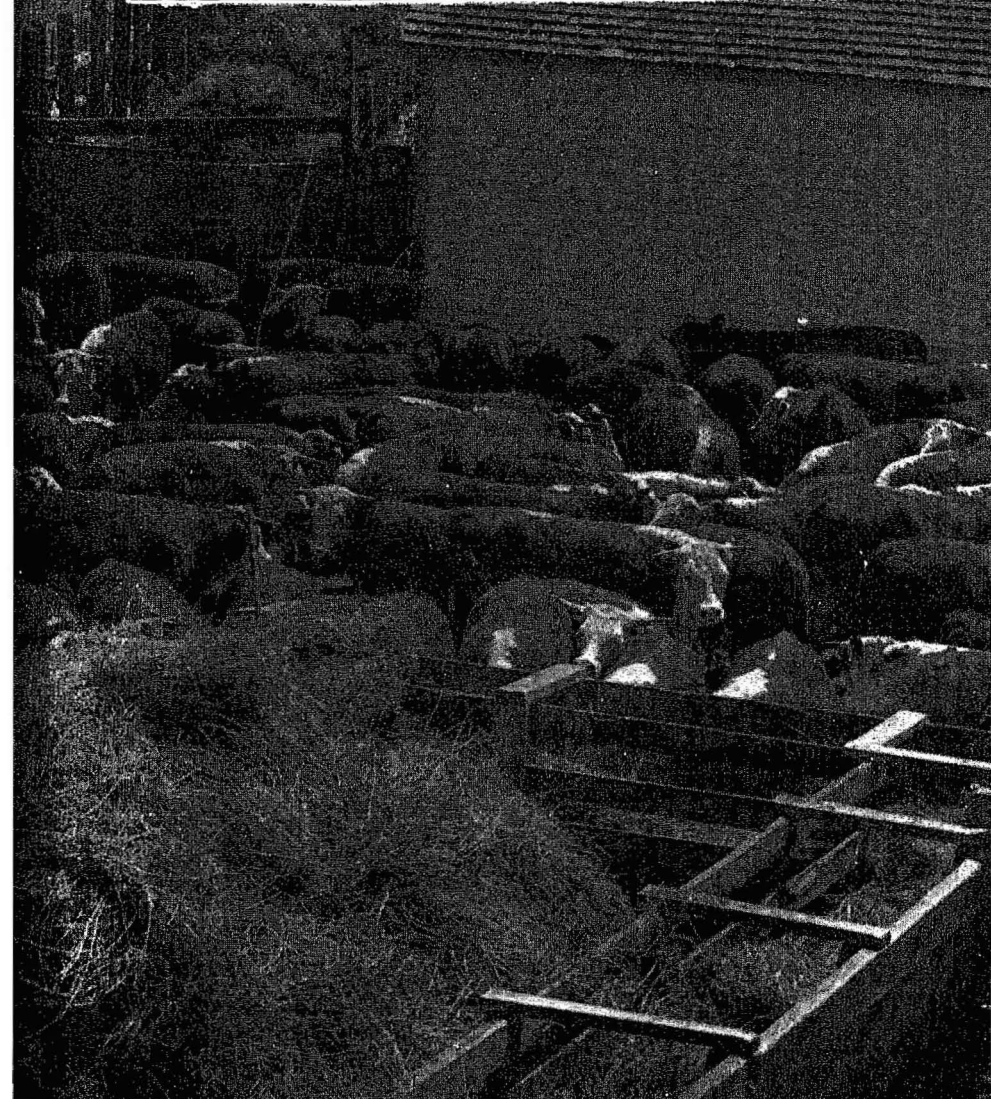


BULLETIN NO. 203

DECEMBER, 1941

FATTENING MONTANA CATTLE

By
E. P. ORCUTT



CONTENTS

	Page
Status of Cattle Fattening in Montana	3
Selection of Feeder Cattle	4
Age, sex, grade, type	4 and 5
Nutrition	6
Proteins, carbohydrates and fats, minerals, vitamins	6 and 7
Feed Grains	8
Wheat	9
Corn	10
Barley	10
Oats	10
Rye	10
Roughages	11
Alfalfa	12
Sweet Clover	12
Mixed Tame Hay	12
Native Hay	13
Silage	13
Corn Fodder	13
Sugar Beet By-products	14
Beet Tops	14
Wet Beet Pulp	15
Dried Molasses Beet Pulp	16
Beet Molasses	16
Protein Supplements	17
Kinds	19
Management	20
Time of Starting	20
Starting the Cattle	21
Temperament	21
Sorting	21
Efficiency	22
Cost of Gains	22
Lowering the Cost of Gains	24
Degree of Finish	24
Equipment	25
Site	25
Shelter	25
Size	26
Feed Bunks and Racks	26
Water	27
Other Equipment (ground plan)	28
Feed-lot manure	30
Bedding	31
Feed Lot Hints	32

MONTANA EXTENSION SERVICE, BOZEMAN

Montana Extension Service in Agriculture and Home Economics, J. C. Taylor director.
 Montana State College and United States Department of Agriculture cooperating.
 Distributed in furtherance of the Acts of Congress, May 8 and June 30, 1914.

Fattening Montana Cattle

by

E. P. ORCUTT

Extension Livestock Specialist

"The past year has made the farmers of the state realize more than ever before, the necessity of greater diversity in farm products. Many are already reducing the grain acreage and increasing the extent of meadows and their coarse forage crops and so concentrating the product of their farm into pork, beef and butter."

This statement might have been made yesterday or a year ago, but it was not! It is the first paragraph of Montana Agricultural Experiment Station bulletin No. 3, written by Luther Foster and dated June, 1894. Over 47 years ago!

What is the Montana cattle feeding situation now? What progress has been made in the breeding of animals, feeding methods, and the final product—the carcass? What findings has the Experiment Station made over this 45-year period?

Livestock fattening in Montana is largely confined to several separate irrigated valleys. These are scattered widely but in each instance are either a part of, or adjacent to, sugar-beet areas¹ where refineries are located. This is not an accident but a necessary combination; necessary because first, certain by-products of sugar-beet production can be used only as livestock feeds, and second, because barnyard manure soon becomes a necessity if high production of sugar-beets and other irrigated crops is to be maintained.

Over-expansion of Montana livestock fattening must be guarded against. Favorable price ratios can temporarily make the enterprise look profitable out of all proportion to true, long-time averages. This recurrent characteristic makes feeding a perfect field for "main-street promotion."

Further, fattening in Montana is, and will continue to be, secondary to wintering breeding livestock. This latter class of animals should not be robbed of previous feed reserves in areas of periodic shortage by a speculative expansion of cattle or lamb fattening.

Six questions are offered for the novice feeder to ponder, with a warning that for a successful outlook most or all the answers should be "yes".

1. Is my farm irrigated?
2. Will I feed every year?
3. Will my farm provide most of the necessary feed and plentiful bedding?
4. Have I had experience with livestock?
5. Do I have some special advantage such as growing beets or raising my own calves?
6. Will I fully utilize the manure?

The major portion of fattened Montana cattle must be marketed at a disadvantage compared to corn belt cattle simply on account of the distance from packing centers. Thus, other factors must be more closely scrutinized and possible advantages carefully estimated if continued success is to be realized.

¹Hay-feeding in the Big Hole Basin is a singular exception and is not discussed in this bulletin.

Selection of Feeder Cattle

Age. The tendency toward baby beef production and away from heavy cattle is general and the reasons for such a change are common knowledge. The individual feeder's decision upon the age of animals to feed will depend upon market probabilities, feeds and cattle available and their relative costs, and personal desires.

Calves will make more efficient gains than older cattle and require a longer feeding period for a finish. Three-year-olds are the other extreme, i. e., they require more feed per hundred pounds of gain and finish more quickly than younger steers.

Sex. Heifers usually make slower and slightly costlier gains than steers but will finish in a shorter period. Cows can make rapid gains on low cost feeds but seldom command high prices. Pregnancy and recurring heat periods can cause specific complications and attendant financial loss when feeding female cattle.



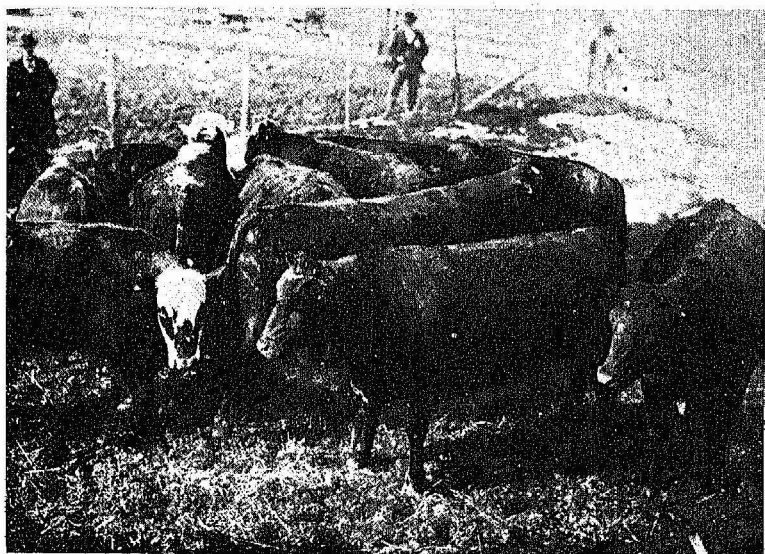
Montana Agricultural Experiment Station Bulletin No. 31
Fig. 1.—“Common” grade steers purchased on the range by the Montana Agricultural Experiment Station and fattened during the winter of 1900-01.

Grade. Common or inferior feeders will never make choice or prime fat cattle. However, they can often be managed so as to make money because there are such specific advantages as low investment per head and ready sale for full current value at the nearest market. The usual error

lies in carrying low grade cattle for a long feeding period in an effort to raise their slaughter grade or "strike a bulge in the market."

Good, choice, or fancy feeders are indicated where an experienced man has quantities of high-quality feeds and can reach a market where choice and prime steers are in ready demand.

Type. Experienced feeders are usually very capable in the selection of desirable feeder type. Inexperienced feeders should delegate the selection of their animals to an able and trustworthy agent.



Montana Agricultural Experiment Station Bulletin No. 31
Fig. 2.—"Medium" to "Good" grade steers purchased in the Gallatin valley by the home Station and fattened during 1900.

Smooth, strong-framed cattle, with thick bodies and well sprung ribs; deep, wide, hindquarters and broad, short heads, represent the desirable feeder type. Uniformity throughout the group of animals is also of much importance. The market grades of Fancy, Choice, Good, Medium, Common, and Inferior are commonly accepted. Figure 1 shows a group of "Common" feeders toward the end of practical fattening and Figure 2 shows "Medium" to "Good" steers about "half-done" and varying considerably in quality and degree of finish. Figure 3, forty years later, pictures a group of "Choice" calves carrying a nice "kill" but of high enough quality and uniformity to be fed until well finished.

Nutrition

Unless the cattle receive a surplus of feed over that required for maintenance they will not fatten, in fact in the case of calves they would lose flesh in compensating for growth of the skeleton. The kinds and quantities of feed required in the feed lot constitute the nutritional problem. It also includes a balanced ration without which the steer may consume fully sufficient quantities and yet not get fat.

The positive nutrients required in animal feeding are: proteins, carbohydrates, fats, minerals, vitamins and water. Feeders of calves should remember that these nutritional essentials are more important than when older cattle are fed. This particularly applies to minerals and proteins.



Montana Extension Service Photo.
Fig. 3.—“Choice” calves bred by the North Montana Branch Station and fattened at the home Station the winter of 1940-41.

Proteins. Proteins are the principal blood and muscle builders and therefore necessary to all animals, but most particularly to rapidly growing ones. They are of importance because they are deficient in some Montana rations and must be supplied.

Leguminous hays (alfalfa, cowpea, sweet clover, red clover) and culpeas are the only low-cost sources of protein in home-grown Montana feeds.

Thus, if these feeds are not a part of the ration, additional provision must be made. The supplementing of feeds that are deficient in protein is discussed later.

Carbohydrates and fats. Starches, sugar, fats, and oils are the fuel of the animal body. They are also the fattening part of the ration and constitute a relatively high percentage of all Montana feeds. The feeder can assume that any fattening ration will contain an adequate supply of these four constituents.

Minerals. A long list of necessary minerals are dependably provided to animals in their usual feeds. Common salt is one deficiency and all livestock men know that it must be directly supplied. The feed lot is no exception.

On account of general iodine deficiency in Montana feeds it is optional whether or not it is furnished along with the salt. It is not yet proven that iodine is a feed-lot necessity but the provision of it is inexpensive and perhaps beneficial.

Phosphorus is the only mineral other than salt, as far as is now known, which must be supplied to some Montana cattle. Feed-lot animals are on such a high rate of daily feed consumption that the phosphorus requirement is usually met. On rations composed of a large proportion of beet tops or wet pulp, or in areas where range cattle show definite symptoms of depraved appetite, feeding a 50-50 mixture of bone meal and salt proves beneficial and economical. (See "Beet By-Products"). A mixture of 2 parts salt and 1 part bone meal will suffice in most Montana feed-lots where the above mentioned special conditions do not exist.

Complicated mineral mixtures are not proven to be either necessary or economical in a well operated feed-lot. They should be avoided.

Vitamins. New findings are being made almost daily on the importance and requirement of vitamins in animal feeding. There are about a dozen different vitamins identified and their functions and occurrence known to varying degrees. The cattle feeder is concerned only with supplying vitamin A, not because the others are unimportant but because they are amply furnished under most all feed-lot conditions. An example of this is vitamin D which is supplied by direct sunshine. Without it, rickets will surely develop and with serious results, but it is unnecessary to be concerned in our state because we do not house our cattle for long continuous periods. Another example is found in the B group of vitamins which are of such fundamental importance in nutrition. Cattle must have their supply like other animals, but the feeder need not be concerned because ruminants produce their necessary B vitamins within their own bodies through bacterial action and fermentation in the rumen or paunch.

Vitamin A deficiency, under usual conditions, will be evidenced by night-blindness—blundering into objects when the light is dim—and susceptibility to infections. This vitamin can be supplied in the feeds with green alfalfa hay or green pasture; green grass or legume hays; silages, including beet

tops,¹ and yellow corn. These sources are listed in their general order of importance. The quality of the feed is closely associated with the abundance of the vitamin, i. e., investigations have shown that U. S. grade 1 alfalfa will carry eight times the amount of vitamin A as does U. S. grade 3.

Further, as hay stacks stand over a period of time they lose their vitamin A value. Year-old alfalfa will have lost 75 to 85% of its A vitamin as compared with its content at the time of stacking².

There are certain commercial sources of vitamin A which, though costly, are reported to be satisfactory.

Feed Grains

High consumption of grain is a prerequisite to finishing steers that will hang up choice carcasses. This is axiomatic but does not rule out the possibility of producing medium and good beef on rations containing an unusually large amount of roughage. Again, a feeder should not be misled into thinking that prolonged feeding of roughage to steers will produce a carcass equal to full feeding of grain.

Montana grown grains are quite consistently heavier in weight per bushel and more nutritious than those grown in the middle-west and east. All Montana grown grains have a certain value as a cattle feed, some definitely higher than others, yet the feeder must consider each one on the basis of its nutritive value as compared with the cost or cash value at home. For example, wheat at \$1.00 per cwt. is as economical as barley at 83c per cwt. on the basis of net energy. A similar comparison between wheat and corn places corn at a value of 96c per cwt.

These comparisons are not the only ones for the feeder to consider in planning his fattening ration. He will realize, for instance, that barley in combination with alfalfa hay may cause digestive troubles; that rye is relatively less palatable; that corn has an advantage over wheat in not being as "heavy" a feed; and perhaps of greatest importance, that the per-acre yield of one grain on his farm may be much higher than another. An example of this is the following list of average yields³ for sample irrigated valleys together with the computed total digestible nutrients produced per acre.

¹Note—Information obtained from commercial sources (Merck) indicates that the vitamin A content of green beet leaves is about 9/10 that of green alfalfa.

²Note—Studies with baled alfalfa by the USDA at the experimental farm at Beltsville, Md., furnish the following information.

Period of Year	Loss of Vitamin A
Winter months	3% per mo.
Spring and fall months	6% per mo.
Summer months	21% per mo.

This indicates that the vitamin A losses vary in direct proportion to the temperatures. Montana temperatures and humidity averaging lower than those of Maryland probably result in lower losses. The same studies showed that timothy and clover hay losses were about the same as alfalfa.

³Montana Experiment Station Bulletins 237, 342, and Reclamation records.

	Flathead		Huntley		Lower Yellowstone	
	Yield	Lbs. TDN ¹	Yield	Lbs. TDN ¹	Yield	Lbs. TDN ¹
Barley—Bushel	19.1	721.5	32.3	1220.2	24.3	918.0
Wheat—Bushel	14.8	761.0	23.5	1208.4	20.6	1059.3
Oats—Bushel	28.8	665.4	36.9	852.5	39.2	905.7
Corn—Bushel	24.8	1145.8	23.5	1085.7	46.8	2162.2
Beet Top Silage—						
Tons ²	3.48	821.3	5.20	1227.2	5.65	1333.4
Alfalfa—Tons	2.18	2193.1	2.4	2414.4	1.92	1931.5
Wet Pulp—Tons	2.43	437.4	3.63	646.1	3.94	701.7

This tabulation must be considered only as an example and an illustration of the crop production angle from a feeder's point of view. There are other agronomic factors in selection and production of the respective crops which are not a part of this discussion but nevertheless important.

Another point to observe is that alfalfa holds a very important position in its production of feeding units although it must be remembered that pound for pound, grains have roughly double the fattening value of roughages. The feed-value of ensiled beet tops is also worthy of note when compared on a per-acre production basis.

The table of figures on yields are averages (12 to 13 years) for the localities and will vary with individual farms but they clearly illustrate the importance of planning the fattening program carefully and in close association with other farming operations.

Wheat. On account of price differential in the past, wheat has not been commonly classed as a feed grain but as the price lowers, it must have consideration because it has been well proven as very efficient in fattening cattle. Even though corn has been the standard of comparison throughout the years when considering fattening feeds, wheat matches it very well and will produce as rapid gains with very little difference in the quantity consumed.

Wheat is more satisfactorily mixed with other grains because it is so "heavy" that greedy cattle can easily go off feed when it is fed alone.

Frosted or shrunken wheat appears to have an equal or slightly greater feeding value than sound wheat and is not injurious unless mouldy or spoiled.

Wheat should be fed to cattle neither whole nor finely ground but is most economically cracked or rolled.

¹Total digestible nutrients—Morrison's "Feeds & Feeding."

²At rate of 0.43 ton of silage per ton of beets, E. J. Maynard.

Corn. "King Corn" requires no discussion as a beef cattle feed. It is thoroughly satisfactory and as efficient as any. It is probably the most palatable grain for heavy feeding, either alone or mixed with others.

Crushed ear corn is an excellent starting feed although special equipment is required to prepare it. Corn-and-cob meal is suitable for the entire feeding period for calves but a little too bulky for the final finishing of older cattle. Mixing cracked wheat with the meal in 50-50 proportions corrects this fault and uses the wheat very satisfactorily.

Corn should be ground for the feed lot unless the cattle are followed by pigs.

Barley. Barley ranks next to corn and wheat as a fattening grain. It is economical, palatable, and has produced carcasses with nice finish and quality.

Little is known of the fundamental causes of bloat and it is apt to occur occasionally with almost any ration, although barley is the most likely of the grains to cause serious trouble when fed in combination with alfalfa. Dried molasses beet pulp is established as a bloat-preventive when it is mixed with the barley in quantities of 30 to 50 percent by weight. Some feeders have been successful in avoiding bloat by feeding native or other grass-hay with barley ration instead of alfalfa. Steam-rolling barley also reduces bloat-trouble.

Steers may lose appetite for straight barley toward the end of the feeding period. It should be cracked or rolled for cattle and not fed whole or finely ground.

Oats. Oats fill two important purposes in the feed-lot and yet are seldom recommended as a finishing grain because of bulkiness.

The first useful purpose is feeding oats for the starting period. No other grain has proved as successful in getting the steers on feed with minimum digestive disturbance. This particularly applies to calves.

The second use is mixing 20 to 30 percent of oats with some other grain that may cause difficulty. A very common practice is to include a decreasing but continuous supply of oats in the ration throughout the entire feeding period, beginning with 100 percent and ending with perhaps 10 percent.

Oats may be crushed or rolled for feeding—never ground finely—particularly for older cattle, and will mix much more evenly with other cracked grains than if fed whole.

Rye. Either winter or spring rye is nutritious and produces good gains on cattle if they will eat it well. Being the least palatable of the common feed grains constitutes its greatest drawback. However, it should

Note: Patented feeds, "cubes" and special "mixtures", are not discussed in this publication. They are usually unnecessary for practical feed-lot management and their higher cost is ordinarily not justified by their actual feeding value.

be remembered that in palatable combinations of feeds, rye may have a feeding value superior to barley and close to that of wheat.

When rye is fed, it should be well mixed with other grains—always coarsely ground—in quantities indicated by the consumption of the cattle. The feeder should watch closely for signs of loss of appetite and decrease the percentage of rye in good time to maintain total consumption. Expert management may result in raising the rye to 50 percent of the grain mixture and occasionally even higher.

Roughages

All ruminants require a certain minimum amount of coarse, rough feed to maintain normal digestive functions. This is due in part to nutritive requirements but also to the physiology of these animals. The daily quantity for feed-lot cattle varies with several factors such as the type of ration chosen, economy, kind of roughage, the degree of finish desired, and age and sex of the cattle.

One should remember that for maximum gains and finish the roughage portion of the ration must be limited if full concentrate consumption is to be maintained. 4-H feeders and inexperienced adults are likely to forget this and complain that their "steers won't take enough grain". A sample practice would be to start the feeder cattle on a full feed of hay and gradually reduce it toward the end of the fattening period until each steer receives a minimum 3 or 4 pounds per day.

The different kinds of dry roughage common to Montana are briefly discussed under separate headings with three following exceptions. Corn stover (corn fodder without the ears) has not been proven of sufficiently high feeding value for finishing cattle. The same applies to straw from a practical point of view although either may be used if necessary, providing the vitamin A and protein requirements are met.

Grain hays, like stover and straw, do not ordinarily provide enough protein and vitamin A and are generally considered more suitable for stock-cattle than feed-lot cattle, although good quality grain hay can be used in the feed-lot if the necessary supplements are provided.

It is not recommended that roughages should be ground or chopped for feed-lot rations unless some special circumstance indicates it. This is for several reasons, i. e.; chopping will not increase the feeding value by the smallest degree; it is ill advised to dispose of poor quality roughages that are not palatable unchopped, to cattle that are being finished for slaughter; feed costs are increased by the expense of chopping. An example of an advantage might be shredded corn fodder (shock corn including the ears) used as a starting feed, although corn silage has proved more economical and efficient if the entire corn plant is to be used. Another advantage is mixing a chopped roughage with the grain ration to facilitate self-feeding.

Alfalfa. Alfalfa holds much the same position as a cattle roughage, as do corn, wheat and barley as fattening grains. While not a necessity, it approaches being so for two special reasons. First, there is no known combination of proteins as satisfactory as those present in alfalfa hay. There is no cheaper source for Montana feeders. Second, alfalfa is a principal source of vitamin A.

Full feeding of grain may mean that the daily consumption of alfalfa falls below the minimum protein requirement. A rough rule to follow when feeding calves is: Figure the protein balance of the ration if alfalfa hay consumption falls below 6 pounds per head per day. The method of figuring is explained under the section on "Protein Supplements."

The higher the quality, as indicated by leafiness, bright green color, fine stems and the absence of blossoms; the higher will be the feed-lot value of alfalfa. Whether the hay is first, second or third cutting is of much less importance than the quality. In fact it has not been possible to prove experimentally that one cutting of western alfalfa had any special nutritive advantage over another.

Sweet Clover. Sweet clover hay has as much feeding value as does alfalfa when it is harvested in good condition the first year. It is slightly lower the second year.

"Sweet clover disease" is evidenced by the incapacity of the blood to clot. The cause is not definitely known but the trouble can be avoided by mixing the sweet clover with some other roughage or by alternate feeding of it for not longer than two-week intervals.

A second disadvantage of sweet clover hay is its tendency to be "washy." Heavy feeding of grain may have a similar effect and the combination of the two might be too laxative.

If sweet clover is so coarse as to need grinding it can ordinarily be considered too low in quality for a good fattening ration.

Mixed Tame Hay. These roughages commonly include different percentage mixtures of timothy, various clovers, red-top, blue grass, brome grass, orchard grass, crested wheatgrass and alfalfa. Well-grown, properly harvested, grass-and-legume mixtures are usually more palatable and often of higher feeding value than pure species. This is simply because mixtures provide variety for the appetite and one species may compensate a deficiency of another.

The protein supply in mixed hay will vary directly with the percentage of good quality legumes it contains and the stage of maturity at which the hay is cut. The signal success obtained in carrying range calves through the winter solely on timothy and clover hay in various mountain valleys has been due to a substantial degree to the liberal percentage of alsike, or white Dutch clover. An observant feeder can watch this percentage and supply necessary supplements when it is reduced below the critical point.

Native Hay. Montana's native hays have had widespread credit for their high feeding value. They include the blue-joint of the Milk River valley and the upland hay of eastern Montana, as well as the native mixtures of the Deer Lodge, Big Hole and other mountain valleys. These hays are extremely varied in species, composition, and nutritive values so that only a broad discussion is possible if it is to be brief.

High quality native hay may be said to have two advantages over alfalfa in that it is commonly considered less bulky and wasteful and that it substantially reduces bloat tendency in combination with troublesome concentrates like barley.

Native hay will furnish sufficient vitamin A in the ration only when it is cut prior to maturity. If it has cured on the stem before harvest it will be a poor source of vitamin A.

A ration composed of grain and native hay will require a protein supplement when fed to calves. The necessity and quantity of a supplement decreases with yearlings as compared with calves, and two-year-olds as compared with yearlings, as is explained later on.

Silage. A succulent feed in the ration will often increase the daily consumption, raise the rate of gain, and may lower the cost of gains. Many feeds have been made into silages but corn silage has long been the standard. Beet-top or pea-vine silages are also worthy of mention. The introduction of the trench silo has made ensiling much less expensive from the standpoint of equipment.

One thousand pounds of good corn silage has replaced 123 pounds of corn and 290 pounds of legume hay in experimental trials but required 7 pounds more of protein supplement. It is highly palatable and fits in very well with the management practices on the farm where it can be grown and in the feed-lot where it can be used.

In higher valleys where corn will not grow but where canning peas are produced, pea-vine silage is proving to be a satisfactory, low cost, succulent, roughage. It requires no silo but is stacked directly from the viner. Pea vine silage has about 85 per cent of the feeding value of corn silage. However, pea vine silage contains about twice as much protein as corn silage.

Pea-vine and beet top silages are the most effective kinds of the ensiled feed which can be had for lowering the cost of the ration because, as by-products, their cash value must be considered low.

Corn Fodder. Where silage cannot be made from corn some growers choose to use the whole plant, including the ears, as fodder. It is much less economical than corn silage.

Shock corn serves well in starting cattle on feed but hogs should always follow the cattle when it is used. Chopping shock corn is ordinarily profitable as compared with feeding it in bundles. Careful figuring is necessary, however, because of increased cost of processing a relatively low-value feed.

Sugar Beet By-Products¹

Sugar beet producing areas are properly the permanent homes of Montana fattening operations. The reasons are repeatedly mentioned because of their significance. (1) Beet tops, beet pulp and beet molasses are useful livestock feeds but otherwise of relatively little value. (2) Barnyard manure decidedly increases beet yields.

Good management is necessary in order to obtain maximum use of beet tops and beet pulp. The tops lose their feeding value very rapidly if left exposed to the weather, yet the pressure of beet harvest makes it very difficult for the tops to be promptly handled. In connection with feeding wet pulp it is necessary for the grower to accurately figure hauling costs because he is moving about 9 pounds of water for every pound of dry feed. Some factory field men limit the practical hauling radius to 12 miles.

It should always be remembered that beet by-products are deficient in phosphorus so when fed heavily they must be supplemented with bone meal. Some feeders take the wise precaution of measuring out the daily ration of bone meal, sprinkling it over the wet pulp or mixing it with other feeds.

It is likewise important to remember that beet tops or pulp will not supply the necessary proteins and it is economical and important to supplement them. A cooperative experiment at the Huntley station in 1928-29 indicates the importance of this. 128 steers were fed on wet pulp, alfalfa hay and molasses. Those which received 1½ pounds of cottonseed cake as a daily supplement made nearly double the gains of the steers receiving none, and showed a margin of \$17.03 over feed costs as compared with a loss of \$1.51 per head on the steers receiving no supplement.

Beet Tops. Three methods of feeding beet tops are followed; (1) grazing in the field, (2) feeding dry-cured in the lot, or (3) ensiling. The beetgrower must decide which method will be most practical for his purpose because, as previously mentioned, available time and labor are important factors. He should always remember, however, that beet tops leach and lose their feed value in direct proportion to their exposure to the weather. On account of this loss, ensiling is recommended over any other method of using beet tops as a cattle feed. Prompt gathering of the green tops into small piles for dry-curing is the second-best method of handling this inexpensive roughage.

The percentage of water contained in the tops likewise largely affects their feeding value. This varies according to the way they are handled from about 90% moisture when topped, to 30-40 percent when dry-cured and stacked. Beet-top silage will vary from 65 to 75 percent moisture depending on the methods used.

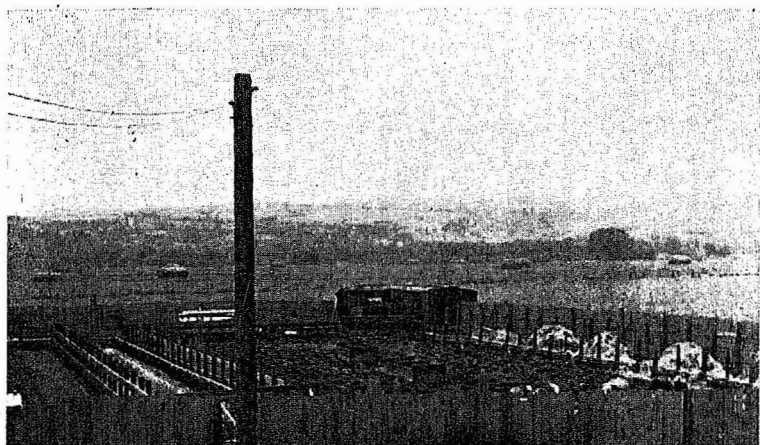
Some precautions are necessary in connection with feeding beet tops. (1) The beet crowns can cause serious trouble from choking. (2) Considerable

¹Order Farmers' Bulletin No. 1718.

quantities of dirt in the silage may cause digestive troubles. (3) Beet tops have a distinctly different composition than other roughage. The feeding of tops must therefore be started slowly. Feed in moderation. (4) They are laxative and should not constitute the sole roughage.

Utilization of beet tops as a livestock feed is largely a salvage proposition so it is one of the most important means of lowering the cost of the ration if the labor charge in connection with handling and feeding them is not excessive.

Wet Beet Pulp. The use of wet pulp in fattening cattle has certain limits such as were previously explained. It is, however, one of the feeds most useful in lowering the cost of the ration if these limitations are duly considered. Some of the cheapest gains have been made through high consumption of wet pulp, with alfalfa, molasses, bone meal and a protein supplement.



Courtesy Yost Farms

Fig. 4.—A conveniently arranged and well located feed-lot suitable for wet pulp feeding or dry rations. Note feed alley.

It is important to remember that wet pulp is composed of from 87 to 91 percent water and is therefore a low value feed. The total digestible nutrients per ton of pulp amount to only 178 pounds as compared with 1006 pounds with alfalfa. It is well to decrease the amount of wet pulp during the latter part of the feeding period for in this way the dressing percentage may be materially improved. Nevertheless, wet beet pulp is a by-product of the main crop and thus has a special advantage as concerns original cost.

Dried Molasses Beet Pulp. It is not entirely sound to recommend feeds for dry-lot fattening that must be purchased, but dried molasses beet pulp occupies a rather special position.

It is properly considered a concentrate and when fed in the barley-alfalfa ration satisfactorily controls bloat. This fact has been quite well demonstrated with a 50-50 combination of barley—dried molasses beet pulp, and alfalfa as a roughage. The work was done at the Montana Agricultural Experiment Station at Bozeman and later at the U. S. Range Livestock Experiment station near Miles City. It is not yet established what the minimum percentage of dried molasses beet pulp might be for bloat control although Montana experiments have indicated that where 25 percent of the concentrates consisted of this pulp, practically no bloat was evidenced. Not quite as definite results were obtained with corn instead of barley in similar trials but the dried pulp was also corrective.

Dried molasses beet pulp also has an excellent use in mixing with ground grains for use in self-feeders. Again it operates as a safety factor when it constitutes 25-50 percent of the mixture.

The feeder must decide for himself whether or not he can afford to buy dried molasses beet pulp. It depends on his kinds and quantities of home grown concentrates as well as the delivered cost of the pulp.

The comparative feeding value of dried molasses pulp and common feed grains is made here in a three-way manner; total digestible nutrients, net energy, and dollar value. Oats at \$1.00 cwt. are used as a basis of comparison. The table could be re-computed using another base price for oats or any one of the other grains.

Feed	TDN	Money Value	Net Energy	Money Value
Oats	71.5	\$1.00 cwt.	64.9	\$1.00 cwt.
Dr. Mol. Beet Pulp	74.3	1.04 cwt.	70.5	1.09 cwt.
Barley	78.7	1.10 cwt.	70.5	1.09 cwt.
No. 1 Corn	82.5	1.16 cwt.	81.1	1.25 cwt.
Wheat	85.7	1.20 cwt.	84.7	1.30 cwt.

This tabulation illustrates the fact that there is some difference if comparison is made on a basis of total digestible nutrients or on net energy. In the instance of dried molasses beet pulp versus barley the net energy comparison has proved the more accurate under actual feed-lot trials.

Beet Molasses. The use of beet molasses as a fattening feed depends largely on the cost, delivered to the feeder. The reason is primarily because this feed provides nothing necessary to the cattle that is not supplied by other Montana feeds. Molasses is more commonly used to improve the palatability of low grade roughages, indicating a disposal-feeding program rather than a finishing plan.

Molasses is definitely laxative and must be cautiously fed. One-half pound per steer per day is considered the maximum for starting this feed, proceeding with cautious increases to a top-limit of 2½-4 pounds for yearling steers and 3-6 pounds for 2-year-olds.

Protein Supplements

It has already been stated that protein supplementing is necessary in certain Montana rations and that younger cattle require a larger and proportionately more accurate protein allowance than do older ones. In working this problem out the feeder must first distinguish between "digestible protein" and "crude protein." The latter is the form usually used to designate quantity of protein contained in commercial feed. The former is just what its name implies, the amount of protein available to the animal.

In order to assist the feeder with the rations for cattle of various ages, the amounts of digestible protein (DP) are here listed in terms of quantities contained in each pound of standard feeds. The information was obtained from Morrison's 20th edition of "Feeds and Feeding."

One Pound of Feed	Pounds of Digestible Protein
Grain:	
Wheat	.114
Rye	.103
Oats	.094
Barley	.093
Corn No. 1	.073
Dried Mol. Beet Pulp	.061
Beet Molasses (Steffens).....	.048
Hay:	
Alfalfa	.106
Sweet Clover (2nd year)	.105
Native wheat grass	.049
Timothy and clover	.048
Timothy	.032
Silage:	
Beet tops (73% moisture)	.018
Corn	.015
Wet Beet Pulp	.008

One Pound of Feed	Pounds of Digestible Protein	Percent of Crude Protein
Soybean meal (expeller process)	.376	43+
Cottonseed meal	.350	43%
Linseed meal	.335	37+
Cull peas	.210	25%

The application of this information is made as follows: An 800 pound baby beef is eating 11 pounds of wheat and 5 pounds of alfalfa hay per day.

11 pounds wheat $\times$.114 DP = 1.254 pounds digestible protein per day

5 pounds alfalfa $\times$.106 DP = 0.53 pounds digestible protein per day

Total 1.784 pounds digestible protein per day

The daily requirement of different ages and weights of steers on fattening rations is likewise obtained from Morrison's text.

Age and Weight of Cattle Pounds of DP Required Daily

Baby beef (calves):

400 to 600 lbs.....0.98 to 1.43

600 to 800 lbs.....1.39 to 1.75

Yearlings:

600 to 800 lbs.....1.2 to 1.6

800 to 1000 lbs.....1.59 to 1.94

Two-year-olds:

900 to 1100 lbs.....1.62 to 1.98

1100 lbs. and up.....1.87 to 2.12

Thus with these two tabulations, the feeder can check the protein balance of his ration according to the requirements of his cattle. It is found that the 800-pound baby beef steer used in the previous illustration is receiving his full protein ration of 1.75 pounds per day and 0.034 pounds to spare.

A deficient ration for a 400 pound calf just started on feed might be as follows:

3 pounds oats $\times .094$ DP = 0.282 pounds digestible protein per day

2 pounds corn $\times .073$ DP = 0.146 pounds DP per day

7 pounds timothy $\times .032$ DP = 0.224 pounds DP per day

Total 0.652 pounds DP per day

Standard daily requirement = 0.98 pounds DP

Total supplied = 0.652 pounds DP per day

Net deficiency = 0.328 pounds DP per day

To supplement this inadequate ration we check back and find that 1 pound cottonseed meal furnishes 0.350 pounds DP and will balance the ration. How about balancing this same deficient ration without purchased feed?

3 pounds oats $\times .094$ DP = 0.282 pounds digestible protein daily

2 pounds corn $\times .073$ DP = 0.146 pounds DP daily

7 pounds alfalfa $\times .106$ DP = 0.742 pounds DP daily

Total supplied = 1.170 pounds DP daily

Standard daily requirement = 0.98 pounds DP

Daily excess = 0.190 pounds DP

The next illustration is with respect to previous statements that rations composed largely of beet by-products will probably require a protein supplement. A sample ration for an 800 pound yearling steer follows:

70 pounds wet beet pulp	× .008 DP = .560 pounds DP daily
3 pounds beet molasses	× .048 DP = .144 pounds DP daily
14 pounds beet top silage	× .018 DP = .252 pounds DP daily
4 pounds alfalfa	× .106 DP = .424 pounds DP daily

Total = 1.380 pounds DP daily

Standard daily requirement = 1.6 pounds DP

Net daily deficiency = 0.22 pounds DP

One pound of soy bean meal (43%) furnishes .0376 of a pound digestible protein so the addition of 0.6 pound of meal daily provides, 0.6 pound × 0.376 DP or 0.2256 pound and cancels the deficiency.

A moderate surplus of daily protein is not harmful to the animal, neither is it wasteful if there is no added cost because excess protein is converted into other useful nutrients by the animal body. However where protein supplements are purchased, the comparatively high cost makes it necessary for the feeder to figure the requirements and hold the daily feed of the meal or cake to the minimum that will balance the ration. In some cases they are so costly that it is not economical to completely fill the protein requirements.

The secret of protein supplementing is thus explained and any feeder can work out his own problem with sufficient accuracy for practical purposes.

Protein Supplements. Soybean meal, cottonseed cake or meal, and linseed meal are the three principal kinds of feed used as protein supplements in Montana. Cull peas and tankage are secondary sources.

Comparison of these three primary protein feeds can be consolidated for all practical purposes into one word—cost! What small difference there is, barely favors linseed meal but this feed is ordinarily of enough higher cost than the other two to offset this margin.

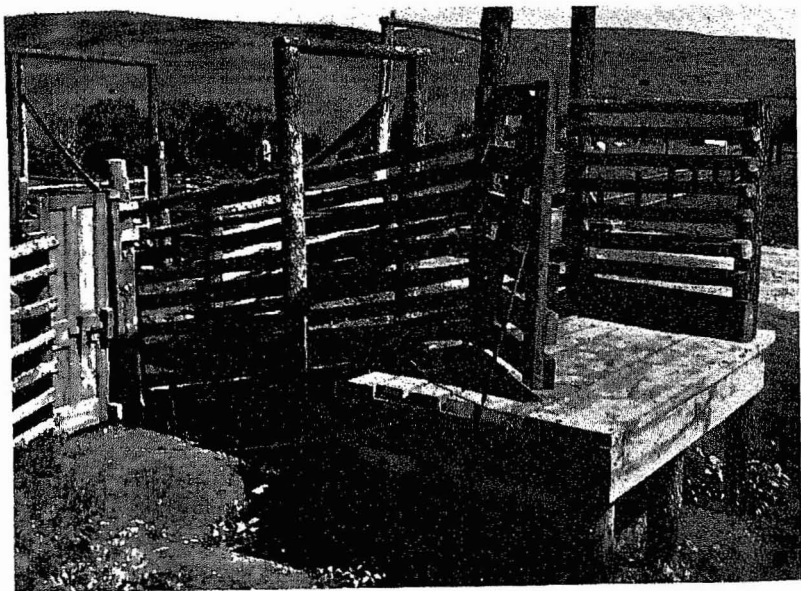
Cull peas are an entirely satisfactory source of protein for cattle and they are classified as secondary only because the available quantity is limited. The tabulation places the digestible protein at 21 per cent for peas and on this basis 1.1 pound added to the beet pulp ration of the 800 pound yearling steer would balance the deficiency just as did the addition of 0.6 pound of soy bean meal. When they can be had at a reasonable price, cull peas will show a decided cost advantage over other supplements.

Dry-rendered tankage has been tested by experiment stations in comparison with other protein supplements. It has not proved satisfactory for cattle on account of unpalatability.

Management

Time of Starting. Should feeder steers arrive October 1, November 1, or wait until December? Various influences will affect the answer to this question.

The time at which various feeds and fields will be available to the cattle is of importance. Beet tops are the best illustration of this point whether they are grazed or stored for feeding in the dry lot. Stubble and corn-stalk grazing is another illustration because the early part of the feeding period is the proper time for utilization of coarse feeds like corn fields, lodged grain, stover, beet top grazing and such; this factor alone may fix the date of arrival.



Courtesy "Lazy E—L Ranch"

Fig. 5.—A very substantial and satisfactory loading chute and platform.
Note wing gates.

Age and class of cattle are vital influences. Weanling calves and wet cows are ordinarily delivered in October while arrangements could be made for receiving yearlings, two-year-olds or dry cows most any month in the fall or early winter.

The length of the feeding period and the contemplated marketing time are two more factors which will affect the time of starting.

Starting the Cattle. The kind of handling the cattle receive upon arrival will influence their performance over the entire feeding period. Rest and quiet; a good fill of fresh, clean water and good-quality grass hay if available; an undisturbed opportunity to get acquainted with the feed-lot; these critical steps will surely fill the first two days and perhaps more.

Feeder cattle should not be turned directly onto pasture or fields when they arrive. The third or fourth day is soon enough and then only with a prior fill of hay and for only an hour or two at first. This particularly applies to beet top grazing. By the end of the first week they may be out for a half day at a time or even longer.

The appearance, texture, and odor of the droppings will indicate how the cattle are starting. This principle also applies throughout the entire feeding period. Observation and advising with experienced feeders are the only means by which the beginner may learn because of the wide variation of the manure as between different rations.

Horned cattle should be dehorned. They will then require less feed-lot and bunk space, handle more quietly, ship more easily and command a higher market price. Dehorning should not be delayed except by such factors as bad weather, flies, and sufficient time for a rest and fill. A dehorning chute is necessary for a good job.

A wise and experienced feeder prefers to buy cattle already dehorned.

Temperament. Wild or restless cattle will not make rapid, economical gains. Quiet, careful handling of the animals will accomplish more to overcome wildness than any other practice. Dogs are taboo. Maintaining equipment and fences in good repair is likewise necessary. Turning in and cutting out dairy calves or milk cows twice a day from the feed-lot is a costly practice. The same feeder and the same feed-wagon at a regular hour daily will create the least disturbance.

Most any range cattle will "settle down" in a short period if properly handled. If more than a very few do not do so it is more likely the fault of the feeder than the cattle.

Sorting. A feeder of a carload or less of cattle would hardly be concerned with the question of sorting his steers. With a larger group than this there will ordinarily be advantages derived from dividing them.

The purposes of sorting are several. Light weight steers will not fare well with heavy ones. "Slow" feeders will be at a disadvantage with "fast" ones but may do a profitable job if sorted to themselves. Heifers should be fed separately from steers. "Cheap cattle" should be fed on a different

ration than "quality cattle." Many more instances could be cited but the point lies in the fact that a feeder of more than 50 head of cattle will ordinarily profit by sorting them unless they are especially uniform.

Efficiency. Efficiency of a feeder steer is measured in terms of the total pounds of concentrate feed required to produce one hundredweight of gain. Some cattle may require less than 500 pounds of grain to manufacture 100 pounds of beef while others may use 1000 pounds or more.

Efficiency is thus one of the important factors determining profit.

Some of the conditions influencing efficiency are: breeding, individuality, management, age, sex, balance and kind of rations, deficiencies, temperament, and weather. Only part of these are under the control of the feeder, once a "lot" of cattle is started.

Steers are slightly more economical in use of feed than heifers although bred heifers ordinarily excel open heifers, and often even steers. Bred heifers must be marketed after a short feed in order to avoid the price penalty applied to "springers" and therefore may not continue through an otherwise profitable feeding period. Calves are more efficient than yearlings or two-year-olds. Well bred cattle use feed to greater advantage than most common cattle and they also command a higher sale price.

Efficiency can only be rated by periodic weighing of the cattle and comparing their gains with the accurately recorded quantities of feed consumed for the same period. As the concentrate consumption of full-fed steers approaches either 500 or 700 pounds per hundredweight of gain so the steers are respectively efficient or inefficient. By keeping these accurate checks on a "string" of calves in a certain brand, the feeder may, and ordinarily will, find that they are either more or less efficient than another "lot" of different breeding. Perhaps "John Doe's" calves will gain one hundred pounds on 520 pounds of grain, while "Smith's" calves under the same management and feeding consume 580 pounds for the same gain—a very important difference!

Cost of Gains. Profit is only partly concerned with margin, or difference between the purchase and selling prices of the cattle. The cost of the gains in live weight will at times exceed the margin in importance.

There is nothing complicated in figuring the margin when cattle cost \$8.00 per hundredweight and sell at \$9.00 per hundredweight. It is obviously \$1.00. However, when such a situation as this exists, that is, only a moderate margin, it behooves a feeder to know whether his beef factory is producing at a cost of 7c per pound or 10c per pound. This is so fundamental that little discussion should be necessary. An illustration is much better. The following feeding record is an actual one, prepared by a practical feeder in his own way. It is reproduced without alteration.

Ration, April 25, to October 1, 1940—155 days.....	Wet Beet Pulp Mill Feed Cotton Seed Meal Salt and Bone Meal
Ration October 1, to January 15, 1941—105 days	Dried Beet Pulp Cracked Wheat Alfalfa Hay Salt and Bone Meal
Number of steers	55
Number of days on feed	260
Average Initial Weight per head	505 lb
Average Final Weight per head	1035 lb
Average Daily Gain per head.....	2.04 lb
Average Daily Feed per head, 1st period.....	
Wet Pulp	75 lb
Mill Feed	5 lb
Cottonseed Meal	0.5 lb
Alfalfa Hay	10 lb
Salt and Bone Meal	0.1 lb
Average Daily Feed, 2nd period.....	
Dried Beet Pulp	6 lb
Cracked Wheat	7 lb
Alfalfa Hay	10 lb
Salt and Bone Meal	0.1 lb

FEED COSTS

Pulp: Average for both wet and dry	\$399.50
Cottonseed Meal	49.23
Wheat	348.45
Salt and Bone Meal	12.00
Alfalfa Hay 75 tons @ \$5.00 per ton	375.00
Total Feed Costs	\$1184.18
Feed Costs per head per day	08.8 c

COST OF STEERS

Initial Cost per head	\$48.25
Feed Cost per head	21.53
Interest per head	4.12
Total Cost per head	\$73.90

SALES

Average Selling Price per cwt.	\$9.18
Average Income per head	\$91.52
Net Profit per head	\$17.62
Net Income per month on investment.....	\$107.80

Note: 38 head of these steers were raised by the feeder and 17 head were bought at an average price of \$55.50 per head. The steers that were raised were valued at the beginning of the feeding period at \$45.00, making the total 55 head cost an average of \$48.25; 48 of these steers were well bred grade Herefords, 5 were well bred grade Shorthorns and two were Hereford-Angus cross. There were two steers that died during the feeding period. One from bloat and the other from a wire found in the digestive tract. This mortality is figured in the net returns, average selling price, and feed costs per head. Bloat conditions were corrected by increasing the dried beet pulp from 4 to 6 lbs. per head per day.

(Courtesy Edouard Deschamps, Missoula, Mont.)

It is pointed out that this feeder kept his feed-cost figures on a "per day" basis rather than per each pound of gain. For market price comparisons the second method is the more suitable and is recommended over the "per day" feed cost.

One thing of importance is especially noted. It is the interest charge of \$4.12. Often this is omitted from all calculations and this instance indicates the importance of including it. On the 260-day basis this interest cost is 1.6c per head per day, about 18 per cent of the total feed cost. The feeder does not state whether this was interest paid or merely charged and it is unimportant which, because it is justified in either case.

It is impossible to keep exact records of feed lot costs and gains without cattle scales. They are urged as being a necessary adjunct to the enterprise and any feeder should realize that he is carrying extra risk until scales are installed. Assume, for instance, that the original cost of the cattle was 9c per pound. Feeding records establish the feed cost for the gain at the same figure, 9c. Perhaps interest is figured at 0.8c per pound, bringing the total cost of gains to 9.8c. Suppose as the cattle approach a practical finish the market breaks downward to 10c for that class of cattle. Heavy market "runs" are expected. What should the feeder do? His scales and feeding records indicate a very definite answer—sell! This is not a fanciful illustration but one which has recently occurred in more than a few cases.

Lowering the Cost of Gains	Each year of cattle feeding will certainly profit the feeder in experience. There is no other teacher as dependable. Among the most valuable lessons are those dealing with greater economy and efficiency of fattening. Selection of feeder animals and rations will become a sort of instinct tending toward higher net returns.
-------------------------------	--

Several means are available for cheapening gains. Examples may be cited such as salvaging the utmost feeding value from beet tops; providing silages according to crops available; feeding grain on pasture; avoiding high priced feeds; increasing consumption of unsaleable roughages, or seizing opportunities to purchase low cost concentrates.

No set of rules can be written for accomplishing these economies. It is a proposition of comparing feed costs, feeding values, and cattle gains and can be done only when these factors are known.

Degree of Finish.	Definite statements concerning the point during the finishing period when the cattle can most profitably be marketed cannot be made. A dependable buyer or commission firm can render real service when this time arrives.
-------------------	--

On the other hand there are certain decisions the owner himself must make. Is his particular market paying a premium on heavy cattle or light ones? Two-year-olds can be made into satisfactory killers at 1100 pounds or can be carried on to weigh 1300 or 1400 pounds.

Again, every feeder should avoid the error of carrying low-grade cattle to a high finish on a heavy concentrate ration. As a common or medium steer approaches a profitable killing condition he is also approaching his shipping day. He will never be a choice or prime steer so why carry him on and on and on until he is "patchy" and "gobby" and costly trimming of the carcass will be necessary.

Conversely, the high-quality steer will improve as he fattens and may demand a substantially higher price at a final finish. It is to be remembered, however, that there is a narrow outlet for truly "prime" cattle. By far the bulk of the better beef would fall into the "good" grade rather than even "choice."

Dressing percentage is probably the first consideration of the buyer of fat cattle. An expert feeder will train himself to estimate dressing percentage closely so that he may better know the slaughter value of his steers. This brings to mind the three principal factors influencing the value of fat cattle in the eyes of market men.

1. "Finish," or degree of fat.
2. "Quality," which includes all such points as desirable conformation, refinement, good breeding, and thick fleshing.
3. "The kill," or dressing percentage, reflects the profit to the killer. It is definitely a combination of both finish and quality.

Equipment¹

Feed lot equipment need not be elaborate. Most all of it can be constructed with unskilled labor. Whether or not it is to be permanent and of labor-saving character is a matter for the feeder to decide although strong construction is a necessity in order to avoid injuries to the cattle.

Site. Beet growers and farmers of depleted land should always select a level site for a feed lot so that a minimum of liquid fertilizer will be lost. In only a few scattered localities of the state is a sloping, well-drained, feed lot indicated. A gravelly bar on a tree-grown river bottom is an ideal location for many obvious reasons.

Shelter. Feed lot sheds are not necessary east of the continental divide as a general rule. Damp and foggy winter weather west of the divide presents a different problem and sheds are of real value to provide a dry bedding area.

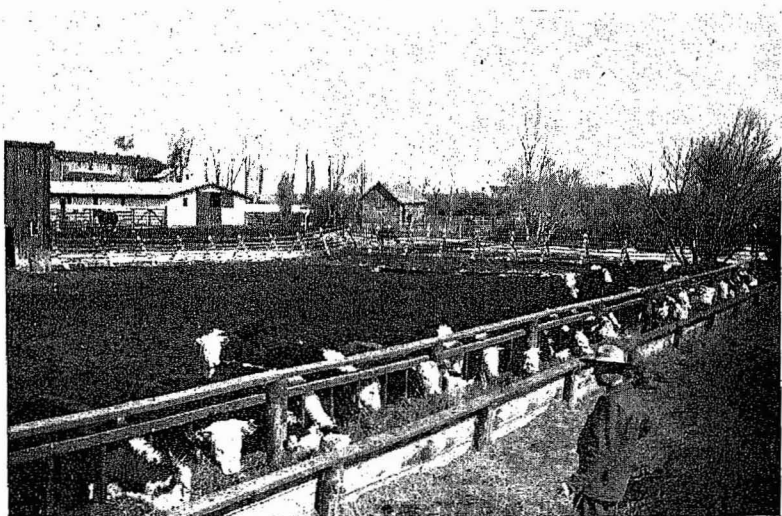
Shallow sheds, open along most of the leeward side, are to be desired over deep, tightly enclosed sheds.

High, tight fences around the feed lot are important. They will furnish protection against wind and unnecessary disturbance. If construction of fences and gates that will be dog-tight is practical, it has certain real value.

¹Order Farmers' Bulletin No. 1584.

Size. Approximately 100 square feet per steer, including shed area, is a rough minimum of space required. Practical, although not absolute, maximum is 200 square feet per steer. An over-large feed lot is to be avoided because it definitely tends to reduce gains on account of the tendency for even gentle cattle to run and play.

Feed Bunks and Racks. Almost as many types of feed bunks and hay racks are to be found as there are feed lots. Details of construction are unimportant. One kind of bunk will ordinarily serve as well as another.



Courtesy Conrad Kohrs Company Ranch.

Fig. 6.—A level feed lot with a strong, safe feed rack and good natural shelter.

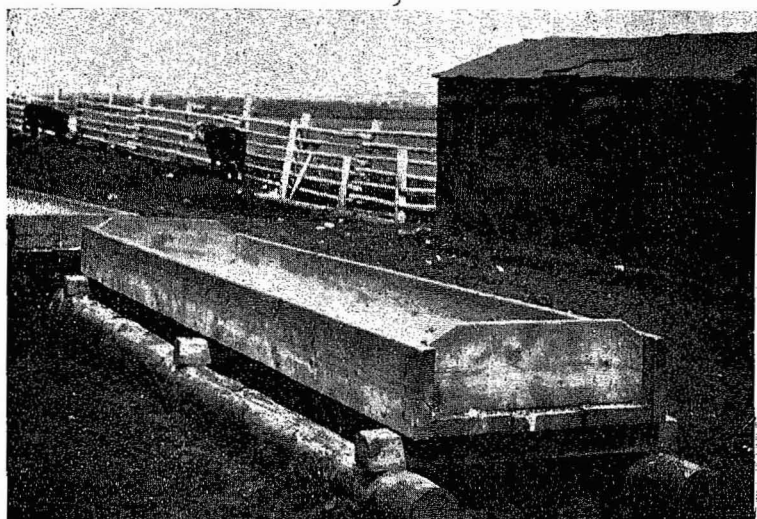
Figures 6, 7 and 8 furnish suggestions on kinds of bunks and racks. Several principles are to be remembered. Feed bunks should be movable and hay racks should provide for easy access and minimum waste. Racks that permit self feeding of unlimited quantities of hay are not recommended because roughage feeding must ordinarily be controlled during a considerable portion of the fattening period.

Mangers and bunks must be so constructed that cattle will not become fastened or trapped. A steer pitched into a manger onto his back by the other cattle will not live very long.

Feeding space per steer should be $2\frac{1}{2}$ to 3 feet, depending on his size. There is no economy in crowding at the feed bunk.

A method occasionally followed for feeding concentrates is to merely shovel the grain ration into the cleaned hay manger, thus eliminating feed bunks entirely. This practice has its disadvantages.

Wet beet pulp feeding requires more of a special arrangement than special equipment. The pulp-wagon should travel in an alley outside the feed-lot and unload directly into the troughs. Figure 4 illustrates this, as does the ground plan of the feed-lot, Figure 10.



Courtesy Gallatin Gateway Hereford Ranch.

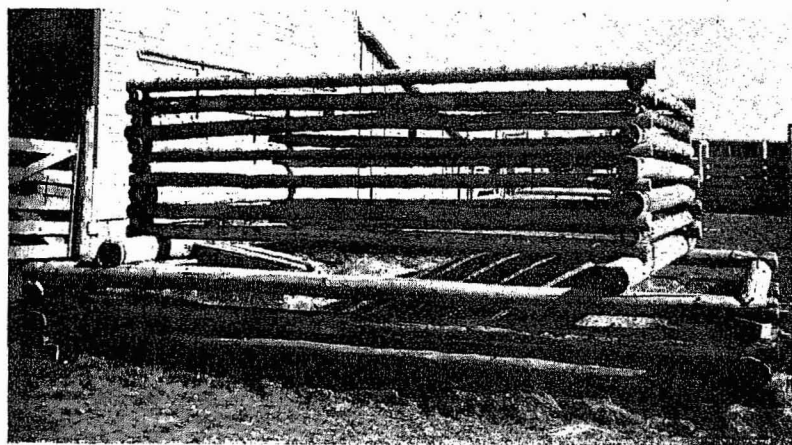
Fig. 7.—A low cost, strong, easily moved feed bunk, 3 ten-inch planks wide and one high.

Water. The importance of a plentiful supply of clean water in the feed-lot cannot be over-emphasized. This fundamental is not always observed. The supply must be dependable; the pumping equipment durable, certain and easily operated; and the tank large, strong and accessible. In cold weather water should always be heated to remove the chill. A spring may furnish it without heating but ordinarily tank heaters will be a necessity.

Watering cattle at a drinking-hole chopped through the ice is not profitable management. A steer requires from 5 to 10 gallons daily, depending on his size, and ice water will cause his teeth to hurt before he gets his fill.

Wet pulp feeders may not always have to furnish water to their cattle. However, a coming-yearling, eating 20 pounds of wet pulp per day is not receiving enough water. On the other hand a two-year-old consuming 100 pounds of pulp per day may not need additional water in cool or cold weather. However, it is questionable whether it is a wise practice to withhold water from any cattle in order to increase their consumption of wet pulp.

Other Equipment. Scales have been mentioned and should be a part of feed lot equipment. Installing them and using them at intervals during the feeding period will sooner or later prevent a loss of several times their cost. A type of scale is illustrated in Figures 9 and 10 that serves very well for weighing either cattle or feed. The scale rack¹ is strong, yet easily rolled off the weighing platform permitting the feed truck to drive on.



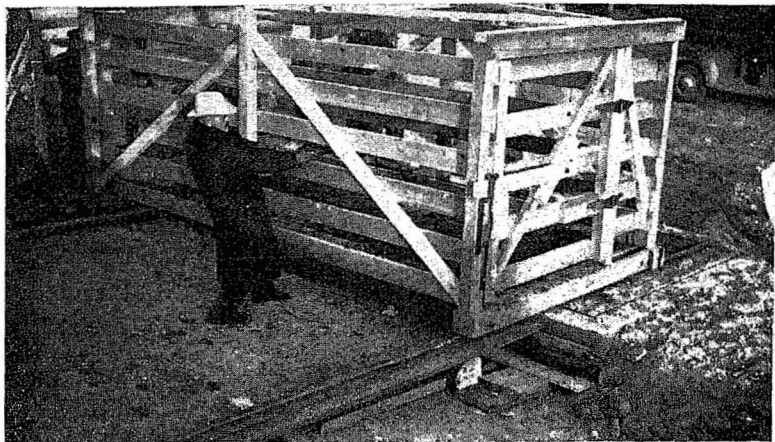
Courtesy Higgins Ranch

Fig. 8.—Here is a well constructed and convenient log hay rack.

The alley arrangement from feed lot to scales can be so installed that it serves very well for sorting or loading the cattle. A crowding pen, sorting and veterinary chute, and a loading platform would complete a feed lot with all necessary equipment.

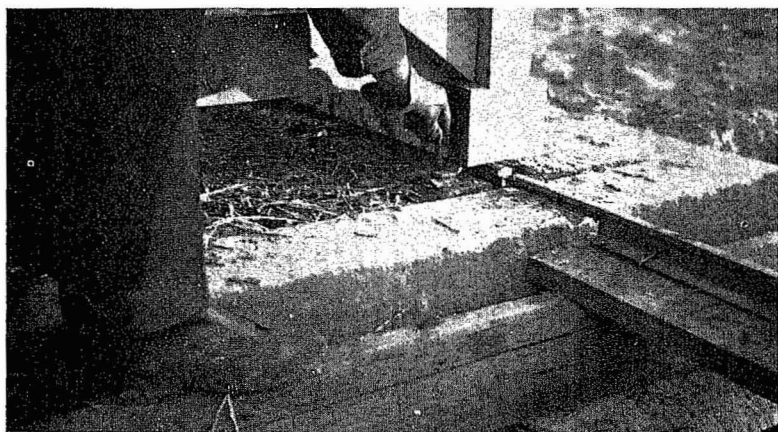
The ground plan illustrated in Figure 11 is merely suggested and includes the various items described as important feed lot adjuncts. Movable bunks could be used instead of the long, permanent ones and the hay feeding equipment moved to the feed alley.

¹This construction would be improved by the overhead type of bracing typical to railroad stock-yards, making full-width gates possible at either end.



Courtesy Frank O'Connor Ranch.

Fig. 9.—Dual purpose scales suitable for weighing livestock or feed.
The scale rack¹ is being rolled off the platform.



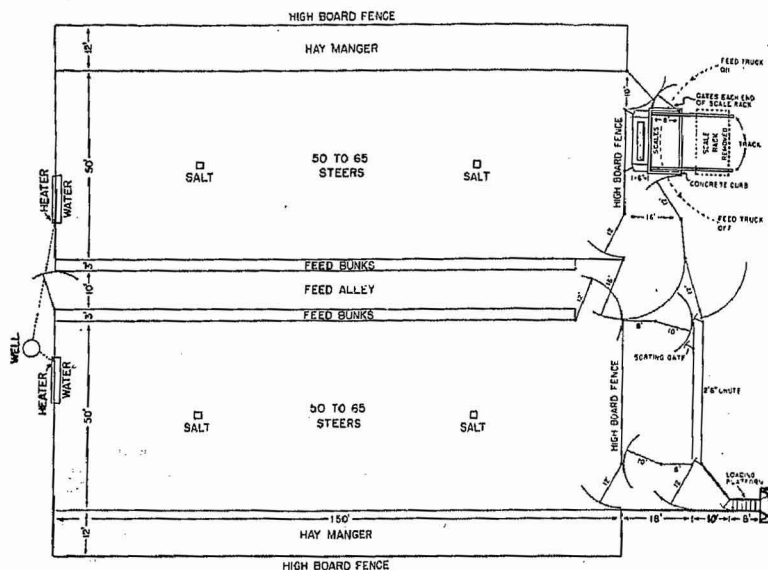
Courtesy Frank O'Connor Ranch.

Fig. 10.—Four pins fasten the rack on the scale platform. Note old mine rail track, cut at edge of curbing.

Feed Lot Manure

The value of feed lot manure has long been considered sufficient to pay all labor costs, veterinary charges and some authorities claim even the usual death losses. Perhaps it is even greater than this.

No intensively cropped land will long continue in high productivity without returning plant food to the soil. This principle becomes most significant under sugar beet production. A 12-year average of yields at the Huntley Field Station near Billings furnishes the following information.



Montana Extension Service Photo.

Fig. 11.—Ground plan of cattle feed lot with complete equipment.

MANURED VS. NON-MANURED ROTATION

Average of Years 1924-35 Inclusive

Crops	Rotation No. 60	Rotation No. 61	Difference
Alfalfa 1st year.....	2.36 tons	3.01 tons	+ 0.65 tons
Alfalfa 2nd year.....	5.53 tons	6.33 tons	+ 0.80 tons
Alfalfa 3rd year.....	5.83 tons	6.24 tons	+ 0.41 tons
Potatoes	284.9 bu.	311.2 bu.	+ 26.3 bu.
Oats	107.6 bu.	108.0 bu.	+ 0.4 bu.
	Not Manured	Manured	
Sugar Beets	11.7 tons	17.0 tons	+ 5.3 tons

These were six-year rotations and manure was applied only to No. 61 as indicated, once in the six years, just prior to the beet crop. The rate of application was 12 loads per acre.

Out of this information comes the recommendation that Montana beet growers can ill-afford to do without livestock of some kind. The recommendation is enlarged by suggesting that the value of feed-lot manure for increasing yields of sugar beets is sufficient in itself for cattle or sheep fattening on the beet grower's farm. As long as the feeder "holds his money together" on the livestock operation he will still have a profit from his increased yield of manured beets.

Bedding. Bedding the feed-lot is a necessity if the "hidden profit" from manure is to be realized. Without bedding, it is impossible to retain the urine and other liquids and prevent the loss of fertilizing constituents through the action of sun and drying.

Bedding has another value in keeping the cattle clean and dry and making them comfortable when at rest.

Straw is a satisfactory material because it will absorb two or three times its weight in water and is usually available. Three to six pounds per day per steer is a reasonable "budget requirement." Continued wet weather, however, can increase this many fold.

Frequency of re-bedding is affected considerably by rain and snow but a practical rule to follow is to re-bed often enough to keep the top-litter dry and bright in color.

The feed-lot should be plentifully re-bedded after the cattle are marketed to retard drying and evaporation pending application of the manure to the fields. This is often neglected.

It is estimated that a 1,000-pound feed-lot steer will produce from $\frac{2}{3}$ to $\frac{3}{4}$ of a ton of manure per month, including the weight of the bedding. Or, to state it in terms of acres, every 25 steer-months in the feed-lot will just about produce the 12 loads of manure required for one acre of beet land.

Note: The discussions and recommendations of this bulletin¹ are necessarily brief and general because the one similarity in cattle feed-lots is their difference. A splendid reference for detailed information is found in F. B. Morrison's 20th edition of "Feeds and Feeding." It can be obtained from the Morrison Publishing Co., Ithaca, N. Y.

¹Order Farmers' Bulletin No. 1549.

Feed Lot Hints

"If my young grandson can profit by his dad's experience and mine, he should make a pretty good feeder by the time he's my age." Such a statement was often heard by the writer in a corn belt state 25 and 30 years ago. It is a challenge to any feeder, even though he be of many years experience.

"The eye of the master fattens his cattle," is an old English proverb and carries a wealth of meaning.

Several accepted feed-lot practices are outlined below.

1. Provide rest; clean, unchilled water; salt; and good, grass-hay at free choice when the cattle first arrive.
2. Start cattle on grain slowly. Oats are the best at the beginning.
3. Change quantities and kinds of all feeds gradually.
4. Watch for scouring and bloat and act promptly if either continues or increases.
5. Provide at all times a clean, dry, bedding area; shelter from wind; unchilled water; and salt.
6. Follow a regular schedule of feeding or pasturing.
7. The bunks should be clean and the cattle hungry at feeding time.
8. The appearance of the hair is an indication of the health of the cattle. Watch it!
9. Sort the cattle at 60 days and dispose of wild ones, "hard feeders," chronic off-feeders, and the like. Re-sort at 90 days.
10. In order to reach the maximum daily concentrate consumption, the daily roughage should be decreased.
11. $1\frac{1}{2}$ to 2 per cent of the body weight is a full feed of grain. (Examples: 6 to 8 pounds of grain per day for a 400 pound calf; or 15 pounds to 20 pounds per day for a 1000 pound steer).
12. Protein supplements are expensive compared with home grown feeds. A successful feeder will figure the protein balance and hold the supplement to a minimum.
13. Cattle that are gaining well look "prosperous and happy."
14. One pig will make a living behind two big steers on full feed, or four yearlings.
15. Yearly feeding is a business. "In-and-out" feeding is a speculation.

This page blank in the original.

This page blank in the original.

This page blank in the original.

