



Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA



FARM FEEDING BEEF CATTLE

To Market Home-Grown Feeds

HORACE T. STRONG

RICHARD G. JONES

ROBERT F. MILLER

ROY V. PARKER

CALIFORNIA AGRICULTURAL
Experiment Station
Extension Service

CIRCULAR 453

If feed crops . . .

are part of your farm operation, a feed lot may be your best marketing outlet







THIS CIRCULAR DISCUSSES:

The advantages of a farm feed lot.

Feeds commonly grown in California, their composition and feed characteristics, and suggested rations.







Cattle buying and marketing.

The equipment needed.

If you start with a . . .	after 75 days the animal will have consumed . . .	and you will have a . . .
 <p>700-pound feeder steer</p>	 <p>975 pounds of concentrate and 675 pounds of roughage</p>	 <p>GOOD grade slaughter steer weighing 850 pounds</p>
OR		
 <p>600-pound feeder heifer</p>	 <p>640 pounds of concentrate and 790 pounds of roughage</p>	 <p>GOOD grade slaughter heifer weighing 750 pounds</p>



How feed is used
to make beef . . .
based on 2-2½ lb.
daily gain in weight

if you feed longer . . .	you will have	for total feed consumption of . . .
 <p>75 more days using</p> <p>1,125 pounds of concentrate and 600 pounds of roughage</p>	 <p>CHOICE grade slaughter steer weighing 1,000 pounds</p>	 <p>2,100 pounds of concentrate and 1,275 pounds of roughage</p>
 <p>50 more days using</p> <p>525 pounds of concentrate and 525 pounds of roughage</p>	 <p>CHOICE grade slaughter heifer weighing 850 pounds</p>	 <p>1,165 pounds of concentrate and 1,315 pounds of roughage</p>

Feeds and feeding

Feed-lot operations can provide a desirable market for home-grown feeds by producing fat cattle that usually command a higher price than the feeder cattle you start with. This section contains a list of commonly grown feeds and suggested rations to bring about a higher grade of finished cattle.

The advantages of a farm feed lot

A farm feed lot, when properly managed, provides an outlet for home-grown feeds which may return a greater profit than would come from direct sale of the feed. In terms of feed required to produce a pound of gain, fattening or finishing cattle in the feed lot is relatively expensive. However, fattening provides a more desirable finished product, and the cost is more than offset by the improvement in grade and yield.

A feed lot also provides other means of profit. Feed and vegetable crop residues that might otherwise be wasted may often be utilized as livestock feed. In addition, the manure produced is a valuable by-product. It can be collected readily and distributed on the farm to improve soil structure and add fertility. The value of manure often offsets the labor cost of feeding the cattle.

Advance planning is important

A farm feed lot calls for advance planning. Besides the equipment needed for a successful operation, the amount and type of feed your farm produces must also be considered. These factors will determine the number, age, and kind of cattle to purchase.

Feed costs make up the major item

in the total cost of producing gain; they amount roughly to 85 per cent of the total. Other costs to be considered are labor, interest, depreciation, taxes, mortality risk, transportation, and marketing costs. Since the latter items vary greatly depending on locality and size of operation, this circular deals only with the three major aspects—feed, cattle, and equipment.

Many feeds produced in California are valuable for finishing cattle in the dry lot. The table on the opposite page lists a number of these feeds with some of their feeding qualities and characteristics.

Preparation of feeds

Grains should be rolled, cracked, or ground. Hay can be fed long or chopped. There will be more waste with long hay.

Getting cattle on full feed

It takes two weeks or more to get cattle on full feed. Calves take longer than yearlings, and yearlings longer than two-year-olds.

Newly shipped-in cattle should be started on hay alone or hay and other good quality roughage, such as silage, for several days. Then start giving 2 to 3 pounds of grain per head daily. Increase the grain at the rate of one-half pound per head every day or two until the cattle

THE AUTHORS:

Horace T. Strong is Extension Animal Husbandman, University of California, Davis.

Richard G. Jones is Farm Advisor, Fresno County.

Robert F. Miller is Farm Advisor, Tulare County.

Roy V. Parker is Farm Advisor, Kern County.

MAY, 1956

are eating 1½ pounds or more of grain per 100 pounds of live weight. A 600-pound animal on full feed may eat about 9 pounds of grain or more per day.

There is much truth in the old adage, "The eye of the master fattens his cattle." If the animals scour or fail to clean up their feed, they are probably getting too

much concentrate. Reduce the amount of grain for a few days, then increase it gradually.

When the cattle are on full feed, it is considered good practice to divide the concentrate ration equally between a night and a morning feeding. However, frequency and time of feeding will have

Some Feeds Often Raised and Fed in California

	Dry matter	Digestible protein	Total digestible nutrients (TDN)	Feeding characteristics
	per cent	per cent	per cent	
Concentrates:				
Barley.....	90.0	7.8	78.0	Excellent feed. May cause bloat if full fed as only grain with alfalfa hay.
Corn.....	85.0	7.0	80.0	Very safe feed and can be heavily fed.
Milo.....	90.7	8.3	80.0	Can be freely substituted for corn or barley.
Beet pulp.....	92.0	7.7	74.0	Adds bulk to grain ration—very palatable.
Corn and cob meal	86.1	5.3	73.2	Somewhat bulky and can be used in large amounts with safety.
Oats.....	90.0	7.6	72.0	Excellent feed.
Cottonseed meal..	92.8	33.9	73.6	High in protein—usually expensive per unit of TDN.
Molasses.....	76.0	0.9	57.0	Good source of TDN. Excellent as a feed dresser to cut down dust and increase palatability.
Wet Roughages:				
Alfalfa silage.....	31.1	4.0	18.8	Very good feed but sometimes difficult to put up.
Corn silage.....	29.1	1.0	19.0	Excellent silage—should be grown on good land. Fattening ration; may need protein supplement.
Sorghum silage...	25.3	0.7	16.1	Better suited to grow on lands of lower fertility or alkali land. Ration may need protein supplement.
Alfalfa soilage.....	25.3	3.4	14.7	Very palatable roughage but has an accompanying bloat hazard.
Dry Roughages:				
Alfalfa hay.....	92.8	10.8	50.4	Very complete feed. Fits well into any ration.
Barley hay.....	85.0	4.4	50.0	Lower in protein than alfalfa. Usually should be fed with protein supplement.
Oat hay.....	88.2	3.3	48.1	Low in protein but usually quite palatable.
Cottonseed hulls..	91.3	0.5	35.7	Animals keep on feed well when hulls are in ration.

to be adjusted to individual ranch conditions. In any event, establish a regular routine and maintain it rigidly.

The table shown here gives suggestions for rations with different types of roughage. Substitutions may be made depending on the feeds available. For example, milo, corn, or oats may be used as part or all of the grain ration instead of barley. Many combinations of roughages and

grains produced in California may be used successfully for fattening beef cattle. The amount of grain that may be fed safely per day depends on such factors as the weight, condition, and kind of cattle and the quality of roughage.

Cattle health

Satisfactory gains go hand in hand with good health. Disease and parasites

Suggested Concentrate Rations and the Various Types of Roughage with Which They May Be Best Adapted

Concentrate ration	Roughage*				
	Alfalfa hay	Grain hay	$\frac{2}{3}$ Alfalfa hay $\frac{1}{3}$ grain hay	1 part hay: 3 parts silage	1 part hay: 10 parts green chop alfalfa
1. Barley or other grain, 100%...	..	..	X	X	X
2. Barley or other grain, 60%... Molasses beet pulp, 40%.....	X	..	X	X	X
3. Barley or other grain, 60%... Molasses beet pulp, 30%..... Cottonseed meal, 10%.....	..	X	..	X	..
4. Barley or other grain, 70%... Almond hulls, 30%.....	X	..	X	X	X
5. Barley or other grain, 90%... Molasses†, 10%.....	X	..	X	X	..
6. Barley or other grain, 20%...	X	..	X	..	X
7. Corn cob meal, 80%..... Cottonseed meal, 10%..... Molasses, 10%.....	..	X	..	X	..

Example of a mixed grain — roughage ration‡
per cent

8. Barley or other grain	35
Molasses beet pulp	18
Molasses	10
Cottonseed meal	7
Alfalfa hay	15
Cottonseed hulls	15

Roughage and grains are ground and mixed together. Cattle on full feed will consume about 30 pounds per 100 pounds of body weight.

* Any one of the types of roughage indicated may be used satisfactorily with the concentrate ration.

† Molasses may replace a part of the grain in the rations 1 to 4 or may be added to the roughage.

‡ May include a wide variety of feeds and crop by-products such as almond hulls, cull beans, etc. Also has the advantage of being able to regulate the relative amount of grain and roughage fed.

can be particularly costly because infection spreads more rapidly in a feed lot, where animals are in close contact for a long period of time.

You may be able to treat simple health problems yourself. However, if serious health difficulty arises, consult a veterinarian at once for an accurate diagnosis and early treatment.

The internal parasite problem may be more serious than is generally suspected. Low-level infestations of stomach worms too often go unrecognized. Animals showing any evidence of internal parasites should be treated immediately. Parasitized animals will not make good use of feed and consequently will not show satisfactory gains.

Buying and marketing

“Cattle well bought are cattle half sold,” is an old saying among cattle feeders. Here are suggestions for buying and selling that will be helpful if you are new to the business.

Where to buy

Cattle that can be bought from local rancher-producers have the advantage of being acclimated. In California, however, the demand for local cattle exceeds the supply. You may have to buy outside the state—in the Southwest, Pacific Northwest, or intermountain country. If you have had no experience with cattle buying, you might do well to buy through an experienced and dependable agent or broker.

Many counties in cattle-producing areas print lists of feeder cattle for sale, and these lists are often available from local farm advisors. In some of these areas feeder-cattle auctions are held every fall. Cattle can also be purchased at union stockyards and at private auction yards.

What age and weight to buy

Younger cattle—calves and short yearlings—utilize feed more efficiently than older animals, but they are usually more expensive and have to be fed longer. They can be fed mostly on pasture or

good quality roughage until they reach 650–700 pounds.

Feeder steers weighing 650–800 pounds are at a good weight to go into the feed lot on a full feed of grain and roughage ration. They should fatten in 90 to 150 days.

Cattle over two years old and weighing 900 pounds or more have greater feed capacity and can utilize more roughage. Sometimes they can be profitably fattened on good quality roughage alone; however, a combination of roughage and concentrates is normally used.

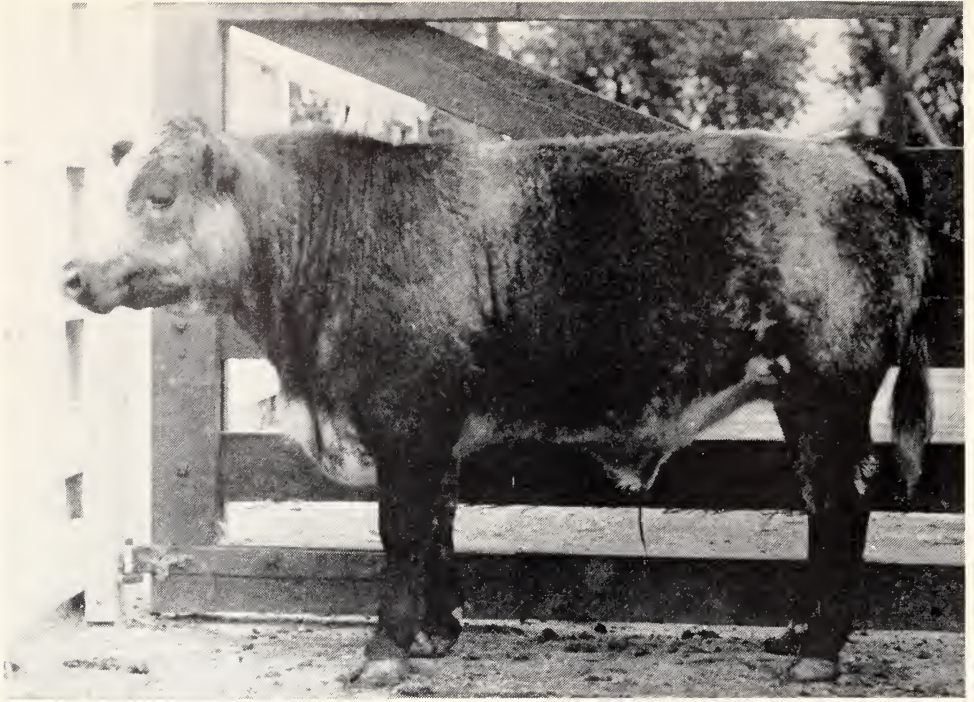
Heifers, cows, and bulls as feeders

Heifers fatten at an earlier age and a lighter weight than steers. If they are slaughtered at 850 pounds or less and in a good to choice grade, yearling heifers yield favorably with steers. If fattened to the top choice or prime grades, however, heifers are less desirable on the market;

(Continued on page 11)

The next three pages show photos of feeder cattle that are fairly typical of the grades indicated.





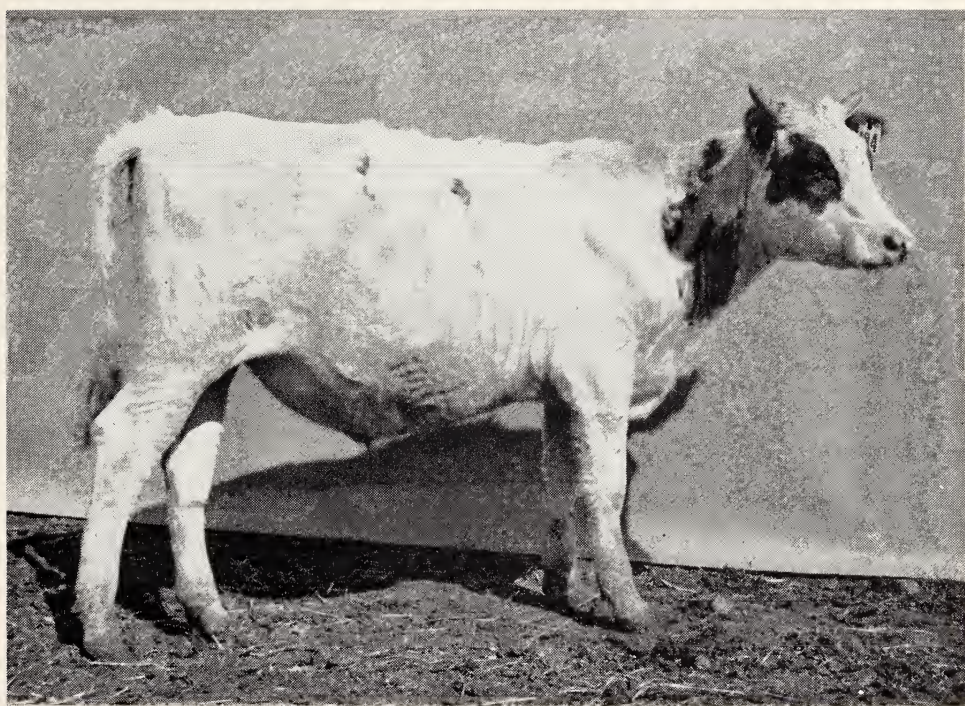
Fancy



Choice



Good



Medium



Common



Inferior

their carcasses are more wasteful and the cost of fattening is increased.

Two-year-old heifers produce more internal fat and carcass waste than yearling heifers and calves. They compare less favorably with steers of the same age than do the younger heifers.

According to tests, spayed or bred heifers seem to have no advantage over open heifers. Heifers heavy with calf should be avoided because they present a marketing and management problem.

Cows are not usually recommended for fattening in the feed lot. They can, at best, be sold only as commercial or utility grade beef.

However, when a wide spread in price exists between thin cows and commercial grade slaughter prices and when cheap roughage is available, feeding of such animals may be profitable. Any calves produced by these cows may be vealed and the cows sold for beef.

Thin **bulls** can make a high daily rate of gain. However, like feeder cows, bulls have such a high feed intake that the gain can be costly in the feed lot. Bulls are not readily available. When they are, they must be purchased at a low cost and must utilize a cheap feed if they are to bring a profit.

Grades of feeder cattle

The grade bought in the beginning will be important in determining the finished grade. Grade terms for "stocker" and "feeder" cattle are not as commonly used as grade terms for fat cattle. Stocker cattle are thin or light-weight cattle that need a growing period before going into the feed lot. Feeder cattle are ready to go onto the feed lot at once.

Feeder grades are based on breeding, type, conformation, and general quality of the animals. Slaughter grades, in addition, include the degree of fatness or finish.

Usually cattle of a certain feeder grade are fed until they will qualify for the next

higher slaughter grade. For example, a steer grading "good" as a feeder may be fed until he reaches a "choice" slaughter grade. "Choice" feeders generally are not carried beyond the "choice" slaughter grade; however, a "good" or "choice" feeder steer is sometimes marketed when he reaches a "good" slaughter grade.

Usually, higher-grading feeder steers require less time in the feed lot to attain a given slaughter grade than lower-grading steers of the same weight. Such steers are better in both quality and desirable conformation.

Since lower-grade feeder cattle are usually deficient in one or more of these characteristics—conformation, breeding, or quality—they have to be unusually well finished if they are to compete with higher-grading feeders.

What grades to buy

The grade to buy will depend on many factors. Among them are the "spread" between the purchase price and the anticipated sale price, the type of feed available, the time of the year the cattle will be sold, and the preference of the feed-lot operator. Note, too, that there is a seasonal variation in the price of feeder cattle as indicated in the chart shown on page 12.

The lighter the cattle are at time of purchase, the longer they will have to be fed. The feed-lot operator, then, can afford to pay more for quality. When calves or yearlings are bought to carry through the growing and fattening period, they should have good quality as more time and feed will be invested in them. A higher grade gives a higher return per pound of gain.

Sometimes, however, the "spread" between purchase price and anticipated sale price is greater for low-quality than for high-quality cattle. When such price relationships exist, the poorer quality may be more profitable, providing the feeding time is not long or costly.

Required margins for feeder cattle

If feeder cattle are purchased or valued at \$20 per hundredweight and must sell when fat at \$23 per hundred pounds for the owner to break even on the feeding enterprise, the difference of \$3 is called the *necessary margin* or *spread*.

For example, a 700-pound steer purchased at \$20 per hundredweight costs \$140. He is fed for 150 days at a cost of \$90. Total investment in the steer is now \$230. Assuming he weighs 1,000 pounds, he must sell for \$23 per hundredweight in order to break even. This \$3 - per - hundredweight difference between purchase and sale price is the necessary margin. Thus, by increasing the market grade and price of finished cattle over that of feeders, the necessary margin is realized.

The table below indicates the necessary margin under varying feed prices and cost of feeder cattle. This table brings out three significant points, long recognized by experienced cattle feeders:

1. The most favorable situation in respect to necessary margin is when the feeder-cattle market is relatively high and the prices of feeds are very low. If under these conditions good feeding practices are followed, even feed-lot operations sometimes show a profit when little or no margin exists between the price paid for feeder cattle and their sale price when they are fat.

2. More margin is required when the price levels of both feeder cattle and feeds are low than when the feeder-cattle market is high and the feed market is low. Less margin is necessary, however, when both feeder cattle and feeds are low in price than when both are high.

3. The least favorable situation of all in respect to necessary margin is to have a low feeder-cattle market and high-priced feeds. When such a price relation prevails, a margin of \$6 per hundredweight, or even more, may not enable the feeding enterprise to break even.

Under most conditions, when cattle are fattened in the feed lot, the cost of producing 100 pounds of gain exceeds the

The Effect of Varying Prices of Feeder Cattle and Feed on Necessary Margin * (All prices shown in dollars)

Cost of feed per ton	Necessary margin at a given cost of feeder cattle per hundredweight								
	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
40.00..	3.16	2.88	2.60	2.31	2.03	1.75	1.47	1.18	0.90
42.00..	3.49	3.21	2.92	2.64	2.36	2.08	1.79	1.51	1.23
44.00..	3.82	3.53	3.25	2.97	2.69	2.40	2.12	1.84	1.56
46.00..	4.14	3.86	3.58	3.30	3.01	2.73	2.45	2.17	1.88
48.00..	4.47	4.19	3.91	3.62	3.34	3.06	2.78	2.49	2.21
50.00..	4.80	4.51	4.23	3.95	3.67	3.38	3.10	2.82	2.54
52.00..	5.13	4.84	4.56	4.28	4.00	3.71	3.43	3.15	2.87
54.00..	5.45	5.17	4.89	4.61	4.32	4.04	3.76	3.48	3.19
56.00..	5.78	5.50	5.22	4.93	4.65	4.37	4.09	3.80	3.52
58.00..	6.11	5.83	5.54	5.26	4.98	4.70	4.41	4.13	3.85
60.00..	6.44	6.15	5.87	5.59	5.31	5.02	4.74	4.46	4.18

* Necessary margins shown in the table are based on the following assumptions: A 700-pound feeder steer, fed 150 days to attain 1,000 pounds' weight after consuming approximately 2,000 pounds of concentrate and 1,275 pounds of roughage or a total of 3,275 pounds of feed to produce 300 pounds of gain. Charges include the cost of the steer, 6 per cent interest on that cost, and the cost of the feed, but they do not include such items as labor, equipment costs, mortality, and taxes. These costs will vary considerably depending on the size of operation. In general, such costs might be considered to increase the necessary margin approximately \$1 per hundredweight under the conditions indicated in this table.

selling price per hundredweight. Profit, under these conditions, must be made by fattening until the grade of the animal is raised. This will result in a higher market price per hundredweight.

Marketing channels

When the animals are finally ready for slaughter, they can be sold through several channels. The three most generally used in California are: direct to the packer or slaughterer, at a terminal or central market, or at auction sales.

In addition, there are shipping associations that assemble the livestock at country points. The cattle are usually then shipped to a central market, where they are sold through a commission firm.

Ranch location, distance to market, and convenience of handling, as well as price, will influence your choice of a marketing method. This may vary from year to year and even with each lot of cattle marketed.

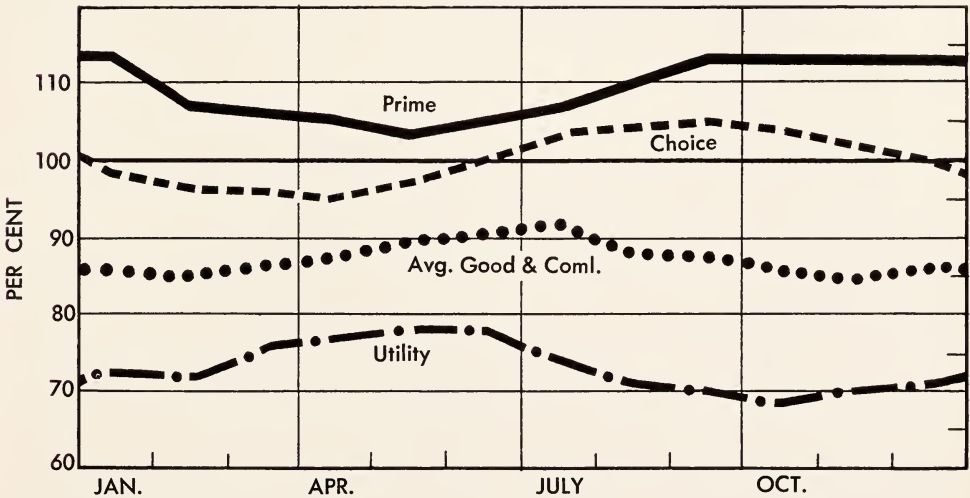
Direct marketing of fat cattle to the processor is the method most widely used in California. In this case, cattle are pur-

chased at the ranch and shipped by the buyer. Some 50 per cent of the cattle are sold in this way.

Central or terminal markets are located at Los Angeles, San Francisco, and Stockton. After cattle arrive at these yards they are provided with hay and water until sold. Commission firms operate on these markets and cattle are consigned to them. These firms handle the consignment and sell at the best price possible. The charges for handling cattle at these terminal markets include the feed and a sales commission. Some 20 per cent of the cattle in California are marketed this way.

Auction sales conducted on both a private and cooperative basis are held in various parts of the state. This means of marketing is increasing in importance from the standpoint of numbers of livestock handled. The cost of marketing through auctions varies from 2 to 5 per cent or more, depending upon the type of auction and the number of animals sold.

The conditions under which cattle are



This chart shows seasonal trends in prices paid for Corn Belt slaughter steers at Chicago. Prices are given as percentages of 1943-52 average annual choice price, with the 1952-53 pattern adjusted for trend to post-war period. Chart was originally developed by the Agricultural Marketing Service of the USDA.

weighed are important in the marketing of slaughter cattle. Terms are often worked out on a mutual agreement basis between the buyer and seller. In California it is customary to allow 4 per cent for shrinkage when cattle are weighed directly out of the feed lot in the early morning. The distance the cattle may be driven or shipped, the weather, and the method of feeding all have a direct influence on shrinkage. Cattle should be sorted a day or two before selling so they will be handled as little as possible just before weighing.

Trend of prices by season

The chart on page 13 shows the trend of prices of different grades of cattle by season. At all times good and choice grades bring the highest prices. How-

ever, the profit margin varies from one season to another. Commercial and utility grade cattle sell better in April and May. Their poorest sale months are October and November when they are most plentiful on the market. April and May are usually the poorest and most plentiful months for the sale of choice and good grade fat cattle.

Sources of market information

The Federal-State Market News Service (717 Appraisers Building, San Francisco 11; or Union Stockyards, Los Angeles) provides daily market news reports that may be obtained by direct request to the agency. In addition, radio, television, and newspapers provide current market information. Experienced feeders keep well informed on market conditions.

Equipment

Certain items of equipment are essential to any feed-lot operation. Here is a list of what you will need, plus suggestions for desirable additions.

The size and permanence of your operation will largely determine the equipment and facilities you will need for a successful operation. Other factors include location of a site (one that will provide the best drainage possible), available capital, supply of labor, climate, and the over-all farming operation as it may tie in with the cattle-feeding project.

The "small operator" with a few cattle needs little equipment. However, any operator must balance the purchase and running cost of machinery against the cost of labor needed to do the job in order to determine to what extent he can mechanize.

Whether the operation is small or large, certain facilities and pieces of

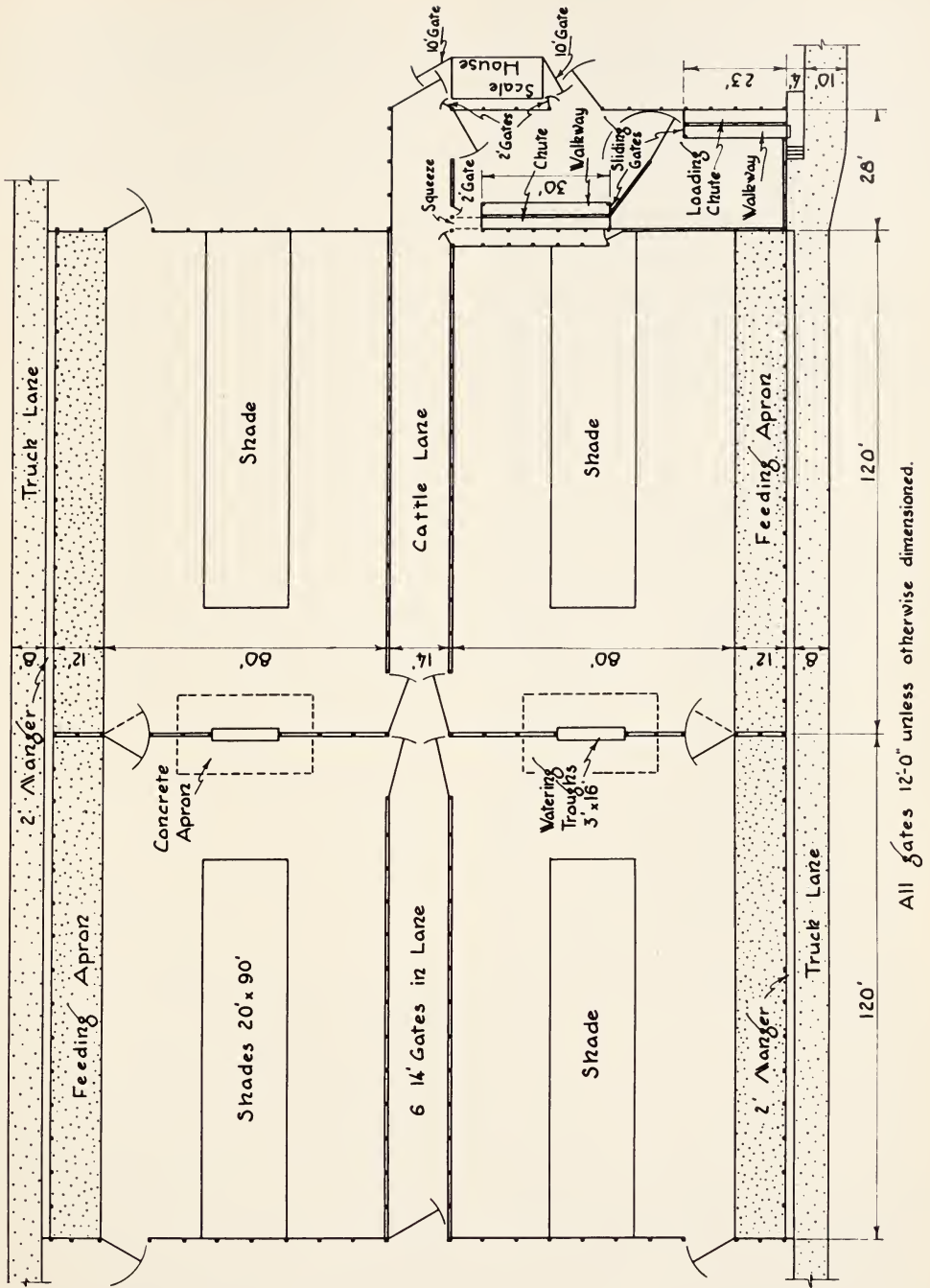
equipment are essential. These include:

1. A **loading chute**, located so that trucks can reach it easily under any weather conditions.

2. A **well-constructed corral** for sorting and for working the cattle into the branding chute, stock scales, or the loading chute. The corral should be constructed of boards spaced about 6 inches apart. In the working corral and drive-ways or alleys the boards should be placed on the inside so that cattle moving through will not be bruised. Sharp corners on the entrances to chutes should be avoided.

3. A **feeding corral**. Lumber construction is best, but five or six stretched barbed wires can be used and the initial

A GOOD OVER-ALL LAYOUT ...



Here is a good plan for a general layout of a feed lot, which includes space and equipment for working the cattle. Some of the individual pieces of equipment needed are illustrated on the next two pages. (From Circular 414, revised 1956.)

AND ADEQUATE EQUIP

TOP: Loading chute should be sturdy and easily accessible under all weather conditions. CENTER: A squeeze is necessary if cattle are to be branded or otherwise treated. BOTTOM: Stock scales are most valuable in feeding operations, although the building to protect the scales is not essential in all areas.



cost will be lower. Wire, however, is not strong enough to be used in front of the feed manger. Where available, oil-field cable makes satisfactory and inexpensive corral material. A slab of concrete or other suitable material about 8 to 12 feet wide should be laid behind the feed manger, particularly if cattle are fed during wet weather. Under desert conditions, where mud is not a factor, concrete may not be essential. Not more than 50 to 75 cattle should be fed in one pen or corral. Under good drainage conditions, allow 100–150 square feet per animal (see the plan pictured on page 15).

4. **Watering troughs** should be well constructed of concrete or wood. Metal troughs may be used *except* under conditions requiring the addition of copper sulphate or certain other medication to the drinking water. The troughs should be placed well away from the feed manger. They should be constructed so that they may be cleaned easily and frequently. Cattle normally drink 8 to 12 gallons of water per day per animal; in desert areas they may drink 15 gallons or more.

5. The best location for **feed troughs** is outside the fence of the feeding corral. In some cases, however, portable feed bunks are located inside the corrals. Each animal should have about $2\frac{1}{2}$ feet of feed trough space. (Circular 414, "Beef Handling and Feeding Equipment," contains construction details for these two types of feeding troughs.)

ENT WILL BE HELPFUL

Water troughs can be built into the fences between corrals, thus making one trough serve for two corrals.

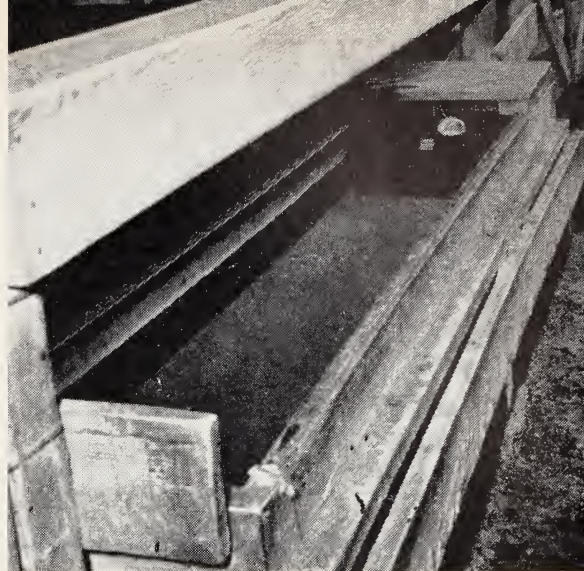
Desirable equipment for a farm feed lot

Other items of equipment and facilities are desirable and may be essential in handling large numbers of cattle, particularly if feeding is to be a continuous enterprise.

1. **Stock scales** are valuable during buying and selling periods. They are useful for determining gain in the feed lot. Scales are now available in a variety of sizes and at various prices—to suit any size of operation (see the equipment list at the end of this section).

2. A **squeeze chute** is essential for doctoring and dehorning. There are several manufactured steel squeeze chutes on the market. These are nominally priced and are a good investment for almost any feed lot.

3. **Spray equipment** for control of flies, lice, ticks, and other external parasites may pay for its cost, for animals that



are free of external parasites will make more rapid and efficient gains.

4. **Shades.** Experiments in hot desert areas have shown that cattle make better gains when provided with shade and cool drinking water. Shades should be 12 feet high and oriented, if possible, north and south. Allow 30 to 40 square feet per animal under shade.

Equipment for feed preparation

The amount and kind of equipment needed will vary with the kind and number of cattle handled. It may be necessary

Feed bunkers are outside corrals for easy distribution of feed. Barbed wire (less expensive than boards) can be used on the other three sides of the feed lot, but heavier posts than those shown below would be desirable.





This hammer mill, mixer, portable auger, and feed wagon (not including power) cost about \$1,200. The setup has a capacity of more than a ton of mixed concentrate an hour.

The receipts from sales of manure often pay for the labor costs of feeding the cattle. Or the manure can be used to maintain soil fertility on the rest of the farm.



to include harvesting equipment as well as that needed for the preparation of roughage and concentrates. With field choppers you can harvest roughage in a form ready for direct feeding. However, most harvested grains require additional preparation for feeding.

Because of the high initial cost of machinery, the small operator should consider the practicability of custom harvesting and milling of the feed.

Experienced feeders have found that there is less waste when roughages are chopped or coarsely ground. At times, however, it may be more economical to feed hay from the stack or bale without chopping. The estimated cost of harvesting and processing alfalfa for feeding under Imperial County conditions is given in the table on this page.

Storage facilities

Storage facilities will be needed for grains and roughage. In most areas, stacked hay—either baled or chopped—should be protected from rain. Trench and aboveground horizontal silos appear to be more practical than upright round silos.

Grain storage facilities should provide protection from moisture and rodents, as well as other grain pests.

Grain-processing machinery

Hammermills, burrmills, crimpers, cold rollers, and other grain-processing equipment are available in a wide variety of sizes and types. The selection of a particular mill will depend on:

1. *The kind and quantity of feed to be*

Costs of Different Methods of Harvesting and Utilizing Alfalfa (Imperial County)

	Cost per ton (dry)	Cost per ton (green)
Baling, at feed lot...	\$8.00	....
Chopping baled hay.	3.00	....
Dry chop and stack...	5.50	....
Dry chop and feed...	5.10	....
Soilage, standing....	5.60	\$1.20
Soilage, windrow....	6.00	1.20
Semi-wilt.....	5.60	1.10

milled. A hammermill, for example, may be large enough for grinding hay as well as grain (see the equipment list at the end of this section).

2. *Available power.* Most feed mills may be operated from their own power units or equipped for operation from tractor power take-off.

3. *Labor available.* Large installations are operated more or less automatically. They need very little labor. Smaller ones, on the other hand, require more labor per ton.

Feeding methods

Farm-feeding operations that involve a small number of cattle can be done most economically by hand. The hay may be fed directly from the bale or stack and the grain distributed in the trough or feed bunk. As the number of cattle increases, the investment in farm-feeding wagons and in additional processing and milling machinery may be justified. A large selection of such equipment is available.

WHAT WILL IT COST?

The following table gives a breakdown of the investment involved for different pieces of equipment used in feeding operations



Feed Lot Equipment

Implement	Size	Number of men required	Size of tractor required (h.p.)	Capacity	Cost new 1955	Years of life	Annual non-cash overhead			Cash operating cost
							Depreciation	Interest	Total	
Livestock equipment										
Squeeze	.....	..	..	.....	\$ 400	15	\$ 27	\$ 10	\$ 37	\$4/yr.
Calf chute	.....	..	..	.....	210	15	14	5	19	\$2/yr.
Sprayer	50 gal.—4 gpm	..	..	.....	560	15	37	14	51	36c/hr.
Sprayer	100 gal.—4 gpm	..	..	.....	640	15	43	16	59	37c/hr.
Spray dip	.....	1	..	140 head/hr.	1,500	5	300	38	338	45c/hr.
Scales	5-ton platform 14' X 8'	..	..	.....	600	25	24	15	39	\$6/yr.
Scales	10-ton platform 16' X 8'	..	..	.....	725	25	29	18	47	\$7.25/yr.
Scales	10-ton platform 22' X 8'	..	..	.....	1,050	25	42	26	68	\$10.50/yr.
Fences:										
4 barbed wire	one mile	..	..	.....	800	25	32	20	52	\$32/yr.
40' woven	one mile	..	..	.....	\$ 1,200	25	48	30	78	\$48/yr.
Fence material:										
Posts	7'	..	..	.....	\$1 ea.	..	..	..	..	.....
Barbed wire	.....	..	..	.....	75c/ft.	..	..	..	..	.....
Woven wire	26"	..	..	.....	70c/ft.	..	..	..	..	.....
Woven wire	32"	..	..	.....	\$1/ft.	..	..	..	..	.....
Woven wire	39"	..	..	.....	\$1.75/ft.	..	..	..	..	.....
Woven wire	47"	..	..	.....	\$2/ft.	..	..	..	..	.....
Staples	.....	..	..	.....	15c/lb. (85)	..	..	..	..	.....
Lumber	.....	..	..	.....	11c/board ft.	..	..	..	..	.....
Feed harvest equipment:										
Mower, tractor	5'	1	10	1.7 acres/hr.	\$ 150	10	\$ 15	\$ 4	\$ 19	27c/hr.
Mower, tractor	7'	1	10	2.5 acres/hr.	330	10	33	8	41	58c/hr.
Rake, dump	8'	1	10	1.6 acres/hr.	135	20	7	3	10	30c/hr.
Rake, dump	9'	1	10	1.8 acres/hr.	145	20	7	4	11	33c/hr.

Rake, quimp.	10'	1	10	270 acres/hr.	150	20	8	4	12	34c/hr.
Rake, dump.	11'	1	10	2.2 acres/hr.	160	20	8	4	12	36c/hr.
Rake, dump.	12'	1	10	2.4 acres/hr.	170	20	8	5	13	38c/hr.
Rake, dump.	14'	1	10	2.8 acres/hr.	215	20	11	5	16	48c/hr.
Rake, side delivery.	8'	1	10	2.5 acres/hr.	540	10	54	14	68	\$1/hr.
Baler, twine PTO. . . . .	.....	1	10	3.0 ton/hr.	1,700	10	170	43	213	27c/hr.
Baler, twine w/motor. . . . .	.....	1	10	3.5 ton/hr.	2,700	10	270	68	338	93c/hr.
Baler, wire w/motor. . . . .	.....	1	10	4.0 ton/hr.	2,900	10	290	73	363	96c/hr.
Baled hay loader. . . . .	.....	3	truck	3.0 ton/hr.	350	15	23	9	32	2c/hr.
Chopper, PTO. . . . .	.....	1	20	.....	1,520	10	152	38	190	65c/hr.
Chopper, w/motor. . . . .	.....	1	15	.....	2,720	10	272	68	340	\$1.37/hr.
Chopper, hay pickup. . . . .	.....	..	..	2.5 acres/hr.	365	10	37	9	46	15c/hr.
Chopper, row crop pickup. . . . .	.....	..	..	.5 acres/hr.	480	10	48	12	60	20c/hr.
Combine, PTO.	6'	1	10	.8 acres/hr.	1,730	10	173	43	216	\$1.37/hr.
Combine, w/motor.	6'	1	10	1.0 acres/hr.	2,160	10	216	54	270	\$1.92/hr.
Combine, self-propelled	10'	1	..	1.7 acres/hr.	5,960	10	596	149	745	\$5.05/hr.
Combine, self-propelled	12'	1	..	2.0 acres/hr.	6,000	10	600	150	750	\$5.17/hr.
Combine, self-propelled	14'	1	..	2.3 acres/hr.	6,500	10	650	163	813	\$5.64/hr.
Combine, self-propelled	16'	1	..	2.7 acres/hr.	7,200	10	720	180	900	\$6.26/hr.
Corn picker, pull.	1 row	1	15	.7 acres/hr.	1,300	8	163	33	196	54c/hr.
Corn picker, pull.	2 row	1	20	1.4 acres/hr.	2,080	8	260	52	312	\$1.07/hr.
Corn picker, mounted.	1 row	1	15	.7 acres/hr.	1,060	8	133	27	160	49c/hr.
Corn picker, mounted.	2 row	1	20	1.4 acres/hr.	1,600	8	200	40	240	84c/hr.
Corn sheller, field. . . . .	.....	..	..	.....	2,500	8	313	63	376	50c/hr.
Ensilage cutter. . . . .	.....	1	30 belt	12 ton/hr.	\$ 700	10	\$ 70	\$ 18	\$ 88	15c/hr.
Feed preparation:										
Blower, silage or hay. . . . .	.....	..	20	10 ton/hr.	\$ 750	15	\$ 50	\$ 19	\$ 69	28c/hr.
Hammer mill.	12" diameter	..	5	1,000 lb./hr.	200	15	13	5	18	7c/hr.
.....	24" diameter	..	20	4,000 lb./hr.	310	15	21	8	29	12c/hr.
Chopper, grinder.	24" diameter	..	20	4,000 lb./hr.	750	15	50	19	69	28c/hr.
Crimper. . . . .	.....	..	1½	4,000 lb./hr.	300	15	20	8	28	12c/hr.
Roller mill.	10'	..	10	4 ton/hr.	350	15	23	8	31	13c/hr.
Roller mill.	20'	..	20	10 ton/hr.	\$ 700	15	\$ 47	\$ 18	\$ 65	26c/hr.

Continued on next page

Implement	Size	Number of men required	Size of tractor required (h.p.)	Capacity	Cost new 1955	Years of life	Annual noncash overhead			Cash operating cost
							Depreciation	Interest	Total	
Silage loader.....	.....	1	1½ ton truck	1,500 lb./min. 30 ton/hr.	\$3,000 400 \$2,500	8 15 10	\$375 27 \$250	\$75 10 \$62	\$450 37 \$312	\$1.50/hr. 15c/hr. 50c/hr.
Feed mixer.....	70 cu. ft.	..	15	.....	.....	.....	.....	.....	.....	.....
Wagon, feed.....	3 ton	..	..	.....	.....	.....	.....	.....	.....	.....
Feed Storage:										
Silos, upright.....	50 cu. ft./ton	..	..	.....	\$15/ton	25	\$0.60	\$0.38	\$0.98	15c/yr.
Silos, trench.....	70 cu. ft./ton	..	..	.....	1/ton	10	0.10	0.02	0.12	15c/yr.
Silos, horizontal wood	70 cu. ft./ton	..	..	.....	1/ton	20	0.05	0.02	0.07	1c/yr.
Hay, loose.....	400 cu. ft./ton	..	..	.....	20/ton	40	0.50	0.50	1.00	20c/yr.
Hay, baled.....	250 cu. ft./ton	..	..	.....	12/ton	40	0.30	0.30	0.60	12c/yr.
Hay, chopped.....	200 cu. ft./ton	..	..	.....	10/ton	40	0.25	0.25	0.50	10c/yr.
Grain.....	45 cu. ft./ton	..	..	.....	13/ton	20	0.65	0.32	0.97	13c/yr.
Mixed feed.....	50 cu. ft./ton	..	..	.....	\$70/ton	25	\$2.80	\$1.75	\$4.55	70c/yr.

Prepared by A. D. Reed, Extension Economist, Farm Management.

WANT MORE INFORMATION?

A recommended reference book is *Feeds and Feeding, A Handbook for Students and Stockmen*, by F. M. Morrison (21st edition), published by Morrison Publishing Company, Ithaca, N.Y. Your bookstore can get it for you.

These publications can be obtained from your University of California Farm Advisor, or from Agricultural Publications, 22 Giannini Hall, University of California, Berkeley 4.

Circular 414, *Beef Handling and Feeding Equipment* (free)

Circular 441, *The Use of Stilbestrol in Fattening Cattle* (free)

Bulletin 745, *Adaptation of Beef and Dairy Cattle to the Irrigated Desert Areas of Southern California* (free)

Manual 2, *California Beef Production* (\$1.00). When ordering, make check or money order out to The Regents of the University of California.



A well-laid-out, well-equipped farm feed lot near Woodland, California, capable of handling about 1,000 animals at one time.