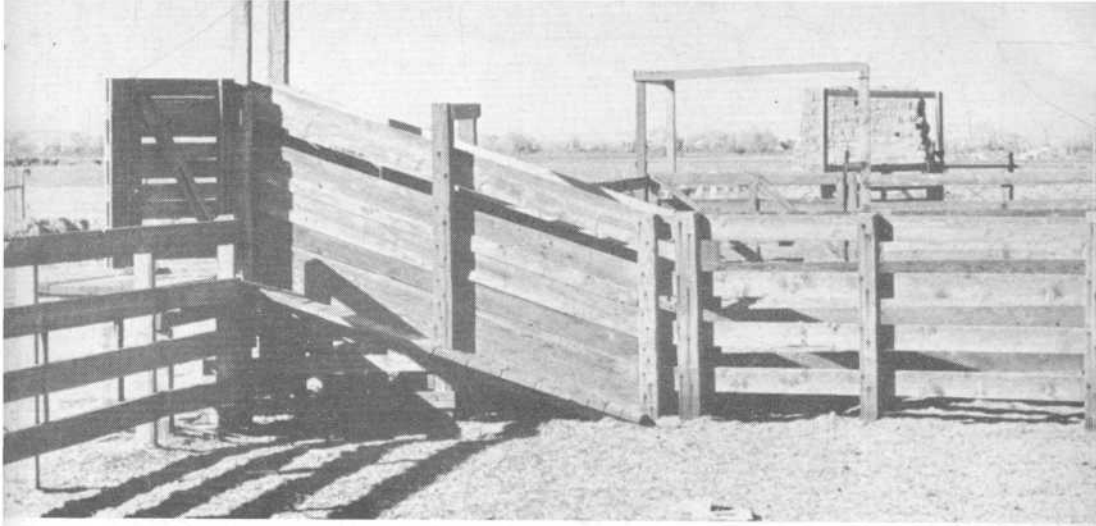
The trough is outside of the fence with a space of 20 to 22 inches through which the cattle can feed. A yoke made of 2x8 inch lumber bolted to the posts is satisfactory.

Water

Clean fresh water should be provided in corrals at all times. One trough can be made to serve two corrals by building the division fence through the center of the trough. (See pictures above.)

There are many ideas about the proper size of watering troughs, one of which is that they be 2 feet high, 18 feet long, and 3 feet wide, thus giving 18 inches of drinking space on each side of the fence. If the bottom is oval shaped and provided with drainage outlets, it will facilitate cleaning (which should take place at least once every week).

Smaller tanks located in the lot are sometimes used to allow frequent replacement of the water, thereby keeping it a little cooler in the summertime. With either type, float-valve connections are advisable to insure continuous water. Cattle will require 10 to 12 gallons of water per head daily.



A well-placed loading chute is readily accessible.

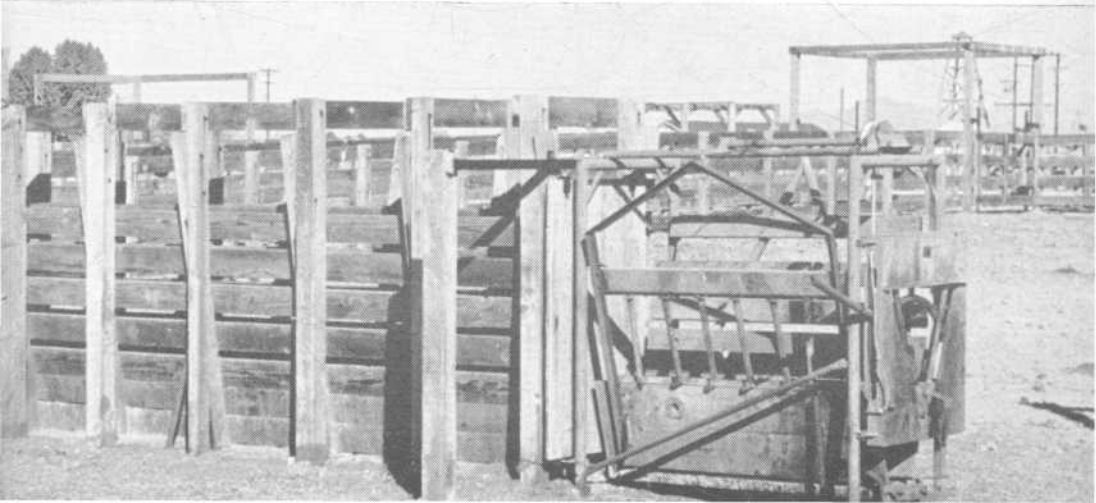
Chutes

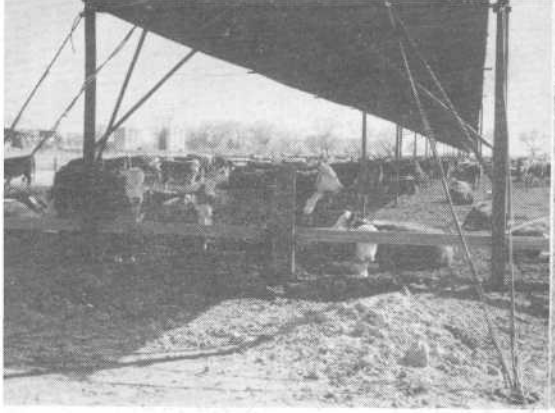
Crowding pens should be made of good 2 inch lumber bolted to heavy posts. Every unit should have some sort of a squeeze for branding and dehorning. There are several types of squeezes made commercially and many homemade plans answer the purpose. Loading chutes also are essential. (See pictures on this page.)

Shade

Shade is important in Arizona valleys. The structure need not be

A chute and squeeze will save many man hours.





Cattle shade should be 10 to 12 feet high.

Ensilage from a trench silo makes a succulent feed.

elaborate. It should be 10 to 12 feet from the ground on well-set posts. It may be thatch or of some solid construction, and it should be left open all around. (See picture above.)

Storage

Storage sheds for hay need not be elaborate, but those for grain must be rodent proof. It is important to consider spacing of hay sheds and stacks as a precaution against fire.

Silo

The trench silo is used almost exclusively and can be built according to specifications available at the office of the County Agricultural Agent. (See picture above.)

Mill

Commercial feeders have found grinding to be of advantage in saving hay, and useful in mixing feeds. Grinding also serves to increase the palatability of hay, but cannot be expected to convert low-grade hay or roughage into top-grade feed.

Layout

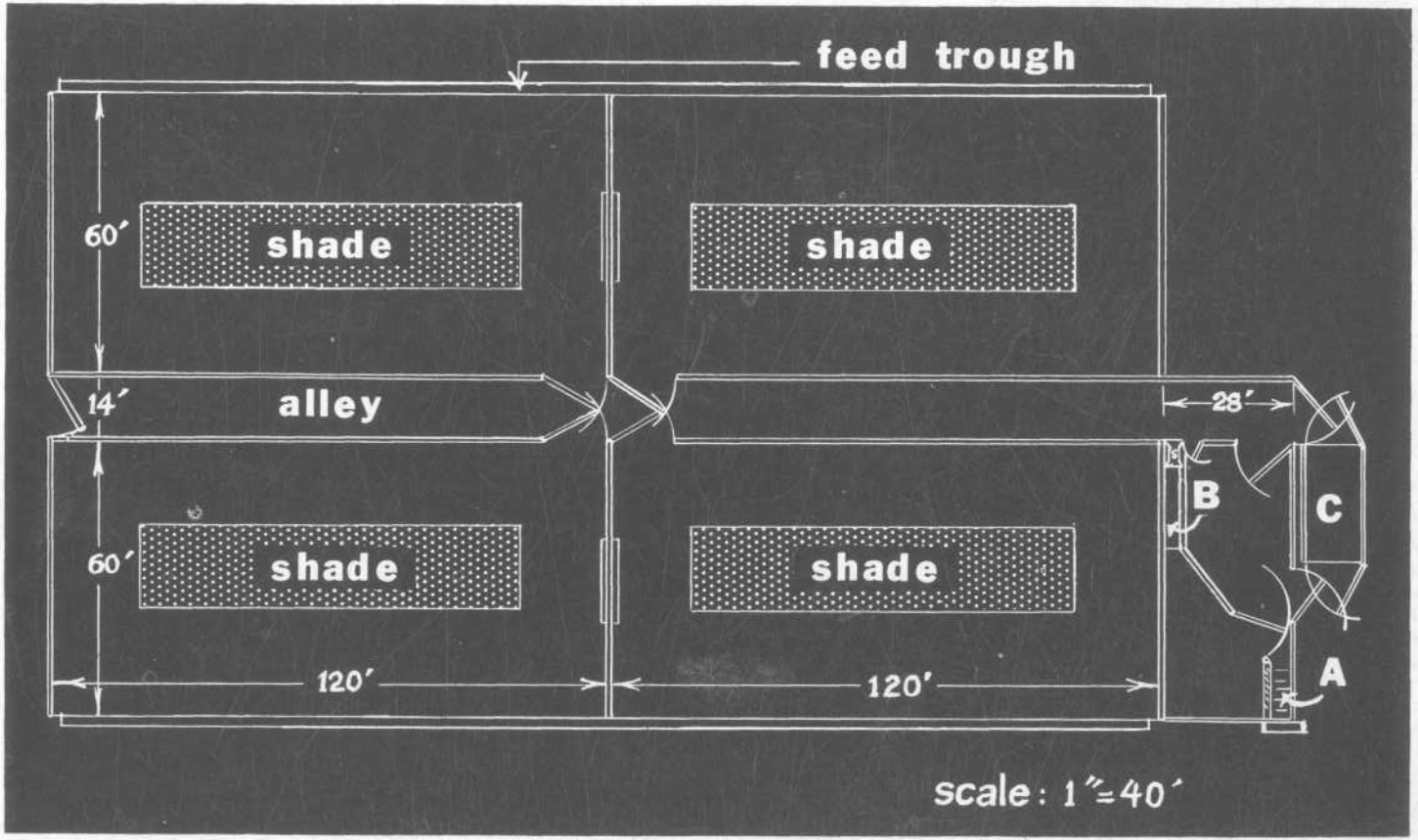
One suggested feed-lot layout is shown in the sketch. (See page 9.) This is just one model plan and will require many alterations to fit varying local conditions. However, it will give a general idea as to some principal requirements.

The sketch shows what has been called the "manger type" of feeding trough along the alley. Shade is provided and water troughs 3 feet wide are shown between lots.

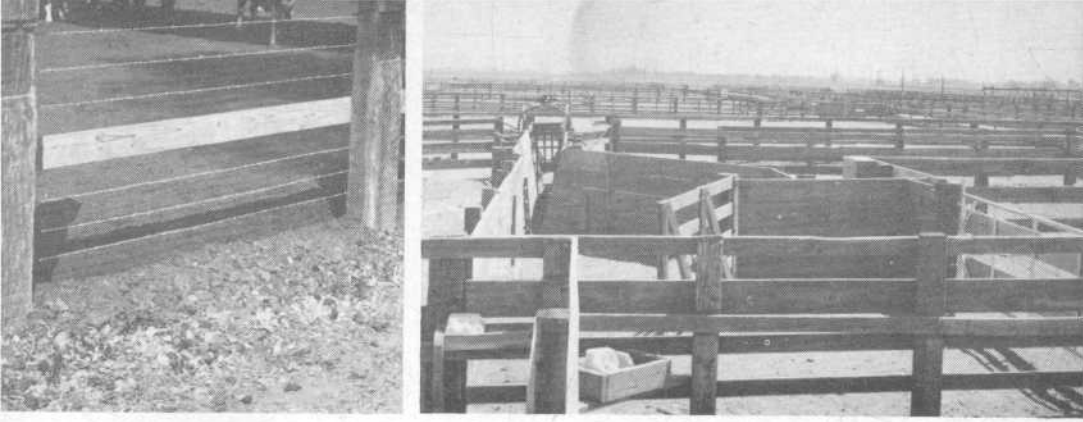
Cattle would be received at loading chute "A." They might be branded at chute "B," or moved through the corrals and weighed at the scales "C." There is room to place a portable squeeze chute in front of "B" if a fixed type is not built in.

Scales are located where they can be used to weigh feed as well as cattle. All gates are 12 feet wide, except alley gates which are 14 feet. After classification, cattle are driven down the alley and cut into the proper pen.

The lots are 120 feet by 60 feet and designed to handle 50 head of



Feed lot layout is important.



Fences may be of either wire or lumber.

yearling steers. If several hundred head are to be fed, the layout could include two pens of 50 head, and the remaining pens of 100 head each. For 100 head, the lot size is 60 feet by 240 feet. About 100 head are all that can be handled efficiently in one lot.

For the larger layout, the working pens would probably be larger and more complete. But for a small feed lot, the investment in working corrals should be kept to a minimum and yet be able to perform the necessary operations.

Complete plans are available in blue-print form, from the County Aricultural Agent's office or from the University of Arizona, Tucson.

Fences

Corrals and feed-lot fences may be of either wood or wire. Wood is probably the most substantial, but both types are used extensively. If wire is used, many strands or a heavy mesh is recommended.

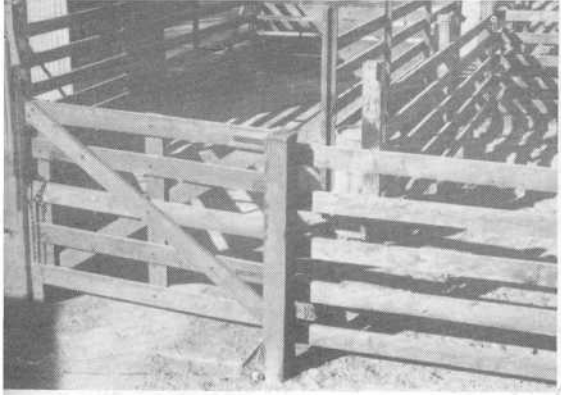
Working corral fences should be 6 feet high with posts 8 feet apart. Feed-lot fences are high enough at 5 to 5½ feet. A suitable corral can be made out of 2 x 6 and 2 x 8 inch lumber spaced 8 inches apart and bolted or nailed to the posts, depending on the strain. Used ties serve well as posts.

Good gate and corner posts are very important. Since gates are quite wide and heavy, extra strong, long gate posts must be set. To allow plenty of room for feed wagons and other mobile equipment, the corral gates should be 12 feet wide.

Scales

Scales are very important in feeding operations. Most feed-lot plans suggest two sets of scales—one for stock and the other for feed. It is well to work cattle at one end of the plant and store feed and supplies at the other to give plenty of room for hauling, grinding, and weighing feed.

In the inexpensive layout, one scale if properly placed and with a wide deck, can serve for weighing both feed and cattle. (See picture top of page 11.)



Scales to weigh feed and cattle reduce the guesswork.

Tractor, loader, and feed wagon cut feeding time.

Feeds and Feeding

Prolonged feeding of a heavy grain ration is not required in Arizona. Choice cattle, weighing 1000 lbs. or less, can be produced with relatively high roughage rations.

Rations of different combinations for fattening cattle are prepared from the following feeds: alfalfa hay, barley hay, corn and hegari silage, cottonseed, cottonseed and vegetable by-products, barley and hegari grain, molasses, and salt.

Silage and Fodder

Silage is widely used by Arizona cattle feeders because of its feed value and high palatability. The succulence of silage tends to improve the entire ration.

Hegari will yield 12 to 16 tons of silage per acre on good farm land, and is the most generally used silage in Arizona. When fed with alfalfa hay, barley, and cottonseed meal, it equals from a third to a half of the feeding value of alfalfa hay.

Cattle on test at the University of Arizona have gained 2.4 lbs. per head daily, dressed out 59.5 percent and graded choice on an average daily ration of 25 lbs. hegari silage; 5.3 lbs. alfalfa hay; 5.5 lbs. grains (barley and hegari); and 2.0 lbs. of cottonseed meal.

Corn silage is equal in feeding value to hegari and can be used where corn will outyield hegari.

Alfalfa and grass have been ensiled to a limited extent in Arizona. The addition of a preservative such as grain, molasses or other carbohydrate, is recommended to properly ferment the silage.

Cull cantaloups have been ensiled with rather good results in a few vegetable-producing areas. The high water content necessitates packing the cantaloup between layers of straw.

Tests conducted by the Arizona Experiment Station indicate that a ration containing alfalfa hay, barley, cottonseed meal and silage produces as economical gains as any other rations tested. Satisfactory rations can be compounded excluding silage.

A mixture of alfalfa and barley hay, fed with barley or hegari grain and cottonseed meal, constitutes a well-balanced ration. Cottonseed hulls may be added for variety and bulk. Some of the roughage should be of high quality, and the ration must be palatable enough to induce maximum consumption.

Good results have been obtained with a ration of ground hegari fodder and cottonseed meal. However, this ration is not widely used because of unsatisfactory storage facilities for fodder on most farms.

Barley and Hegari

Barley and hegari are fed almost exclusive of other grain feeds. Occasionally wheat, if available at a price equal to or below that of the other grains, can be incorporated in the ration. Corn, while slightly superior in feed value, is rarely available to Arizona feeders at a price that would warrant its substitution for the barley or hegari.

Barley and hegari are of equal value and should be rolled or ground. Heavy feeding of these grains is not required in the Arizona fattening ration.

The amount to feed is governed by its cost, the age and class of cattle, and the market for finished beef. Feeding these grains at the rate of about one pound per 100 pounds live weight will insure a good rate of gain and a desirable market finish when included in a well-balanced ration.

Cottonseed Meal

Cottonseed meal serves its greatest use as a protein supplement. The amount necessary is small for this purpose because of the comparatively high protein value of alfalfa and barley with which it is often fed. Larger allowances of meal than necessary to balance the protein requirements are advisable only in the event its cost is below the price of barley.

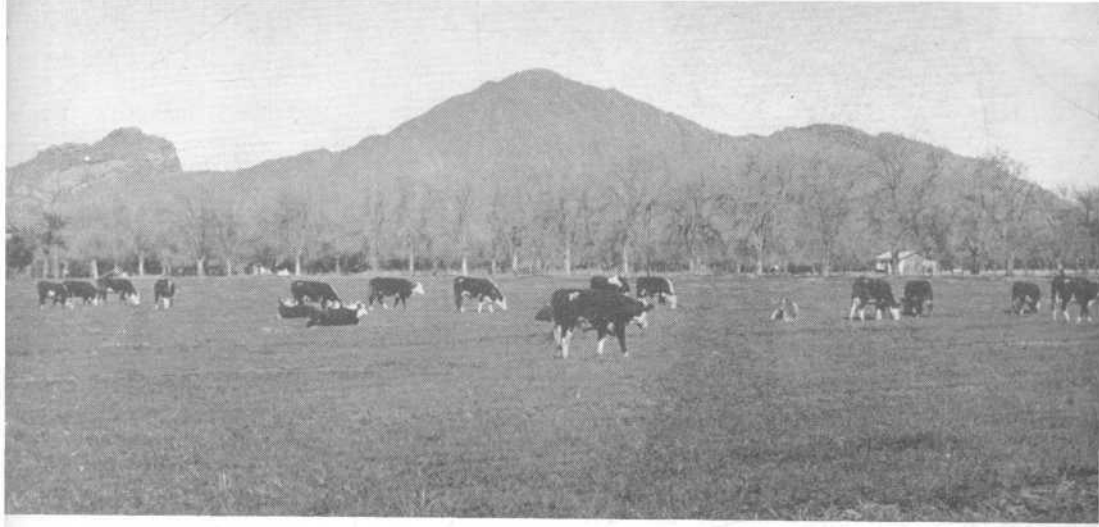
Cottonseed meal is useful not alone for its protein content but also for its high energy value. It can be fed as the sole concentrate with cottonseed hulls and hay, if the price warrants its use in this manner.

In areas adjacent to cottonseed mills, a ration of cottonseed meal, cottonseed hulls and alfalfa hay is sometimes fed. High quality alfalfa hay must be included to provide the necessary vitamins. Because of the higher dry-matter content of cottonseed hulls, their feed value is approximately 65 percent above hegari silage on a weight basis.

Whenever the price of whole cottonseed is substantially below that of cottonseed meal, cottonseed can be included in the ration to replace the meal. Tests reveal that the seed is about equal to meal in a ration excluding silage, and 88 percent as valuable in rations including silage.

Molasses

Molasses is used in fattening rations for a variety of reasons. In



Cattle on pasture, with proper handling, can make good gains.

rations of low palatability, molasses will increase consumption. In pelleting, and in rations containing finely ground ingredients or dusty hay, it is effectively used as a binder.

Because of its high carbohydrate content, molasses can be used as a partial replacement for grain. When considering molasses for this purpose, it is advisable to use the feed only when its price is two-thirds or less the price of barley.

Molasses is relished by stock. A limited amount of molasses provides a ready source of quick energy to the rumen bacteria, stimulating these bacteria to break down the more complex portions of the ration.

MC-47, a by-product of the sugarbeet industry, is being fed in some localities. MC-47 is a liquid with a protein content of approximately 20 percent, but contains no true sugars. It can be fed to replace a part of the protein in the ration.

Pasture

Alfalfa, the small grains—barley, oats and wheat—and sudan grass are the principal pasture crops in the irrigated farming areas of Arizona. Cotton, grain sorghum and vegetable fields are an additional source of "clean-up" pasturage.

Irrigated pastures of Arizona will support one to two animal units to the acre for a pasture season.

Alfalfa and the alfalfa-small grain pastures will produce an average of 60 animal-unit days of feed per acre for each rotation or pasturing with a daily gain of 1.0 to 1.5 lb. per head. Barley pasture will yield about 52 animal-unit days and sudan 59 animal-unit days of feed each rotation.

Production for the entire grazing season or calendar year will depend upon the number of rotations or pasturings. These are determined by the regrowth intervals. For alfalfa-barley pasture, 45 to 60 days are required in winter for another

Hauling the pasture to the cattle (soiling) is a proved practice.

rotation; alfalfa takes about 50 days in winter and 30 days in summer; barley 40 days in winter, 20 in spring and sudan grass takes 25 days in summer.

Average beef-cattle gains aggregating 520 pounds can be realized each year from an acre of alfalfa and 300 pounds from an acre of barley or sudan without figuring supplemental feed. Dry hay or other feed is occasionally fed to increase carrying capacity, stop up gains, and reduce danger of bloat.

Before undertaking a pasture project, costs should be weighed against expected yields and compared with the alternative of pen feeding. Pasturing is an economical means of harvesting feed crops for most areas except some areas of high production costs.

Soilage

Alfalfa, small-grain crops, and sudan grass are being fed as fresh green chopped forage—a practice known as soiling. Accurate records of the productivity, costs, and returns from soiling are limited.

Gains on soilage are usually reported as better than on pasture. Forage yields appear to be 25 to 50 percent greater than when pastured.

Other advantages of soilage over pasture are: Clean water and shade are more easily provided for stock; Field, borders and ditches are not subjected to trampling; Stock is more closely watched and provided for; Rations are more uniform, both as to quality of green feed, and mixture of green and dry feeds.

The uncertain supply of green feed during the winter season, particularly from December 15 to January 30, is a problem common to both soiling and pasturing. A pen-feeding unit affords considerable flexibility in adjusting to variations in feed supply. Hay, silage and concentrates can be fed with the soilage if the situation warrants pen finishing. Such facilities, too, will allow for an increase in the capacity of the operating unit and more

independence in purchasing, feeding and marketing of livestock.

Dry feeds, when fed with soilage will help to balance the ration and also will tend to prevent bloat. Soilage is high in protein, and if supplemented, the feed should be of high carbohydrate content.

The hay-soilage price relationship is about 4 to 1 on the average. For example, if hay is priced at $24 per ton in the field or $18 plus $6 harvesting cost, soilage is worth $4.50 per ton plus harvesting cost.

The cost difference is due principally to moisture content. Chopping costs are estimated at approximately $1.25 per ton on the trailer.

There remain some difficult problems confronting the practice of soiling. One is the investment cost in machinery. Also these units require expert mechanical maintenance. Their use on low producing fields is not usually profitable. Also, deeper troughs may be needed because of the bulky nature of the feed.

Coordination of the cattle feeding and crop cutting programs is a major management problem usually requiring a large scale operation for its successful development.

Miscellaneous Feeds

Results of tests indicate that dried citrus pulp and dried cantaloup are each equivalent to rolled barley when used to replace up to 50 percent of this grain in a ration including alfalfa, hegari silage and cottonseed meal. The principal problems of these feeds are limited production and local availability.

Limited tests at the University of Arizona with hormone products did not indicate any beneficial effects from their use.

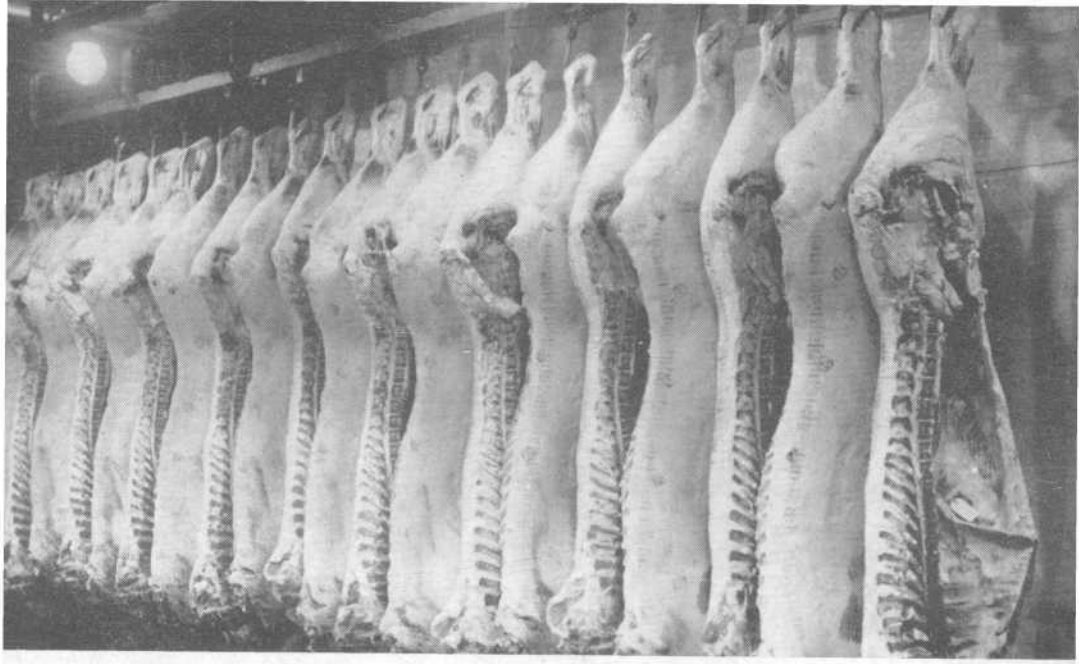
Concentrate-Roughage Ratios

Price relationships between feeds will vary from season to season and frequently to an extent requiring a major adjustment in the composition of the ration. One method by which such adjustment can be made involves a change in the proportion of concentrates to roughages.

Tests have been conducted to determine the efficiency of rations with varied concentrate-roughage ratios. Rations with concentrate to roughage ratios of 1:3, 1:2, 1:1 and 2:1 were fed to yearling steers and all lots reached a high finish and were appraised at approximately the same market value. The average daily ration, average daily gain, and feed required per hundred weight of gain for each ration are set forth in the table on page 19.

Feeder Cattle

Calves, yearlings and a few two-year-olds are the three major age groups of feeder cattle. Less financial risk is involved in feeding younger cattle. Normally they do not afford the opportunity of realizing as large returns as with older cattle, nor is there the possibility of losing as much on an unfavorable market. Calves weighing



Top grade Arizona beef—the end product of good feeding.

400 to 425 pounds must double their weight to attain a satisfactory market finish.

A six-year cattle-feeding test at the Arizona Experiment Station involved over 500 top-grade native weaner calves. It revealed conclusively that this class of stock—after a conditioning period of about two months on a ration of alfalfa hay, hegari silage, and cottonseed meal—can be fattened satisfactorily to baby beef in 90 to 120 days on this ration plus an average daily allowance per head of from 6 to 8 pounds of grain. These cattle made an average killing yield of 60 percent; 75 percent of these were graded "Choice" or better and the balance "Good" by federal graders.

Older cattle are preferred on a strong market, particularly if roughage feeds are in abundance. They offer a better opportunity to realize a greater return over a shorter time than do calves.

Heifers are frequently included in feeder stock selections and make satisfactory returns for this purpose in comparison with steers.

An attractive practice to some feeders who have good pasture is the purchase of old range cows in the fall, keeping them until after their calves are of sufficient age to veal and the cows can be sold when fleshy enough to slaughter. Good judgment is required to select cows that are sound, still capable of being conditioned, and likely to be in calf.

It is advisable to segregate feeder cattle according to sex, age and grade. The timid, nervous, and otherwise poor "doers" should be kept

"The eye of the master fattens his cattle."

in a separate corral.

Not only will cattle benefit by proper classification in the feed lot, but the feeder will be able to better judge the relative performance of the groups and to recognize readily the slow gaining, costly feeding animals.

Dehorned stock is the choice of cattle feeders. They are more quiet in the feed lot, have an equal chance at the feed trough, and require less corral and feed space than horned stock. Fat-cattle buyers likewise prefer the hornless stock because of less injury to the carcass from horn bruises.

Young feeder stock can be dehorned if the animals are to be held for five months or longer. Older cattle are not often dehorned, but instead will have their horns tipped, temporarily eliminating the hooking habit.

Feeding Methods

The old adage "THE EYE OF THE MASTER FATTENS HIS CATTLE" embraces about all that can be said on this subject. The inexperienced feeder can only learn many of the requisites of feed-lot management by experience.

However, the novice and old feeder both can gain valuable information about the progress of their

cattle by the periodic weighing of individuals or pens. No set of directions can be made applicable to all conditions, but there are some guides that warrant consideration.

Avoidance of any sudden marked changes in the kind and amount of feed is of first importance. Changes are frequently necessary and they should be foreseen in time to be effected gradually. Cattle unaccustomed to harvested feeds can be started on dry alfalfa or grain hay, preferably mixed. After a few days, the amount can be increased according to the appetite. It should be a safe procedure then to offer all of the roughage that can be eaten.

The concentrates (grain and cottonseed meal) are introduced when the stock is well started on the roughage. A 500 lb. animal will require air-dry feed weighing about 3 percent of his body weight. An 800 lb. animal needs feed at the rate of about 2½ percent of his body weight to make satisfactory daily gains.

For 400 pound calves, begin with 2 to 3 pounds of concentrate, consisting of grain and enough cottonseed meal to balance the protein requirement. Increase the concentrate a half pound every third day so that in 30 days a calf will be taking around 7 to 8 pounds of concentrate. Older cattle can, of course, take more feed and can be brought to a full feed level faster than calves. Feeder calves may be kept on pasture or good range preparatory to a fattening period of 3 to 5 months. Some feeders are substituting green chops for pasture.

Where pasturing is practiced, weaner calves are often placed in feed lots and fed a light ration of hay, silage and meal for 30 days prior to pasturing. A yearly gain of 400 pounds or more can be realized on good grade calves under this type of pasture management.

Some difficulty may be expected in starting cattle on a ration of hay, grain and meal, exclusive of silage. The feeder should be ready to detect bloat, scouring, and other evidences of animals going "off feed." Animals so affected should be segregated if their case becomes chronic.

Frequency and time of feeding each day are matters of individual decision depending upon the particular conditions of the operation. After a working schedule is perfected, regularity and quiet should be rigidly maintained. Refused feed should not be allowed to accumulate in the troughs.

Additional Information

The foregoing touches only the high spots of cattle feeding. For additional and more specific information contact your County Agricultural Agent. He can refer you to the best textbooks on the subject and to local feeders whose experience will be a help to the beginner.

Another source of information is the Animal Husbandry Department at the University of Arizona. The department publishes results of feeding tests currently conducted. These reports are available at the County Agricultural Agent's office or by writing directly to the College of Agriculture, University of Arizona, Tucson, Arizona.

There are many blueprints of various types of equipment available through your County Agricultural Agent.

Results of Feeding Tests of Varied Concentrate-Roughage Ratios

Concentrate-roughage ratios	1 part concen. 3 parts rough.	1 part concen. 2 parts rough.	1 part concen. 1 part rough.	2 parts concen. 1 part rough.
Av. Daily ration (14% protein)	**lbs.**	**lbs.**	**lbs.**	**lbs.**
Barley and hegari grain	1.98	4.5	9.8	13.4
Cottonseed meal	3.47	3.23	2.73	1.98
Molasses	1.33	1.35	1.35	1.23
Roughage (30% hulls and 70% alfalfa-barley hay)	19.9	17.9	13.3	8.2
Total daily feed	**26.7**	**27.0**	**27.2**	**24.8**
Feed required per cwt. gain				
Barley and hegari grain	80	179	367	492
Cottonseed meal	141	129	102	73
Molasses	54	54	51	46
Alfalfa-barley hay	563	492	346	210
Cottonseed hulls	249	217	153	93
Total feed per cwt. gain	**1087**	**1071**	**1019**	**914**
Av. daily gain (lbs.)	**2.4**	**2.5**	**2.6**	**2.7**