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BEEF PRODUCTION IN COLORADO

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By C. I. BRAY

Meat is the most popular if not the most necessary source of protein for balancing the human diet. One-third of the money paid out by the average American family for food goes for meat and fish. Meat forms the basis of practically all meals, either at home or in the restaurant. Meat supplies 30 per cent of the protein and 59 per cent of the fat in the average diet. Meats are more thoroughly digested than most foods, 96 per cent of the protein and 97 per cent of the fat being digestible.

While the cattle business has had to face serious reductions in value in the deflation process that followed war conditions, this reduction is not seriously out of proportion to that in other lines. Feed prices will not likely be any higher in proportion to cattle prices. While profits may not be as large as in 1917-1918, the money made will have a higher purchasing power. Man must have protein in his diet and will choose that form that most appeals to his taste. We now have less cattle in proportion to population than ever before, and to a large extent the supply of beef for the American people must be raised in America. There is little likelihood of over-supplying the demand, or reaching a point where cattlemen cannot get reasonable prices for their marketable stock.

THE PLACE OF BEEF CATTLE

Beef cattle are especially well adapted to Colorado conditions because of the grazing afforded by Forest reserves, public ranges or rough land on farms. Beef cattle are best suited to utilize the rougher and more unmarketable hays, straw and fodder produced on farms. They do not require the close, personal attention given to dairy cattle, and can be handled in larger numbers and at greater distances from headquarters. High-priced grain feeds are not needed except for fancy breeding stock or when finishing the steer for market. On medium-sized dry land farms, it is usually profitable to produce beef in connection with other farming operations, especially if there is some grazing land available. The big cattleman has no monopoly on the beef industry. The greater part of our beef is produced either by small range-men with herds of 150 head or less or by farmers who sell only 5 to 15 head of cattle annually.

BEEF CATTLE IN COLORADO

Colorado has been an important cattle state since the West was first opened. The mountain land in the State is especially adapted

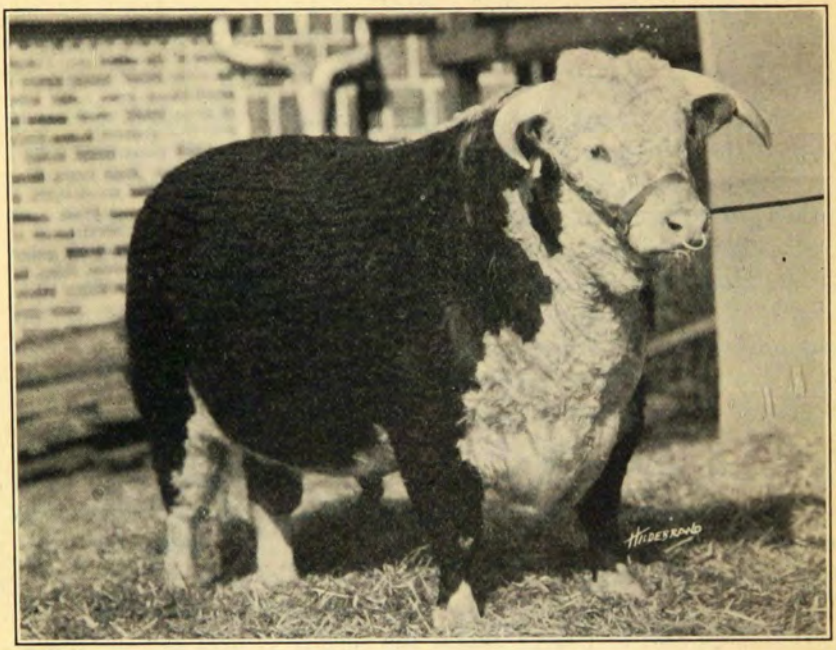

Fig. 1—Mischievous Jr., the Famous Hereford Bull Heading the Herd of Dr. T. F. DeWitt, of Denver.

to grazing. The forest reserves of Colorado carry 400,000 cattle annually in addition to 1,000,000 sheep. In addition, a large amount of public and private range is available for beef cattle. The mountain parks furnish large yields of hay used almost entirely for cattle feeding. Mountain hays are unexcelled for wintering stock and will fatten steers fairly well without grain.

Colorado is also well prepared to fatten steers. The irrigated districts produce 1,500,000 tons of alfalfa annually, much of which is used in fattening sheep and cattle. Colorado beet-sugar factories produce as by-products about 660,000 tons of beet pulp and 100,000 tons of beet molasses annually, all of which is used for feeding. Over a million tons of beet tops are left after the beets are harvested and make good stock feed. Eastern Colorado produces an abundance of corn, cane and kafir for grain, fodder, or silage with which large numbers of cattle can either be wintered or fattened on the farm. Corn needed for fattening can be shipped in readily from Kansas and Nebraska. It is better business to ship in corn to fatten steers than to send Colorado steers out of the State to be fattened. Steer-feeding makes a market for rough feeds and saves fertility. Feeds produced on the western side of the range

can be marketed through cattle, when it would not pay to ship these feeds across the range.

BREEDS OF BEEF CATTLE

Reference: Farmers' Bulletin No. 612—Breeds of Beef Cattle.

Most stockmen are sufficiently familiar with the various breeds. For those who are not, a brief description may be of value. There is no best breed, though some breeds may be better adapted to certain conditions than others. The Hereford is usually considered the best grazing animal for the range. It is next in size to the Shorthorn and is given credit for greater hardiness than other breeds, the Galloway excepted. It is the most popular range-breed in Colorado. Hereford sires stamp their color markings on their calves in a very uniform manner. Herefords put on flesh readily and are fairly quick maturing. The Polled Hereford is similar to the horned type except for the horns and while probably not equal in all respects to the horned cattle, is improving rapidly in form, fleshing and popularity. Polled bulls will produce 75 to 85 per cent polled calves.

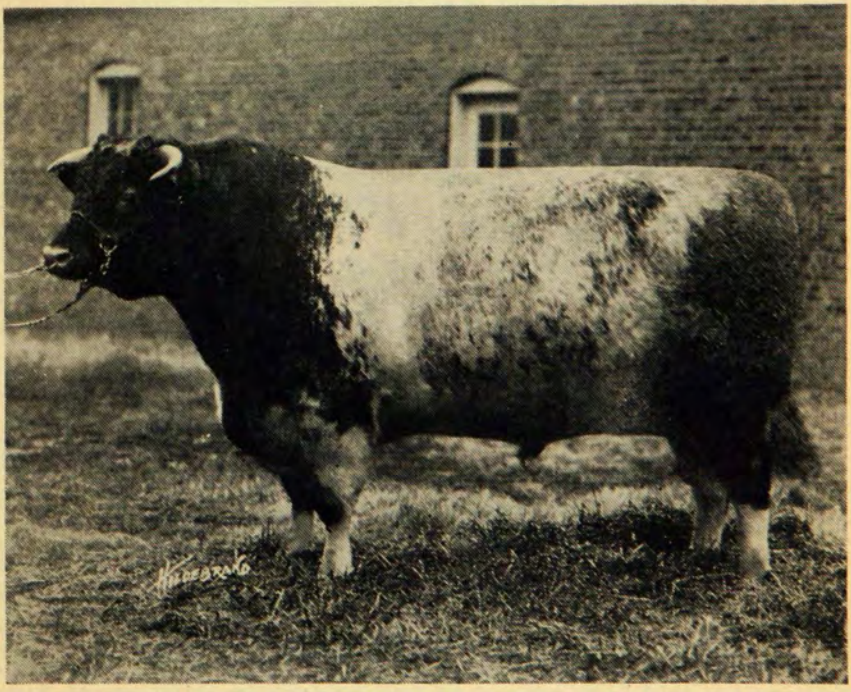

Fig. 2—Princely Stamp, Grand Champion Shorthorn Bull at the National Western Stock Show in Denver in 1921. (Courtesy Record Stockman.)

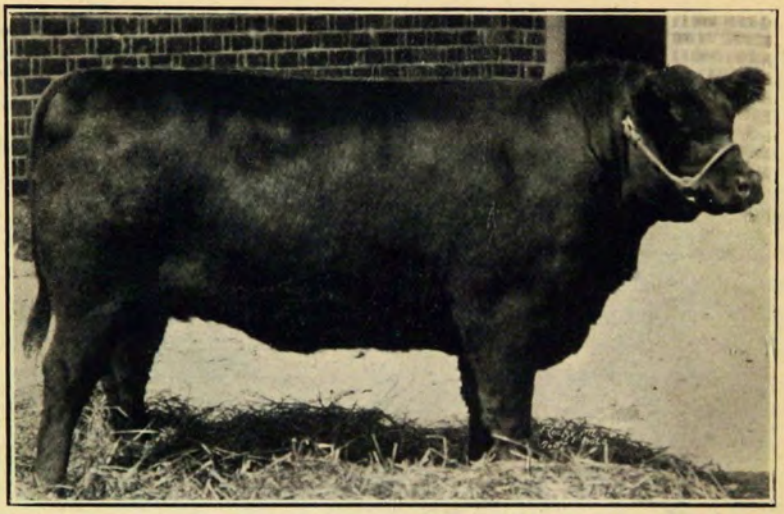

Fig. 3—Enrica Entella, Junior and Grand Champion Aberdeen-Angus Heifer at Colorado State Fair, 1921. Owned by Barr and Son of Sanford, Colorado. (Courtesy Record Stockman.)

The Shorthorn is the most widely distributed breed of beef cattle in the world, and ranks next in numbers to the Hereford in Colorado. The breed colors are red, white, red and white, and roan. The Shorthorn is larger than the other beef breeds and is often crossed on range stock of other breeds to produce larger steers. Shorthorn cows are, as a rule, good milkers which makes them more popular on the farm than on the range. In some parts of the State the Shorthorn is as popular as the Hereford and is considered equally hardy. The Shorthorn is sometimes faulted for legginess.

The Polled Durham is practically a hornless Shorthorn and bears about the same relation to that breed that the Polled Hereford does to the Hereford.

The Aberdeen-Angus, a black, hornless breed, is very popular in the cornbelt and in the South, but has not gained a strong foothold in the West. However, the steers that won the feeder championship at the 1917 International were Aberdeen-Angus from Colorado. The same carload came back the next year and won the fat-steer carload championship. Aberdeen-Angus cattle are noted for compactness, smoothness, and superior quality and have made a great record in fat classes at the shows. They are prepotent, quick maturing and easy to fatten. Objections made to the Aberdeen-Angus are that they are not so well adapted to stand severe weather because of their finer hair and that the bulls are not as active

as in other breeds. While there may be some basis for these criticisms, the breed comes from a cold climate and does well in climates more severe than that of Colorado.

The Galloway is also a black, hornless breed, smaller and slower maturing than the Aberdeen-Angus but very hardy and vigorous, being protected with an exceptionally thick coat of hair. There are a number of Galloway herds in Colorado.

DUAL-PURPOSE BREEDS

Reference: Farmers' Bulletin 892—Breeds of Dairy Cattle.

The principal dual-purpose breeds in Colorado are the Milking Shorthorn and the Red Polled. Both breeds produce considerable milk and butter, while also raising calves that fatten well for beef. Milking Shorthorns are not as thickly fleshed or as heavy set as the beef Shorthorns. They approach dairy type in wedge shape, and development of udder; otherwise they are much like the beef Shorthorn. The Red Polled is a smaller breed, red in color and hornless, and inclining more toward dairy type than the Milking Shorthorn. Some very creditable individual records and herd averages have been made both by the Shorthorns and the Red Polled. Steers of dual-purpose breeds make good beef and some individuals have stood high in competition with steers of the beef breeds at the larger fat-stock shows.

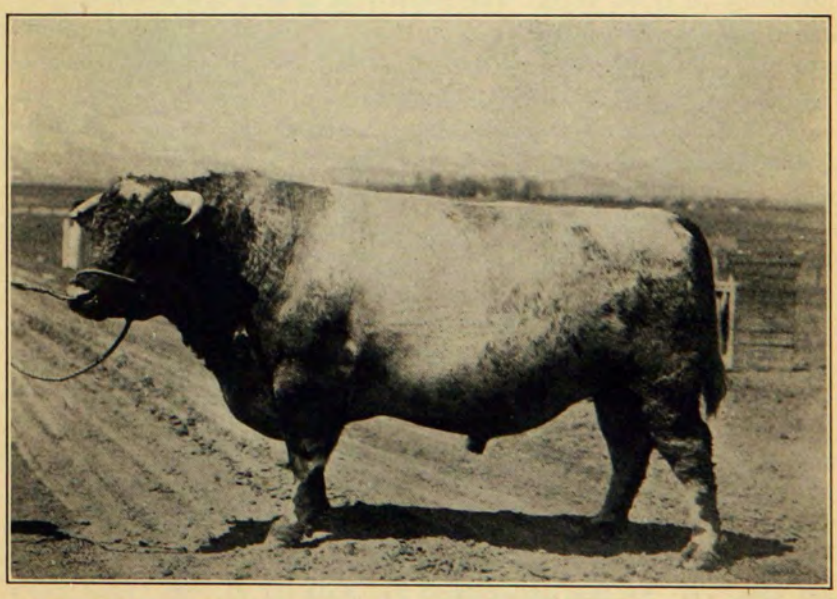

Fig. 4—Lord Douglas, Junior Shorthorn Herd Sire, Colorado Agricultural College.

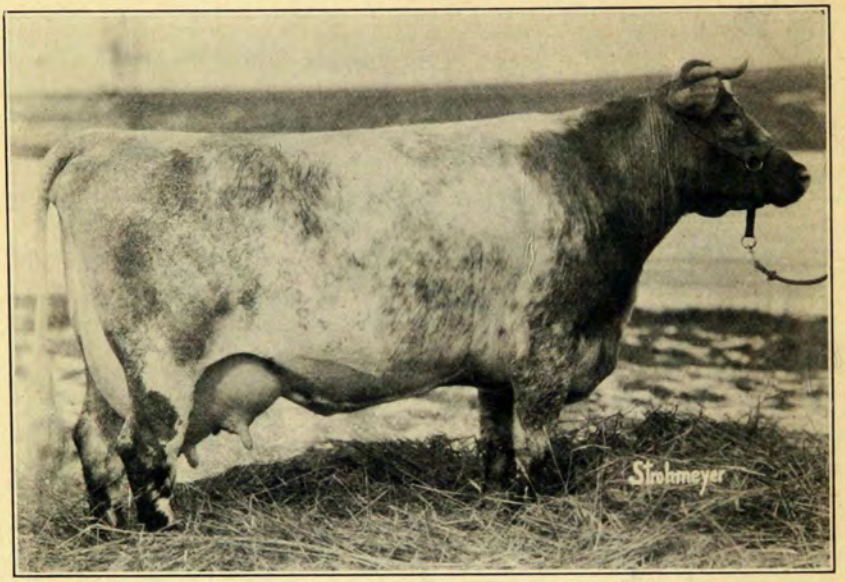

Fig. 5—A Typical Dual-Purpose Cow.

JUDGING AND SELECTION OF BEEF CATTLE

Reference: Farmers' Bulletin No. 1068—Judging Beef Cattle.

One element of success in any line of animal production is a knowledge of good type. The successful breeder must know good animals and how to weed out poor ones. This knowledge is needed in buying breeding stock, pricing stock for sale or buying and handling market stock for profit. In finishing stock for market, the feeder must know which animals are ready to ship and which must be held for further fattening. All branches of livestock management,—buying and selling, selecting and culling, feeding and breeding,—demand some knowledge of judging if the business is to be profitable.

A man need not be an expert judge of purebred beef cattle to be a successful beef-cattle producer or feeder. Only a relatively few men combine the natural ability, experience, and technical knowledge to be successful as professional judges. But any man of ordinary perception and ability can pick up a working knowledge of beef type for commercial beef-cattle production. Most men learn entirely from experience and observation, but it will be easier for the beginner if we give some of the main points of judging.

The Fat Steer: Since the fat steer is the final product of the beef producer, we can understand the judging of beef cattle more easily if we begin with the steer. We judge the steer on the basis

of the beef he will produce. That is the basis on which the stockyards buyer will value him. The accompanying diagram, Fig. 6, shows the cuts of meat outlined on a prize-winning beef steer with the relative value of each. The heavy line divides the body into two almost equal parts. One part includes all the high-priced cuts,—the prime ribs, the porterhouse, the sirloin and the round. The other contains the cheap cuts,—the chuck, neck, plate, flank and shanks. A good steer should be thick and meaty in the region of cuts 1, 2, 3, and 4 and relatively light in cuts 6, 7, 8, 9, and 10, and in the head and legs. Since meat must be of fine texture, the steer must have *quality* and this is shown by a loose, pliable skin, fine, soft hair, clean bone and general smoothness of covering. As beef from well-fattened steers keeps better, looks better, is more juicy and has better flavor than beef from thin animals, it brings more money on the retail market; consequently the steer must be well covered with smooth, firm fat.

The Stocker and Feeder: In selecting stockers and feeders, the aim is to get animals that will put on gains economically and rapidly, either on grass or in the feed lot. This is not all, how-

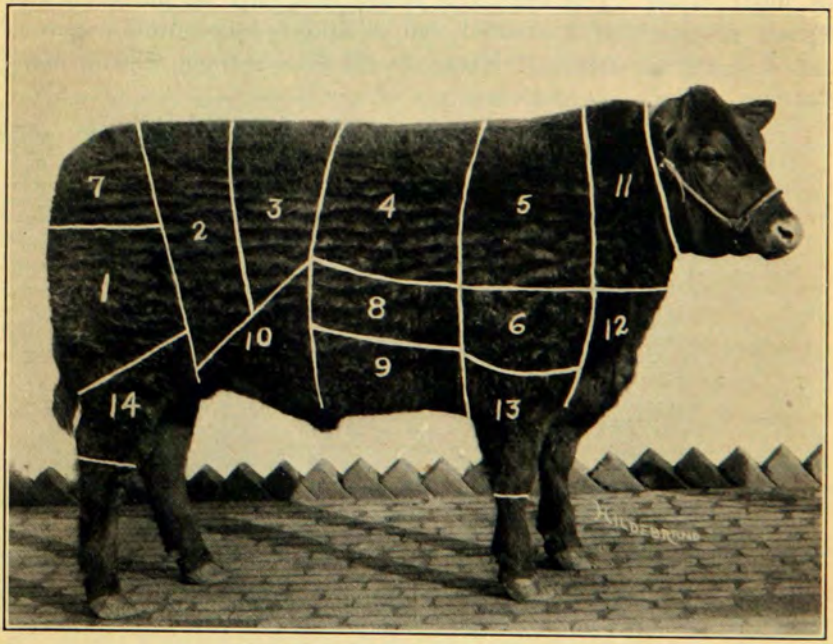

Fig. 6—An International Grand Champion Steer Showing Cuts of Beef and Their Relative Values. High Priced: 1-Round, 2-Sirloin, 3-Porterhouse, 4-Rib; Medium Priced: 5-Chuck, 6-Shoulder Clod, 7-Rump; Cheap Cuts: 8-Short Rib, 9-Plate, 10-Flank, 11-Neck, 12-Brisket, 13-14-Shanks.

ever, as they must be of such type that they will bring the best price when finished. To do this the feeder-steer must have something of the same form and quality desired in the fat steer. The feeder steer is not so fat, but must show good evidence of fattening ability.

The feeder that will fatten rapidly and economically will have a large girth and deep flanks, short neck, short, broad head, should show a high proportion of beef blood and give evidence of easy keeping by a smooth, shiny coat and a good covering of natural flesh.

Breeding Cattle: Since breeding cattle are kept either to produce feeder steers and fat steers, or to produce other breeding stock for that purpose, they must have the same good qualities needed in feeder and fat stock. Like produces like. Good wheat must be sown to get good wheat. Bulls that would not make good steers themselves cannot sire market toppers. Herd sires should have all the width and thickness of loin, back and hind quarters, and all the quality of skin and hair of the fat steer, and all the constitution, capacity, beef temperament, and fattening ability of the ideal feeder. The herd sire should not only be purebred and a good specimen of his breed, but should be masculine, vigorous and of strong constitution. Cows should show refinement and femininity as well as size and vigor.

CONDENSED SCORECARD FOR BEEF BREEDING STOCK.

		Points.
Form.	Rectangular, broad, deep, low set, straight back and underline, ribs well sprung, loin broad and thick, thighs thick, broad and deep, flanks deep, legs short and straight, neck short, head short and broad.	40
Quality.	Hair soft and smooth, skin elastic and medium thickness, flesh covering smooth, bone fine and clean but with reasonable strength.	15
Covering.	Showing evidence of thick, smooth, firm flesh, especially on ribs, loin and hind quarters; not necessarily as fat as fat stock but showing ability to fatten.	15
Constitution and Vigor.	Strong heartgirth, straight, strong back, prominent, bright eyes, wide muzzle and nostrils, quiet but active disposition, active carriage, good growth for age.	15
Breeding. Characteristics.	True to breed type. Bulls strongly masculine with bold appearance, strong head and crest. Cows feminine and matronly, long-bodied, roomy, refined in head and neck, mild disposition. Grade cows showing a high per cent of beef blood.	15

TYPES OF BEEF PRODUCTION

The beef business may be divided into separate parts, carried on together or separately or in combination with other types of farming. One man may maintain a breeding herd and raise calves,

selling them at weaning time; another may buy calves or yearlings and graze them for one or two years, then sell them as feeders. Another man will buy these steers and fatten them for market. Others may combine two or more of these operations, breeding, raising and fattening their own stock. The small farmer may most profitably carry a steer through from start to finish, saving transportations, commissions and profits.

The system chosen will depend on the locality, size of farm, proximity to grazing land, character of feed supply, and available feed. The raising of calves used to be a specialty on the southwestern ranges as far north as the Rio Grande and Arkansas Valleys of Colorado. Through this section the winters were mild and the grazing light. The steer ranges included northern Colorado, Wyoming, Montana, Idaho, etc., where grass was nutritious and fattening, but the climate too severe for calves. Steer feeding is usually practiced where a large feed supply is available. The largest feeding centers in Colorado are usually near the beet-sugar factories in order to utilize the pulp and molasses. The cornbelt is a cattle-feeding section because of the abundance and cheapness of corn. Where land is high priced, farmers often have small herds of high-grade beef cows, keep the calves growing from birth, and market them as baby beef at 15 to 18 months of age. This gets

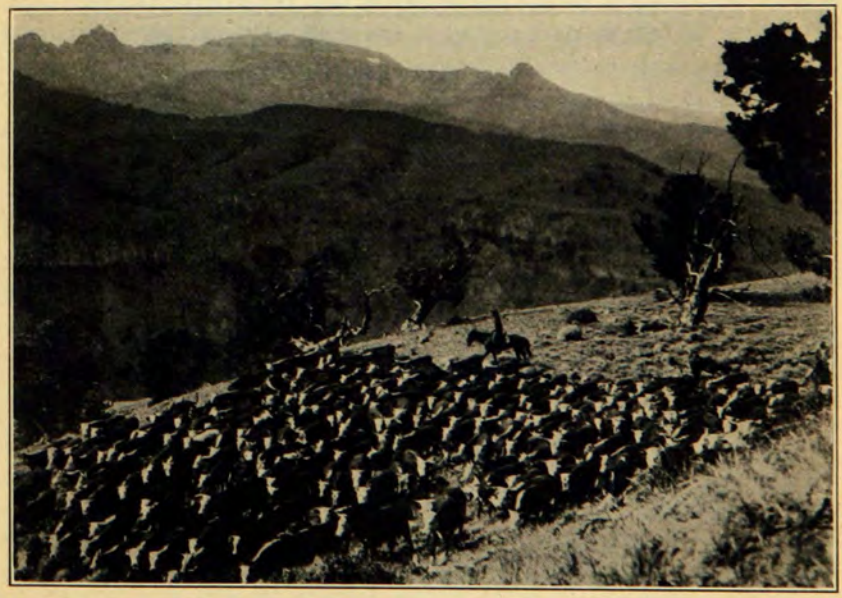

Fig. 7—Typical Scene in Spring When the Cattle Are Being Driven to the High-Altitude Ranges of the Rockies.

one year's calf crop out of the way of the next, and turns capital more quickly than when steers are kept until two and a half years old. The dry land farmer who handles dual-purpose cows, and markets milk and cream, can either do the same or sell his calves as stockers for someone else to finish.

The beef raiser must choose that form of production best suited to his experience, grazing land available, feed supply and markets. A beginner is usually safe in adopting the methods of older farmers in the community.

STARTING WITH BEEF CATTLE

How a man starts in the beef business will depend on his capital, credit, experience or location. If one already has a farm, he should decide first whether or not it is suited to beef raising. Next he should decide whether to depend entirely on cattle or make them a sideline to general farming.

A beginner should not invest much in either cattle or land until he has gained some experience. If he has experience but no capital, he must either get financial backing or start on a small scale and depend on the natural increase of stock to enlarge his herd. A man cannot make much of a living with less than 100 head of breeding cattle unless he has other sources of income. Some get a start by working with a cattleman a few years with the privilege of taking heifers in part payment for their services. A small herd can soon be built up in this way and experience gained at the same time. Those of greater experience can homestead land, lease other sections and take cattle to graze on shares. Some buy steers on credit, running them on grass during the summer and selling again in the fall. There is considerable chance of losing instead of making money by this method, but if successful it is possible to add a few cows and heifers gradually and work them into a breeding herd. The man with money, credit, and experience, can buy enough land and a sufficient number of cattle to make a business profitable from the start.

BUYING COMMERCIAL BREEDING STOCK

The principal aims in buying breeding stock are to get animals of good type and breeding, to get them as cheaply as possible and to get healthy and prepotent animals from a breeding standpoint. The general type required in breeding animals has been described on pages 5-7. Bulls should be pure-bred, thick fleshed and blocky, with plenty of constitution, vitality and strength. Two- or three-year-old bulls in medium condition, strong and active, and raised

under conditions similar to where they are to be used will give best results. There is no need to buy show bulls to go on the range. Valuable bulls should be put with picked herds of purebred females, not put on the range with grades.

An inferior bull should not be used because he is cheap. The bull does not sire steers alone, but also sires the heifers that make the future herd. Consequently the bull should always be an improvement over the cows. A good rule is to get bulls worth *at least* three to five average cows in the herd.

The sire should be selected to correct any general faults or deficiencies of the herd. If cows are lacking in size, select a bull that is a good all-round individual, but of especially good size. If the cows are coarse and lack quality or natural flesh, select bulls that are strong in fleshing and quality. The bulls should be of similar type and breeding so as to produce a uniform lot of calves.

The main thing in buying grade cows is to get fertile, healthy, young stock of good size and showing at least two or three crosses of pure beef blood. Better results can be obtained if the females are similar in type and breeding. Fertility is of great importance. As beef cows produce only their calves each year to pay for care, feed and depreciation, it is necessary that as many calves be raised as possible.

If a cow is barren from defective organs, the loss is bad enough, but if she has contagious abortion she is dangerous to all other cows in the herd. Contagious abortion is the worst disease to be feared in the beef herd. Tuberculosis is not nearly as serious on the range, but one should have stock tested before buying it. In buying purebred breeding stock it is a good plan to buy subject to a 60-day retest. With the various tuberculin tests, it is not hard to weed out tuberculous animals if one has a squeeze chute available to run the cattle through. Lumpy jaw causes considerable trouble sometimes, and as it is passed more or less indirectly to other stock in the herd, it should be avoided in buying.

Buy as good a grade of cattle as possible at reasonable prices. It takes a long time to build up a herd from low-grade cheap stock. By cheap stock is meant the cull stuff that has been refused by other buyers.

Success in buying and selling livestock is a matter of knowing values, and recognizing good bargains. Stock may be bought at private sale, at auction or through commission agencies. Often good bargains can be located and bought through advertisements in stock papers. Commission companies usually fill orders satis-

factorily. The advantage of direct buying is that freight and commissions may be saved. Where a man is not familiar with the various market classes and their values, he should have the advice of the commission company's buyer or some other disinterested agent. The National Western Stock Show is an important clearing ground, both for purebred range stock and the better class of grades. This stock is sold both at auction and through private sale.

Auction sales are excellent places to learn values. The beginner should not plunge too heavily in purebreds at auction prices unless on good advice. The experienced breeder can make good on high-priced stock where the beginner cannot. Often, however, stock sells at auction for less than at private sale.

MANAGEMENT OF THE BREEDING HERD

This part of the beef industry covers the subject of calf production up to the time of weaning. The breeding herd is kept solely for producing calves and is really a separate business in itself. Calves are often sold at weaning time to be raised and fattened elsewhere. The wintering and feeding of yearlings will be taken up later.

PRINCIPLES OF MANAGEMENT

Economy: Beef calves are produced on a close margin of profit. The only source of income from the beef cow is her calf. The value of the calf at weaning time must cover the cost of keeping the cow for a year, depreciation, sire service, interest on investment, rent, and losses, and leave a margin for the owner. This is true whether one is producing calves to sell at weaning time or to sell as two-year-old feeders. If one cannot produce calves as cheaply as he can buy them at weaning time, it will pay him to buy rather than breed. By cutting out the breeding herd altogether, this would put all available capital and available land into handling steers, a practice followed in many parts of Colorado. Usually it is better to raise calves where conditions are favorable for taking care of them when dropped.

Economy demands that grazing be made use of to the fullest extent; that where winter feeding has to be done the feeds shall be of a cheap nature, and that no more be fed than necessary to keep the stock in thrifty condition. On the other hand it is not economy to let stock get thin in winter for lack of feed. Cows will raise more calves and better calves, and there will be fewer losses if the cows are kept up in weight. While economy must be

kept in mind at all times, it must not be carried to the point of neglect in care and feed. Cheap shelters will produce results as well as expensive buildings, and should be put up wherever needed.

Increasing the Calf Crop: A high per cent of calves has a direct bearing on profits. If each cow raises a calf, the cost of producing the calf is the cost of keeping one cow for a year, including pro rata charge on herd bulls, depreciation, labor, interest and other incidentals. Suppose the calf is worth $30.00 at weaning time and the cost is $24.00 per cow, then the profit is $6.00 per calf if each cow has a calf. But if 100 cows raise only 80 calves, each calf carries one-fourth the cost of an extra cow, or a total of $30.00, leaving no margin. If the calf crop is only 60 per cent, each calf would cost $40.00 or $10.00 more than it will sell for. These cost figures are arbitrary and are only for illustration.

To increase the per cent of calves, first weed out all barren cows. Aborting cows are a serious menace and should be removed immediately. One diseased cow may infect twenty or thirty others in a year. One bull should be allowed for every 20 to 25 breeding cows on the range. He should be vigorous, acclimated, somewhat used to range conditions, and between two and five years old.

If cattle are ranged in rough country, groups of cows get away from the main herd and may be unbred. The Forest Service concludes from investigations on a number of ranges that judicious fencing will show a 10 per cent increase in number of calves. They also estimate that careful range-riding will mean at least a 5 per cent additional increase. Proper care, feeding and shelter of cows and calves at the time the calves are dropped will result in a larger number of strong calves dropped and therefore a larger number saved. On the Jornada Range Reserve in New Mexico, an 81 per cent calf crop was obtained by proper care and feed compared to a state average of 66 per cent. Good cattlemen in Colorado often report 85 per cent calves or more.

Avoiding Losses: The greatest losses on the range are due to lack of feed. On going through the range country in the interest of increased cattle production, the question has often been asked the better class of cattle raisers: "Where is the biggest chance for improvement in raising range cattle?" Invariably the answer has been: "Grow more feed for wintering the cattle." The results of starvation are often too evident in the carcasses along the roads and the piles of hides under ranch sheds. The spring losses of 1920 were estimated at 45 head per 1,000 from storms and exposure and 20 per 1,000 from diseases. There was enough hay in the State

but not where most needed. (There were probably heavier losses in the spring of 1917.) Artificial wind-breaks and sheds should be devised if natural shelter is not available. By saving winter grazing-land for spring use and keeping supplies of cake on hand for emergencies, stock may be saved that would otherwise be lost in spring storms. On the Jornada Reserve, New Mexico, 700 head of calves fed alfalfa and cake, sold for enough more than unfed calves to pay for their feed and there were practically no losses. The average loss in herds in that state was around 10.6 per cent for calves and 5.6 per cent on yearlings.

Blackleg kills annually $6,000,000 worth of cattle in the United States, one-third of the losses in some states being caused by this disease. Blackleg is almost absolutely preventable. While vaccination may not be necessary, in some cases, it is always safer to vaccinate. The modern germ-free filtrates are safe, sure, and permanent in their results and can be given to calves of any age. The saving of one calf will pay for vaccinating 100 head.

Poisonous plants kill 6,000 head of cattle annually on the U. S. Forest Reserves alone and probably three times that number elsewhere. On some ranges the loss is 3 to 5 per cent. In the Western States 90 per cent of this is due to Larkspur poisoning. Much of this loss can be avoided by fencing the worst patches, herding cattle away from them or grubbing out scattered larkspur where it is thick enough to be langerous. Larkspur-infested range can be safely grazed by sheep during the dangerous part of the season. After the plants mature there is little danger to cattle. After spending $11,000 in grubbing out larkspur on sixteen forests, the U. S. Forest Service estimated that in one year on nine forests alone, $16,000 worth of cattle were saved from poisoning. It has been estimated that it will pay to grub larkspur if the cost of grubbing is not more than the total average loss for eight years. For further information see Farmers' Bulletin No. 988.

Other losses may be avoided by reasonable supervision. Straying, bogging down, bloating and losses from predatory animals will take toll from the herd in reverse proportion to the care taken of the stock. Cattle, when on the range, should be looked over at least once a week but every two or three days is better.

Improving the Product: One way to increase the profit per calf is to increase the selling value. Stocker calves were quoted (November, 1920,) at $7.00 to $9.00 per cwt. On a 400-pound calf this means a difference of $8.00 per head between the best and poorest grades, and on an 800-pound feeder, means $16.00 per head.

This increased value is largely the result of better breeding and selection.

Two hundred dollars additional spent on a bull may mean $4.00 increase in the cost of each calf during two years but may add $5.00 to $10.00 to the selling price. The benefit of better breeding is not confined to the steer calves. The heifers from the better bull will be the future breeding cows in the herd and when bred to other good bulls will produce a still better lot of calves. Continual care in selection of sires and in weeding out the cow herd will make considerable difference in the value of calves.

Another way to increase selling value is to improve the size or condition by better management and feeding. Economy must rule in this, as it is easy to feed away all the profits in trying to feed for size. Careful attention means added gains, seeing that the cattle are getting water, that they have enough salt, that they find the best grazing, and that they do not lose in winter all that they have gained in summer. If 100 pounds extra weight can be put on without too much outlay, it means $4.00 to $8.00 increased value per head when marketed. With an additional value from better breeding, this makes possible a total increase of $10.00 to $15.00 per head.

Naturally this increase in value cannot be brought about without some additional cost. The problem of the operator is to balance costs and profits so that any improvement made will be paid for by increased value.

SUMMER MANAGEMENT

The cattleman's problems in summer include getting the herd out on grass at the right time, seeing that water and salt are provided for, avoiding poisonous weeds, keeping up fences and seeing that all sick or injured animals and strays are looked after. Where calves are dropped after the cows are on grass, they need some care when small, and later must be branded, vaccinated and the males castrated. The breeding season begins in June if March calves are wanted, or may begin as much earlier or later as desired. In the fall, the calves are weaned when the cows come off the range. On the range the main work consists in keeping the cattle within a certain allotted territory, either by line riding, drift fencing or permanent fence.

BREEDING

The bulls should be in fairly good condition when the breeding season starts. For turning on the range, one bull will be re-

quired for each twenty to twenty-five cows and on farms for not more than thirty to thirty-five cows. In rough country one bull to fifteen or twenty cows may be better. Only well-matured bulls may be used to advantage. Steers should not run with the breeding herd in any considerable numbers. Small bunches of cows that stray from the main herd should be rounded up. The main object at this time is to get all cows bred in as short a time as possible so as to get a high per cent of calves all of uniform size.

Breeding should be done early if possible, to insure an early calf crop. A March calf that can be cared for properly will get a better start than a June calf, will make better use of grass the first summer and will not be set back in the fall when separated from the cow. Under farm conditions it pays to keep the bull separated from the cow herd. Under this system the cows are brought in to be bred and only require one service.

On the forest reserves and similar larger ranges, stockgrowers' associations are formed to look after herds that run together. Arrangements are made to apportion the cost of supervision, buy salt, hire the salting done, and insure that each herd is supplied with the right number of good bulls.

CASTRATING AND BRANDING

Bull calves should be castrated at from two to three months of age. The older the calf, the more serious is the operation and the more staggy the calf becomes. No especial attention is paid to disinfection under range conditions, but on the farm a disinfectant solution should be used to wash the scrotum before and after operation. All that is necessary in calves is to cut off the end of the scrotum, squeeze out the testicle and cut the cord. With older animals an ecraseur may prevent excessive bleeding, but is rarely used. Farmers' Bulletin 949 gives more directions on the subject than need be given here.

Branding and ear-marking are necessary on the open range as a proof of ownership. Brand designs and ear marks must be recorded with the Colorado State Board of Livestock Inspection, and published in the official journal of the association before admission to the Brand Book. Brands should be clear and large enough to be legible. If well put on, there is no need for such large brands spread over the side of the animal as are sometimes seen. Such brands reduce the value of the hide, though undoubtedly easy to see. A red-hot iron that will burn through the hair immediately and produce a clear reddish blister on the skin makes the best

brand. A hand forge is excellent for heating branding irons. Much of the branding now done is being done in squeeze chutes, also used for vaccinating and dehorning and thus doing away with roping and throwing the cattle as on the open range.

DEHORNING, VACCINATING AND WEANING CALVES

Steers usually fatten faster and sell better if dehorned. Full directions for dehorning can be found in U. S. Department of Agriculture Farmers' Bulletin 949. Calves can be dehorned any time after weaning, usually in the cool months when there are no flies. The work is easier when the calves are young, a neater job can be done, the shock is not so great and the calves are easier to handle. The aim should be to take a ring of skin off with the horn to prevent a stub growing out. A little pine tar over the wound helps to stop bleeding and keep away flies. Clippers do good work with all young cattle, and are quicker and more humane than the saw. If the clippers are kept sharp they will handle any ordinary horn without crushing it, though it is not as easy to cut close to the head as with the saw.

Vaccinating for blackleg is advisable in all parts of Colorado. The new germ-free filtrates are safe, can be used when calves are small and will give immunity until they are past danger of infection. Vaccinating should be done before the calf is six months old and can be done at time of branding. Directions for vaccinating come with the vaccine, the equipment needed being a hypodermic syringe and a disinfectant solution.

To vaccinate, have the animal secured. The two best places to inject the vaccine are the neck or front flank. In the squeeze chute the flank is probably easiest to reach. Sterilize the needle of the syringe, insert it through the stopper of the vaccine vial, with the plunger pushed full down. Raise the vial bottom up and draw back the plunger. If any air bubbles show, push in the plunger till they are forced out, and re-fill. Set the regulator screw on the piston at the proper mark, disinfect the skin at point of injection and inject dose.

WATER AND SALT

Cattle should not need to go far for water. Good cattlemen like to arrange so that cattle will not have to go more than one and a half or two miles to reach water from any one place though they can go four or five miles. Springs can be developed, reservoirs built or wells put in with windmills to pump water. Farmers' Bul-

letin 592—Stock-Watering Places on Western Grazing Grounds—discusses this subject in full, describing all methods of developing a water supply.

Salting is important. Cattle need about twelve pounds of salt per year or eight pounds during the summer. Rock salt may be used, but the best practice is to use ordinary stock salt or crystal salt dampened and packed down in heavy boxes, or troughs hollowed out of logs. With plenty of these troughs scattered in desirable places, the cattle make better use of all parts of the range. The carrying capacity of one range on the National Forests was increased from 1,574 head to 2,200 head by proper distribution of salt. Where a number of herds are grazing on one range the salting should be done co-operatively, one man doing the work and all owners paying in proportion to the number of stock they own. Full discussion of salting methods is given in U. S. Department of Agriculture Bulletin 790—Range Management on the National Forests.

CARE OF THE RANGE

Those familiar with western ranges since the early days know that the open range has greatly deteriorated through over-grazing. Mr. John Painter of Roggen, Colo., who has been in the State since the early eighties, has made a careful study of grazing conditions and gives some interesting observations. In 1886 his four-year-old steers sold off grass direct to the packers, weighing 1,333 pounds; in 1887 steers of the same age weighed 1,278 pounds; in 1888, 1228 pounds and in 1893 only 1,100 pounds, and sold as feeders. Mr. Painter is in the sand hill country and experimented with seeding over twenty kinds of grasses without any beneficial result. Then he tried leaving certain parts of the range to re-seed itself and has greatly improved the carrying capacity of his pastures. He reports 15 or 16 different grasses on his land, some well relished by stock and others that are left until everything else is eaten. If the range is overgrazed the palatable grasses are killed out first, and only the weeds and the coarser grasses get a change to re-seed. It is only necessary to keep off the stock until the grasses have a chance to make seed, then the cattle can be turned on and will help to distribute and cover the seed. This is known as deferred grazing, and can be applied to different areas each year.

Another practice of great benefit is to take stock off the grass in the fall before all the old grass is eaten off. The old grass helps to hold moisture and snow through the winter and protects the young grass in the spring. Grazing land that holds considerable

old grass through the winter may not look as green in early spring as range that has been eaten off to the grass roots, but on examination it will be found to have more new shoots coming up than the other. The old grass also helps to feed the cattle in the spring when the young grass alone would be too washy. Mr. Painter turns off hay onto grass around April 20 of each year without any shrinkage in weight. Another reason for taking care of the grass is that poisonous weeds come in as the grasses die out, and then when the grass is eaten down close the cattle eat poison weeds they would not otherwise touch. Mr. Painter tells of having been called in where a number of cattle were dead of larkspur poisoning on an adjoining ranch. The larkspur had grown up very thickly on this ranch which had in the past been considerably over-grazed. On walking to his own fence-line to see if his pasture was affected he found that the larkspur stopped at the fence, owing to the better growth of grass on his pastures. For further information the cattleman should get the U. S. Department of Agriculture Bulletin 34—Range Improvement by Deferred and Rotation Grazing.

THE SQUEEZE CHUTE FOR HANDLING RANGE CATTLE

While there is not space here to give complete directions for

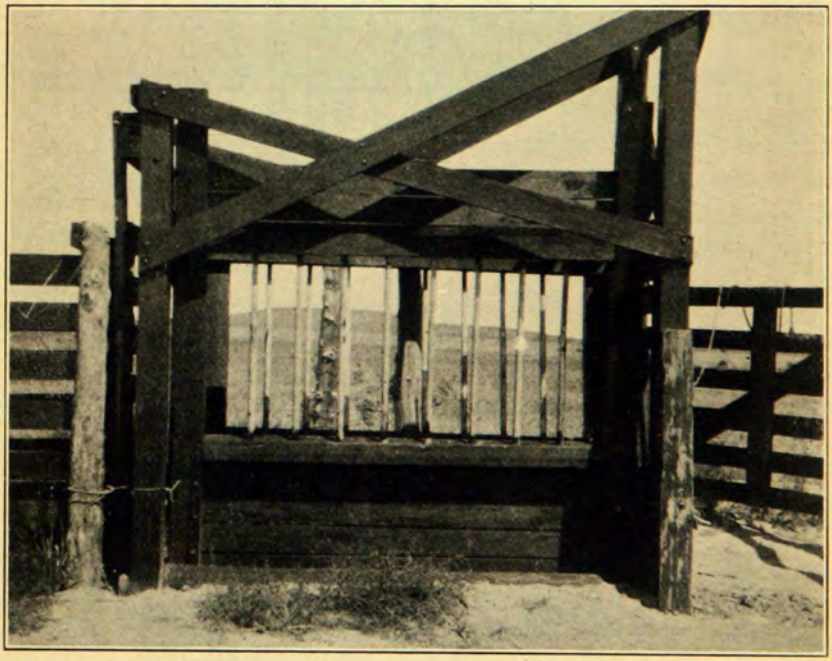

Fig. 8—Side View of Squeeze Chute in use at Colorado Agricultural College.

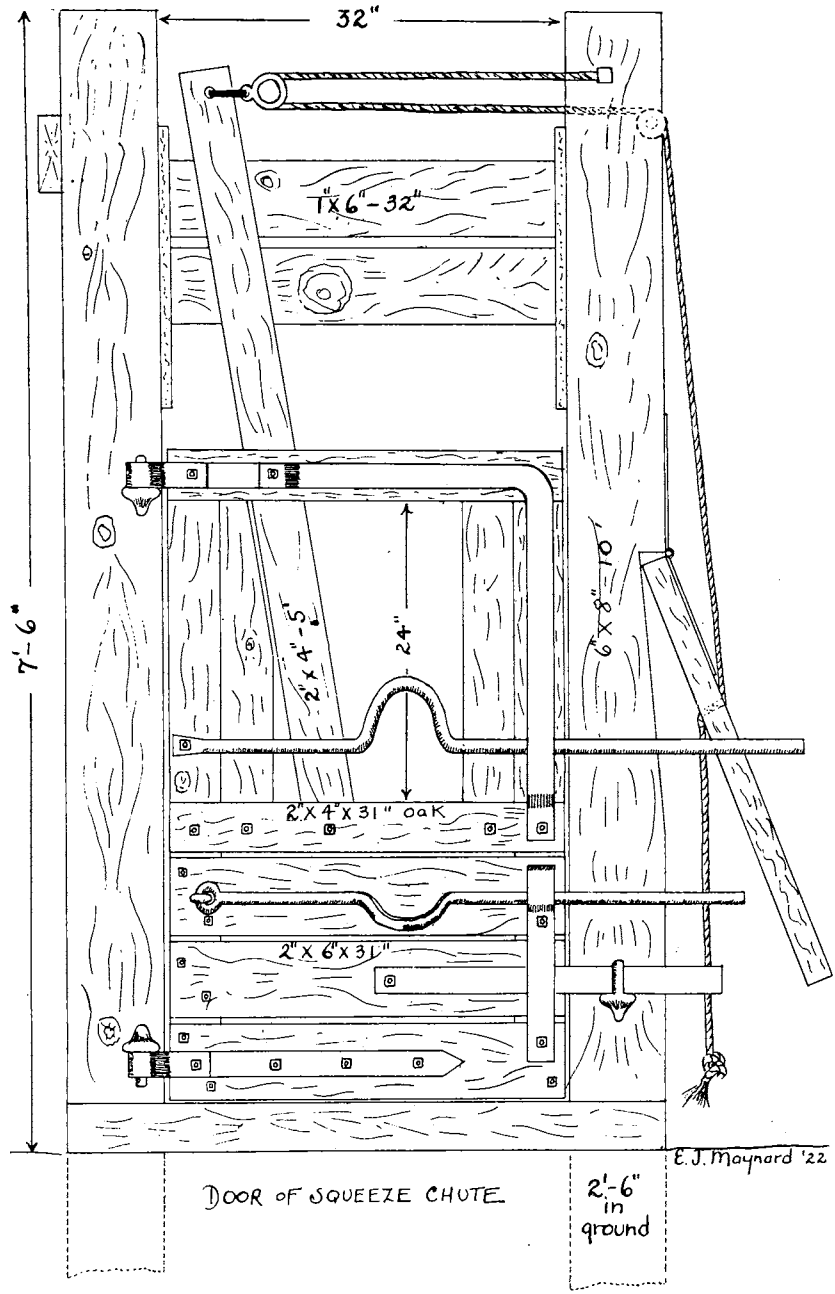

Fig. 9—Diagram of the Door for the Squeeze Chute.

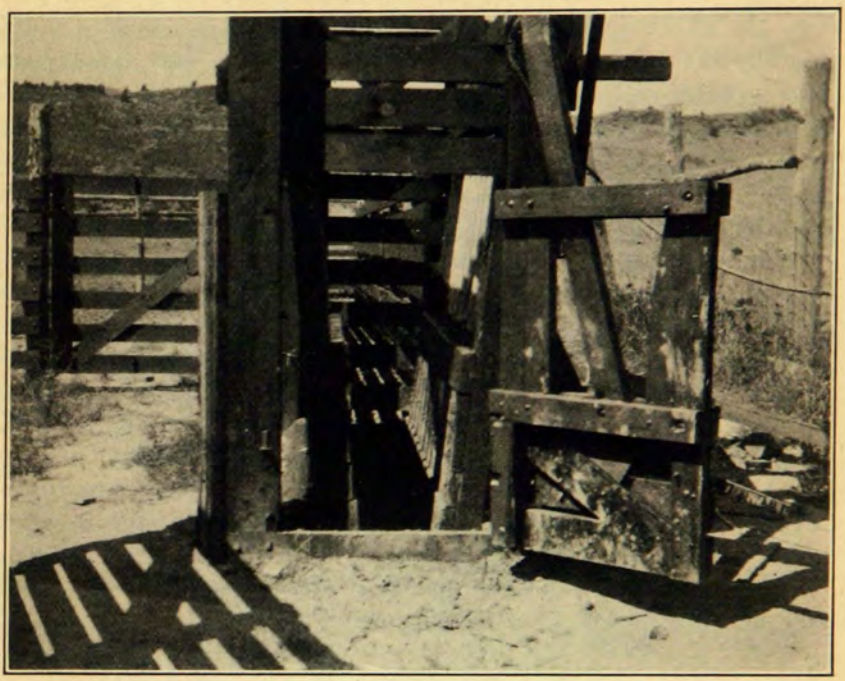

Fig. 10—End View of Door and Inside of Squeeze Chute used by Colorado Agricultural College.

building a squeeze, the following dimensions and diagrams will prove helpful:

The squeeze can be 7½ to 8 feet long and 6½ to 7 feet high. The sides can be solid for the first 30 inches up, then open for 32 inches and then boarded up with lighter material to the top. The open space is partially filled with iron pipe which may be run lengthwise or up and down. If up and down, the pipe may be one inch in diameter, placed 9 inches apart; if lengthwise, a 1½ inch pipe may be used. These pipes are removable for convenience in vaccinating or branding. The sides of the squeeze are placed 12 to 14 inches apart at the bottom, sloping out to about 3 feet apart at the top when open. A weight is hung on the movable side to release the squeeze and a lever on the other side pulls it shut. Work is usually done from the stationary side of the squeeze, so that the movable side can be boarded up solid without openings. The movable side is hinged to a cement base or to cedar posts sunk in the ground.

The measurements for the gate in Figs. 9 and 10 were obtained from one on the farm of John Scheafer of Weldona that had been in use for twenty years. The door is of 2x4 oak or, strictly speak-

ing, 1¾"x3½", and can be hinged from either side. It is 54 inches high by 32 inches wide and can be set between 6"x8"x10' square posts. The leverage on this stanchion is so powerful that no lever is needed to hold it shut, the man operating the lever on the squeeze being able to shut the neck stanchion by a rope. For dehorning, a loop of iron can be bolted on the gate into which the animal's nose can be placed, while a rope over the back of the neck draws the head down, by means of a lever at the side. This type of gate is not so handy for dehorning as the following one, but is quicker for vaccinating or branding.

Another type of gate and apparatus for holding the head for dehorning is shown in Fig. 11. The door is solid and can be made of two thicknesses of 1½-inch material, running in opposite directions. A U-shaped cut in the top of the door makes room for the neck. The head is held by two ⅞- or 1-inch iron bars, shaped as shown, one going around the nose and one over the neck. A gate can be so arranged with boards nailed across the end in a T-shape so as to block the upper part of the doorway as the steers are run in so it will keep them from jumping through.

Fig. 11—Another Type of Dehorning or Squeeze Chute Found on Chas. R. Evans Farm near Fort Collins.

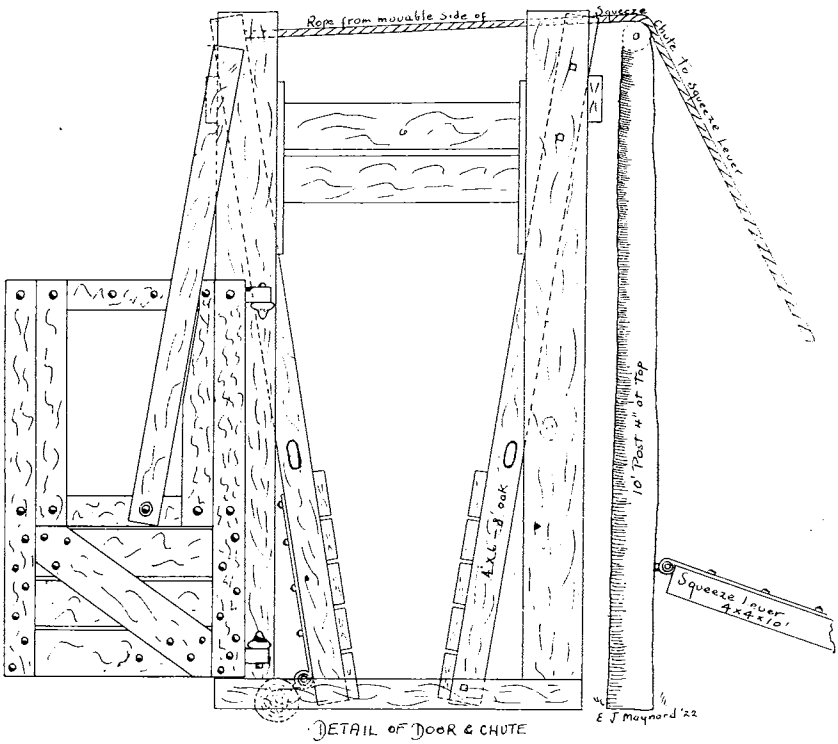

Fig. 12—Detailed Drawing of Squeeze Chute Used by Colorado Agricultural College.

WINTER MANAGEMENT

Range conditions vary considerably in different parts of the State so it is not possible to state definite rules for handling cattle in winter in all sections. The problems of winter management are largely those of feeding, and of protection from severe weather.

Shelter: Cattle in Colorado do not need expensive shelter. The main requirement is protection from wind. In rough, wooded country, the cattle may find their own shelter but in open country it is good economy to provide windbreaks or sheds. Feed is too expensive to use for fuel to keep up animal heat where cattle are exposed to high wind and extreme cold. Better protection is needed where calves are to be droppel in February or March than where they are to be dropped in May or June. The advantages of early calving should more than offset the extra expense of shelter. Shelter need not be expensive. Straw sheds or partial dugouts will keep off the wind and snow as well as higher priced buildings, while

tree plantations and natural windbreaks can be used as much as possible.

Winter Feeding: The first consideration is saving stock. Sufficient feed should be provided to avoid death losses, or any

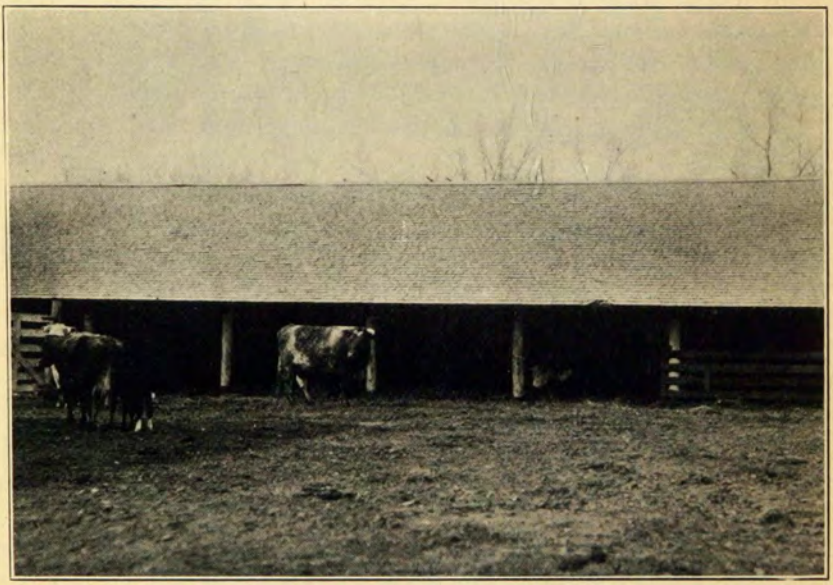

Fig. 13—Open Sheds in the East Corrals at Colorado Agricultural College. Sheds Are Needed in Winter.

Fig. 14—Young Breeding Bulls Should be Given Attention and Kept in Good Condition During the Winter.

great loss of weight. One should not count on more grazing than can be depended on in a bad winter. With good winter ranges cattle may not need much extra feed. Under present range conditions most cattle need to be fed during at least part of the winter months. A good cattle ranch usually has sufficient cultivated land to grow hay for the ranch horses and for wintering at least the calves, breeding cows, herd bulls and heifers that are to be saved for breeding purposes. The steer herd can run a little longer without extra feed except in case of storms.

Extra feed needed should be arranged for in the fall as it may cost more to buy late in the spring. The discovery of the giant sunflower as a silage crop has made it possible for ranchers either on dry land or in high altitudes to store up a good feed supply on limited acreage.

The second consideration is economy. As much use as possible should be made of winter grazing and the pasturing over of fields, meadows and stalk fields. The cheaper roughages, like straw, fodder and inferior hay, can best be used in wintering dry stock. Feeding should not be begun until really needed, as cattle will not hunt for food much after hay feeding starts.

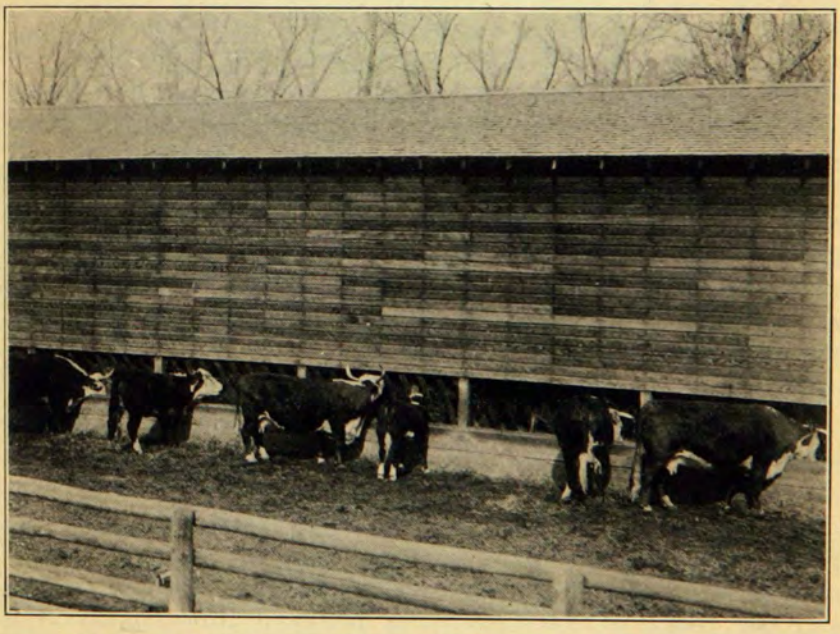

Fig. 15—A Very Convenient Hay Feeding Shed Used at Colorado Agricultural College.

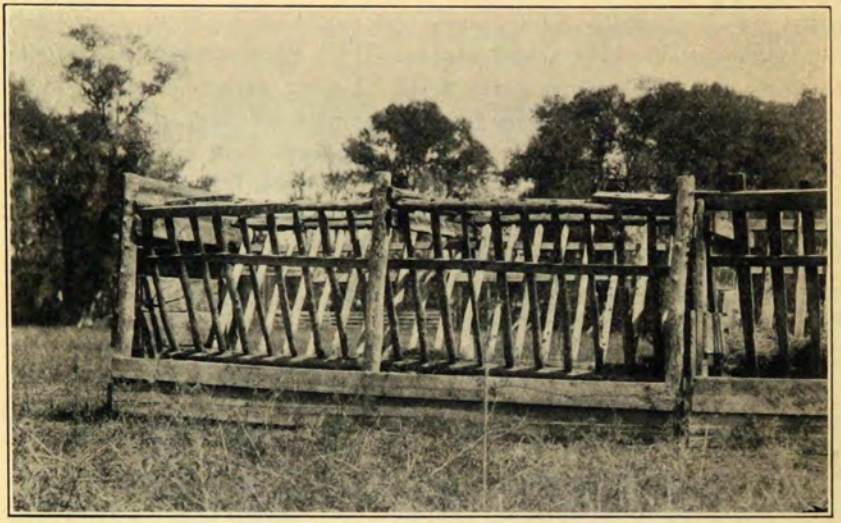

Fig. 16—This Type of Hay Feeder is Cheap Yet Satisfactory for Winter Feeding.

Rations for Wintering Cows: Rations for cows must be cheap, but must nourish the cow sufficiently to carry her through the winter with a slight increase in weight to make up for the growth of her calf. The cow must produce a vigorous calf, be able to raise it, and be in good shape to go on grass in the spring. One to one and one-quarter tons of hay is the average allowance per cow for the winter months, allowing 15 to 18 pounds per day for four and a half months. Hay can be fed directly from the stack, or hauled out on wagons or slips onto dry well-drained ground. A wet feeding ground will cause a heavy hay loss. For emergency feeding during stormy weather or temporary feed shortage, cottonseed cake or oil cake is always satisfactory. It can be fed on the ground or on hard snow and is transported quickly and easily.

For farm cows, silage is always advisable with such cheap roughages as straw and corn fodder. A ration of 15 pounds oat and pea silage and 10 pounds alfalfa hay proved sufficient to produce 25 pounds gain a week on 1,200 pound cows at the Wyoming Experiment Station, while 22 pounds of hay fed alone proved more than enough. At the Pennsylvania Station, 58 pounds of silage and one pound of cottonseed meal produced three-fourths of a pound gain daily on purebred cows weighing over 1,200 pounds.

These rations are both well balanced and need only be reduced in quantity to suit smaller range cows.

SOME SAMPLE RATIONS FOR WINTERING 1,000-POUND COWS.

1	2	3
Alfalfa hay.....5 lbs.	Cane silage.....20 lbs.	Corn or Sunflower
Oat straw.....8 lbs.	Prairie hay..... 8 lbs.	Silage .....40 lbs.
Corn fodder... ...8 lbs.	Cottonseed meal.. 1 lb.	Cottonseed meal.. 1 lb.

Care of Calves: When cows are to drop calves in March or April, they will need a little better feed during the winter months than where the calves are dropped on grass in June. Cows in poor condition do not have as strong calves when dropped and have not as much milk for them afterwards. It is necessary to have a good feed supply on hand, also protection from storms. A newly born calf is not in condition to endure a blizzard or a zero night unprotected. A good, well-bedded straw-shed will be satisfactory if no better is available. After the calf is on its feet and the cow has plenty of milk there is no need for losing the calf. A chilled calf must be brought into a warm place and rubbed dry as soon as possible.

Two common troubles of young calves are navel ill and scours. Navel ill is caused by germs getting through the navel opening before the cord has healed over. Iodine or any good disinfectant can be used to treat the navel before infection occurs. It is not necessary to do this unless calves are becoming infected. After an abcess has formed it must be opened and syringed out. Half a dram chloride of zinc in one pint water is recommended by the U. S. Department of Agriculture, but any antiseptic solution can be used. Calf scours is a more serious trouble and seems to spread worse when cows are in muddy corrals and getting filth on their teats. First, one or two calves start scouring, then it spreads rapidly to all the calves and is likely to be fatal to a large number. The best results have been obtained at the Colorado Agricultural College from copper sulphate or bluestone solution. A teaspoonful of copper sulphate in a pint of water makes a one per cent solution and three tablespoons of the solution make a dose for a calf. Repeat daily till cured, and increase to four tablespoonfuls if the case is bad. Calves fed from the bucket can be given the solution in their milk. A vaccine is on the market which has also given good results in checking the spread of scours.

Wintering Calves and Yearlings: Calves and heifers can be wintered on rations similar to those suggested for dry cows except that more attention should be paid to protein requirement. Young animals have to make their growth, while older animals

do not. Lack of protein for the growing animal stunts its growth and prevents proper development. It is not desirable to have the young stock fatten, unless they are to be finished as baby beef. Where young animals are to be run on the range the following summer, they will make better gains if they have not put on much fat during the winter. The best rule is to have yearling cattle come through the winter just a little heavier than they were in the fall. If they do not gain any in weight during the winter they are liable to grow in height at the expense of vital development. Calves should gain considerably, and so also should two-year-old heifers that are to drop calves in the spring.

Calves weighing around 400 pounds will gain half a pound a day on 12 to 15 pounds of mixed hay per day without grain, or will gain over a pound a day with two or three pounds of grain added.

The U. S. Department of Agriculture experimented with beef calves in North Carolina, feeding silage with and without cottonseed meal. The calves weighed 320 to 340 pounds at the beginning of the experiment. Those fed 15 pounds of silage per day with-

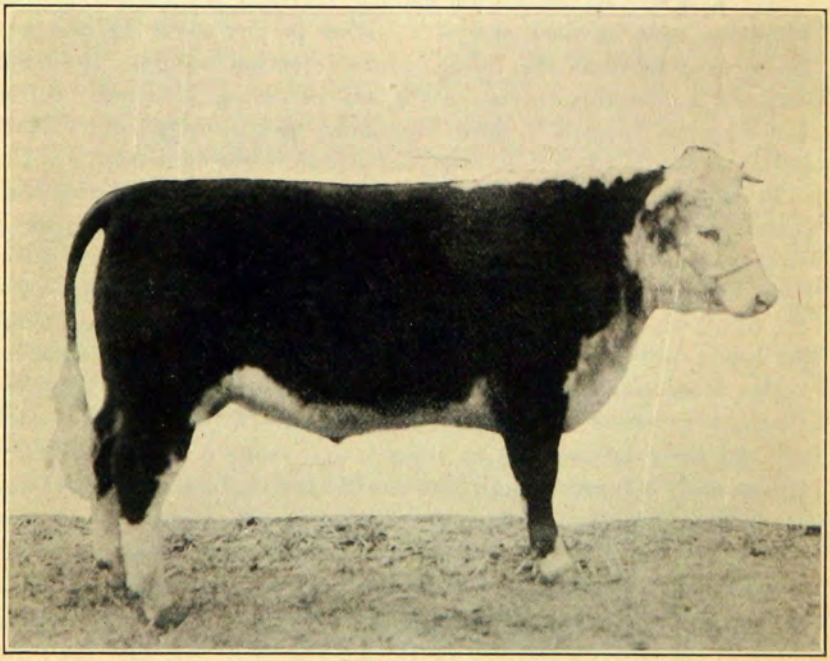

Fig. 17—Morris, Purebred Hereford Steer Calf. Won First Prize as a Yearling, Third as a Calf, and the Championship as a Two-year-old at the National Western Stock Show (in 1918).

out meal lost 16 pounds each, while those getting one pound of cottonseed meal in addition gained 19 pounds through the winter and were in much better shape to go on grass in the spring.

The following may be recommended for wintering 500-pound cattle, increasing the amounts for larger animals:

1	2	3
8 lbs. alfalfa hay.	25 lbs. kaffir silage.	15 lbs. cane silage.
5 lbs. straw.	1 lb. cottonseed cake.	6 lbs. straw.
2 lbs. corn.		2 lbs. cottonseed meal.

Balanced Rations: In the above rations the plan in each case has been to combine a protein feed with the non-protein feeds. Young animals need protein in order to grow and develop. Stocker steers can be wintered on roughages like cane hay, prairie hay, corn fodder, with fair results; but calves and young heifers need some protein feeds like alfalfa, clover, cottonseed cake. The mountain park hays are fairly well balanced and can be fed alone with good results, but even with this a little cake is an advantage where good growth is wanted.

A YEAR'S WORK ON A CATTLE RANCH

The following description of a year's work in handling cattle on the open range is by T. J. Snyder, a graduate of the Colorado Agricultural College, who was raised on a cattle ranch in western Colorado:

"The June round-up starts about June 1 to 10, the time and place being set beforehand so that all interested can be there. The number of men meeting may vary from a few to a hundred or more. Each man brings a string of four or five horses, all shod and in good condition. A mess wagon is obtained, a cook hired and a boss of the round-up elected. The whole region is worked in a systematic manner, the round-up staying a few days at each of different camps over the range. In this ride, calves are branded, strays gathered and castrated, and often the yearling steers are held to be turned over shortly after the ride closes. Cattle found away from home are brought back and one must be wide awake to get all of them. The round-up usually closes about July 1, because every cowboy enjoys the celebration of July 4, when many of them participate in roping tournaments, bucking contests, horse racing, etc.

"During the rest of the summer each individual outfit is busy taking care of its own interests. A few colts may be broken to ride, late calves branded and castrated and yearlings vaccinated for blackleg. This last is not always necessary but it is best to be safe. Any reservoirs to be constructed can be made during the summer months to catch the fall rains or the next winter's snow. The bulls are turned out with the herd about July 1 for April calves. They should be well fed during the spring and be in good condition when turned out.

"In the fall a 'ride' is started, called the 'beef-ride.' This is to pick out the cattle to go to market. The time depends on range conditions, condition of stock and the market. On this ride no wagon is used. Each man brings his chuck and bed on a pack animal. Turns are taken with the cooking and horse wrangling. The country is worked as in the round-up, only on a smaller scale and generally with fewer outfits represented. Stock to be cut out includes all the fat steers and fat cows intended for market. This is also the time to weed out undesirable animals such as old cows, stock that is off color, poor breeders and poor keepers. Considerable business judgment is required in picking out stock for sale and deciding whether to sell locally or ship to one of the central markets. It is a good plan to order all the cars necessary for shipping at least two weeks in advance of the beef ride. The fat cattle are held in pastures or are 'day-herded' and corraled at night. Before taking them to the railroad be sure the cars are ready and notify the brand inspector at least twenty-four hours before shipping. Have sufficient help to load the cattle. It is advisable to go to market with the cattle rather than depend upon railroad hands feeding and watering.

"Young stock may be dehorned at the time of branding. If grown stock is to be dehorned, the late fall, after fly time, seems best for range conditions. The horns are generally taken off with a saw and a coating of tar put on as a disinfectant and to stop blood. This should not be done in too cold weather. A chute is needed for dehorning.

"The fall and winter is generally the best time to buy bulls for the range the following year. It gives them a chance to become partly acclimated if they come from any distance. Also, it affords a chance to select the more desirable ones. Range bulls are generally bought in carload lots and there are always a few to be culled out. For best results bulls should be two years old or older when turned on the range. Do not turn yearling bulls on the range. They do not grow well and their service is of little value the first year. In bringing in stock one should be on guard against disease. Pink-eye and lump-jaw are two common range diseases.

"If the cattle are summered and wintered on separate ranges they should be moved before too deep snow falls. During the winter months one should ride every day if he has a good-sized herd and knows how they are doing. If they are ranging out, he must be prepared to feed quite a number of them. Bring those in that need it at an early date. Do not wait until an animal is almost dead before starting to feed. Time and feed will not be saved by waiting, and often the animal cannot pull thru. While feeding, do a good job. It does not pay to half feed. To turn stock out in the spring in a weak condition means that the feed given may be lost if the animal does not find the best of range conditions. Cows that are to calve early in the spring will require extra feed as a rule.

"We keep one man riding with the stuff on the range in winter and have one man to feed. One man can feed 500 head of cattle if he works well. Feed on a slip whenever it snows enough to run one. Run the hay out and scatter it on the range. A good feeding ground is important. We use a hillside with plenty of drainage and where the sun shines on it most of the time. It pays to build feed racks where you do not have dry feeding-grounds.

"We always figure on having enough feed for those that will need it. It takes about one ton of hay to winter a cow. It is a good idea to have a little oil cake or cottonseed cake on hand. You can put a sack or two on a mule and take it out to some of the cattle if they only need feed for a few days."

BABY-BEEF

Baby-beef production is a phase of the beef industry better suited to the relatively small farm on high-priced land, than to the western range. Baby beeves are well-bred calves that are carried in good flesh from birth and marketed at an early age, 15 to 18 months or even less, weighing 1,000 to 1,200 pounds.

The advantages of baby-beef raising are as follows: Young animals make approximately one-third larger gains on the same feed than do mature cattle. By marketing at 15 months there is practically only one crop of calves on the farm at one time, one year's crop of calves being marketed before the following crop of calves is weaned. On high-priced land this saves land and pasture and there is less money tied up in non-breeding stock than when steers are kept to two and three years of age. Good heifers can be marketed as baby beef at the same price as steers, while at later ages they do not sell for as much. There is generally a good market for baby-beef.

Baby-beef production is not to be recommended under all conditions. On the range it is not possible to give calves the extra feed needed to keep them in the high condition needed for baby-beef. Where grazing is cheap, as on the forest reserves and large ranches, the big item of expense is producing the calf, while the profits are made on raising the calf to two or three years of age. On the range a large carcass is produced cheaply on feeds which are either unmarketable or not easily sold. The range steer thus produced can then be finished for market some place where feeds like corn, barley, beet pulp or other fattening feeds are more readily available. Baby-beef cannot be produced successfully with low-grade stock and neither is it a good method for anyone not thoroughly familiar with the feeding and handling of cattle.

The essentials of baby-beef production may be stated as follows: The sire should be a purebred beef bull of quick-maturing, thick-fleshed type and compact rather than rangy. Only high-grade beef cows should be used, or well-bred cows of dual-purpose type. The cows should be good milkers, not of the refined dairy type, but able to feed the calves well and keep them fat till weaning time. Baby-beeves must not lose their calf fat at any time.

For this reason they are started on grain feed before weaning. Calves dropped in September or October have an advantage over spring calves for making baby-beef as they are ready to make good use of pasture the next spring; can be given a light grain feed on pasture through the summer; and are ready to go into the feed lot by fall to be marketed by Christmas. The feed for baby-beef steers must be of good quality. Any good, clean hay will do but clover or alfalfa is preferred together with corn silage or roots. Two good finishing rations might be given as follows:

I.	II.
Alfalfa hay, 3 lbs.	Prairie hay, 4 lbs.
Corn silage, 6 lbs.	Cane or kaffir silage, 6 lbs.
Oat straw, 2 lbs.	Barley chop, 3 lbs.
Corn chop, 3 lbs.	Oat chop, 3 lbs.
Oat chop, 3 lbs.	Gluten feed, 3 lbs.
Beet molasses, 2 lbs.	Cotton seed meal, 1 lb.
Linseed meal, 1 lb.	

The following amounts of grain per month for finishing baby-beeves may be suggested:

Months of age.	Finishing at 15 months.	Finishing at 18 months.
4 months	1 pound per day.	1 pound per day.
6 months	2 pounds per day.	2 pounds per day.
8 months	4 pounds per day.	3 pounds per day.
10 months	6 pounds per day.	5 pounds per day.
12 months	9 pounds per day.	6 pounds per day.
15 months	12 pounds per day.	9 pounds per day.
16 months		11 pounds per day.
18 months		14 pounds per day.

These amounts may seem high, but they are slightly less than those recommended by Farmers' Bulletin 811, on Baby Beef, to which the reader is referred for further information.

DUAL-PURPOSE CATTLE

It is not necessary to discuss here the merits of the dual-purpose cow compared to the dairy cow. The man who has the necessary experience or location for running a specialized dairy farm wants a special-purpose dairy cow. He expects to more than make up on the production of his cows what he loses on the beef value of his steer calves. Many farmers, however, believe that they have a place for dual-purpose cows on their farms. They do not want to run a regular dairy but their farms are not large enough to run paying herds of beef cattle alone. On such farms, cows may be kept that will produce a fair amount of milk and butter for household use and cash sales, and still raise calves that can be run on the range and make good beef. There are three methods of handling such herds. The cows may be milked entirely by hand, and the calves fed separated milk; the cows may be partially milked and the calves allowed to take the remainder; or each two calves may be put on one cow and the other cow milked.

Fig. 18—Second Prize Shorthorn Herd at the National Western Stock Show in Denver, 1921. Bred and Owned by Colorado Agricultural College.

The object in keeping dual-purpose cows is to make the cow do more than raise a calf to pay for her keep. Where the cow makes no other return than to raise a calf, a cost of $20.00 or $25.00 must be paid by the calf, in addition to its own feed and care before profit can be made. On high-priced land it is hard to do this unless there is some other source of income. The dual purpose cow should give enough milk and butter to pay for her own feed and care, leaving the calf free from overhead expense. Evidently this method means more labor and not quite such good calves, as where calves are allowed the entire milk of the cow.

Dual-purpose cows have shown up well in some of the cow testing associations in the State. In the Douglas County Testing Association in 1918, the leading herd in butterfat production was of milking Shorthorns; the third highest herd in milk production was of milking Shorthorns; and the four highest herds in economical production were milking Shorthorns. Five Shorthorn cows in the Association made over 365 pounds of butterfat in the year. Such records are a little above the average for dual-purpose grade cows. The prospective purchaser should be on guard against the scrubby type of grade that may be offered as "dual-purpose."

DISEASES OF BEEF CATTLE

Beef cattle are not subject to many disorders or infectious diseases. A few troubles prove dangerous but may usually be guarded

against by vaccination or quarantine, but most troubles yield readily to curative or preventive treatment. The following may be briefly mentioned:

Blackleg is an infectious and highly fatal disease, attacking cattle under two years of age. The principal symptoms are swellings on the muscular parts of the body, usually on the thighs or shoulders, high temperature, dullness, and loss of appetite. Blackleg swellings are distinguished by a crackling sound under the skin, due to gas formation in the subcutaneous tissue. Prevention by vaccination is necessary. Usually the affected animal is dead before the disease is recognized. The saving of one animal will usually pay for vaccinating an entire herd. Vaccination is now done almost entirely with the aggressin, more popularly called the Kansas serum. It is safe, certain, and permanent in its protection. Calves should be vaccinated before 6 months of age. Burn all diseased carcasses or bury them and cover with quicklime.

Anthrax is a highly infectious disease, somewhat similar to blackleg and extremely fatal. It is transmissable to other animals and to man. Animals may die very suddenly, or may last as long as three to seven days. Symptoms are high fever, dullness, great weakness, and bloody discharges. Some swellings may appear but not of the blackleg type. The blood of animals dead of anthrax is black and tarry; the spleen enlarged and black; and the internal organs sprinkled with bloody spots. Where anthrax is suspected, call a veterinarian and have an expert diagnosis. No attempt should be made either to skin the animal or to make a post mortem examination when anthrax is suspected. The disease is endemic in Colorado only in the Arkansas Valley. Anthrax cases must be reported to the Board of Livestock Inspection for the safety of other herds. A vaccine is now available for the protection of cattle against the disease. Burn or bury deeply on the spot all carcasses of animals dead from anthrax. Refer to Farmers' Bulletin 784—Anthrax or Charbon.

Hemorrhagic Septicaemia is a highly infectious and fatal disease, somewhat similar to blackleg and anthrax. It has various symptoms, the most characteristic being high temperature in the living animal or the presence of hemorrhagic or bloody spots on the internal organs and diaphragm, of the animal that has died. In some forms the skin around the throat and neck may develop soft, doughy swellings. In others, the tongue, throat, and lungs may appear affected. Neither the crackling swellings of blackleg

nor the black, tarry blood of anthrax are in evidence. Diagnosis should be made by a veterinarian, and preventive measures used for the balance of the herd. Refer to Farmers' Bulletin 1018—Hemorrhagic Septicaemia.

Tuberculosis does not commonly affect range cattle in Colorado, it may appear occasionally in purebred stock that has been shipped in. There is no need to let this disease spread. The intradermal test is comparatively easy to apply, and affected animals can be weeded out before they can affect others. Have breeding stock tested, if there is reason to suspect tuberculosis.

Lumpy Jaw or Actinomycosis is caused by a fungus growth which usually attacks the lower jaw, tongue or throat, but may break out in the form of tumors or abscesses under the skin on various parts of the body. This trouble is well known to stockmen. Affected animals should be separated from the herd, especially when the swellings break. The tumors may be taken out by a veterinarian before they become attached to the jaw. One treatment is the use of potassium iodide given in doses of one and one-half to two and one-half drams once daily, dissolved in water and given as a drench. Continue ten days; stop for a week; and continue another ten days. Repeat if necessary. Potassium iodide should not be given to dairy cows giving milk or to cows in an advanced stage of pregnancy.

Contagious Abortion: Avoid purchase of cows from infected herds. If cow aborts, isolate her from the herd, burn or bury afterbirth and all discharges and soiled litter. Keep her isolated for three months. Do not breed until the time the cow would have been bred had she carried calf full time. Refer to Farmers' Bulletin 790—Contagious Abortion of Cattle.

Mange: For small areas, wash with soap and water and apply ointment of 10 parts lard, 2 parts sulphur, 1 part oil of tar, 1 part sodium carbonate. Apply at intervals of 10 to 12 days. Isolate the animal and disinfect stall or shed. For more serious outbreaks use lime-sulphur dip, either as wash or dip. For directions, write for Farmers' Bulletin 1017—Cattle Scab—U. S. Department of Agriculture.

Ringworm: Paint with tincture of iodine.

Bloating is caused by an unusual formation of gas in the stomach which may kill the animal by pressing on the heart and lungs. Cattle and sheep are more liable to bloat than other stock, owing to their larger stomach capacity. The fiber of roughages is digested by bacterial fermentations in the stomach, which liber-

ate gas. Usually the gas is absorbed or removed as fast as made. When such feeds as green, frozen, or wet alfalfa, rape, clover, etc., are eaten in large quantities, the gas is formed faster than it can be absorbed and the animal bloats. One treatment for bloating is to put a bit or gag in the mouth, causing the animal to champ its jaws and belch up the gas. A drench that will neutralize the gas will bring quicker relief if the trouble is noticed before the animal is past swallowing. Any of the following treatments for bloat are recomemnded by the U. S. Department of Agriculture:

1. Two tablespoonfuls baking soda in water.
2. One tablespoonful formalin in water.
3. Four tablespoonfuls turpentine in milk or oil (lard oil or linseed oil).

Where an animal is down and in need of instant relief, tap the paunch on the left side by puncturing with a trocar or knife in the center of the triangle formed by the point of the hip and the last rib. Point trocar forward and down. Feed lightly for a few days.

Impaction and Indigestion: Occasionally an animal will eat more grain than it can digest and engorgement of the first stomach results. The paunch may also become filled with roughage, dried grass, leaves, or even green forage in such quantities that the mass cannot be digested or moved on.

The best treatment is to give strong purgative doses twice daily, together with enemas of warm water. Any one of the following is a good dose for a 1,000-pound animal:

Epsom salts—1 pound to 1½ pounds in one quart of water.
Linseed oil or lard oil—1 quart.
Castor oil—1 pint.

Pneumonia or Inflammation of the Lungs often starts as a cold, beginning with a chill followed by high temperature. It is most common in cold weather. The animal stands with its head down and breathes with as little muscular movement as possible. On placing the ear close to the side of the chest, a rattling sound may be heard. Blanket the animal and place in a warm stall where there is plenty of fresh air. Call a veterinarian for treatment.

Brisket Disease is a swelling of the brisket and surrounding tissues, caused by the action of high altitudes on the heart tissues. Remove the animal to lower altitude. Do not ship stock from a low altitude to an extremely high elevation, but use acclimated stock.

Poisonous Plants: Write for Colorado Experiment Station Bulletin No. 200, "Plants Poisonous to Livestock," and also, write the Department of Agriculture, Washington, D. C., for Farmers' Bulletin 720, "Prevention of Losses from Poisonous Plants." Keep stock sufficiently well fed so it will not eat heavily of poisonous plants. Avoid, fence in, or grub out dense patches of larkspur. Dig out and burn roots of water hemlock where possible.

BREEDING PUREBRED CATTLE

The man who has made a success of handling grade beef cattle will frequently want to establish a purebred herd, at least to supply range bulls for his own herd as well as for others in his territory. Such a man should have good chances for profit. Colorado is almost in the center of the western range country and sooner or later the grade sire on the range will be discarded and the purebred will take its place, making a good market for purebred bulls. The tendency in any country , as population becomes more dense and land higher in price, is for the livestock to increase both in quality and in numbers. As this will be the probable condition in America in the future, we may expect a steady increase in demands for purebred cattle.

The method of establishing a purebred herd will vary with the capital and experience of the owner. The wealthy man can buy all the cattle he wants and can hire experienced herdsmen to select and care for them. The small cattleman cannot do this, yet many of the best herds have been established by men who had to begin at the bottom. The man of small means and limited experience should gain knowledge first by handling grade cattle, using purebred sires and learning the characteristics of good individuals of the breed. After experience has been acquired, purebred females can be added to the herd, a few at a time. Many beginners make the mistake of buying a lot of cheap cattle because they are pedigreed. A better way is to put the same money into a few well bred cows from the herd of some reputable breeder. Breeders of good standing will usually give beginners the benefit of their experience and assist them to get a start, believing that a satisfied customer is the best advertisement. In this way a good herd can be established at a low price, and without such danger of loss as when a man starts in with a lot of high-priced animals without experience in caring for them, or reputation to help sell them. Ex-

tremely high-priced animals should not be bought until the herd is fairly well established and a reputation has been gained. Excellent animals can be bought at reasonable prices that will be satisfactory until the breeder is able to sell his own stock at something above ordinary prices. By saving the best heifers and sending the culls to market, the herd can be brought to a high standard in a relatively short time.

It takes good feeding, careful management, and considerable patience to build up a herd. Good blood alone cannot do much if feed and care are neglected. When handling registered cattle, the calves must be properly recorded and marked so that the pedigrees may be correctly certified. It means considerable loss to sell a purebred as a grade because it has lost its identity or its breeding is not known.

Culling is highly important. A breeder should not be afraid to sell inferior animals for beef. Culls appear in the best herds. Weeding out is a necessary part of the breeding business. A scrub purebred is a bad advertisement for the seller, as well as an injury to the buyer. A satisfied customer is likely to be a permanent customer, while a buyer who feels he has been loaded up with unsatisfactory stock can spoil a good deal of business for the breeder. After a breeder gets to the point where he has a well-selected herd of purebred cattle, a well-merited reputation and a number of satisfied buyers to advertise his stock, he can be assured of a good income. He will have the additional satisfaction of knowing that he has a real part in the building of one of the State's greatest industries.

SOME IMPORTANT BULLETINS ON BEEF CATTLE

U. S. D. A. Bulletin 790—Range Management on the National Forests. Price, 35c.

U. S. D. A. Bulletin 588—Increased Cattle Production on Far Western Ranges. Price, 15c.

U. S. D A. Bulletin 615—Economical Winter Feeding of Beef Cows. Price, 5c.

Report 110—Livestock Production in Western Range States. Price, 25c.