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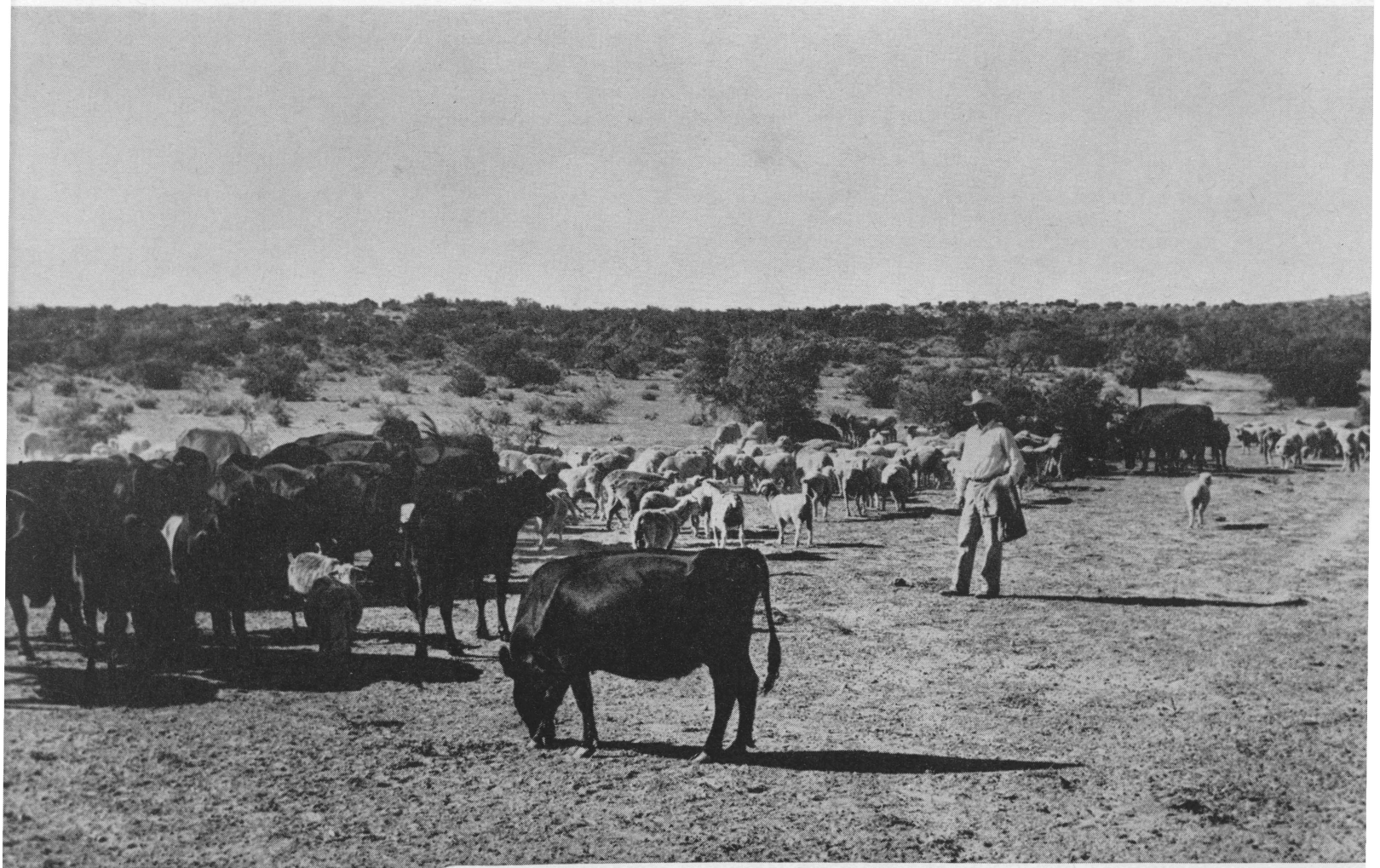
Emergency Feeding

of Livestock



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Acknowledgment is given to A. L. Smith and John H. Jones, former Extension animal husbandmen, for their contributions in the preparation of the original manuscript for this publication.

Emergency Feeding of Livestock

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MOST RANCHMEN KNOW they will have to reduce their livestock numbers during drouth, but hesitate to start selling because of their hope for rain or better prices to lessen the losses they may suffer in the disposal of carefully selected breeding stock. The older and less desirable animals should be sold first to reduce the stocking rate. Moving breeding stock to another part of the country is seldom advisable because of the costs of transportation, possible losses of calf and lamb crops and because the herds become older before the home pastures revive.

Subsistence feeding or supplying every bite of feed for the stock is not the same as supplemental feeding which is an aid to both stock and pastures during winter and short drouth periods. However, in this publication, the methods used in one case apply in the other.

The procedure of reducing numbers and feeding the remainder applies particularly to preserving selected breeding stock. Two considerations are: (1) to use the feeds in amounts to keep the stock alive and (2) to use the feeds to maintain production. The principal difference is in the amounts of feed supplied. Other considerations vary little, whether the objective is maintenance, subsistence, supplemental or emergency feeding.

General Considerations

If there is no pasture, it is well to feed in a trap or drylot where the stock conserve energy through not having to travel for feed and water. Shelter to prevent chilling and to conserve body heat helps thin animals on short rations.

Only the strongest and most valuable stock should be kept under the most severe conditions. Calves and lambs should be weaned as soon as possible. Late calves should be sold to prevent the cows nursing them during the winter. It is easier to winter dry stock than wet stock. Breeding plans for fall calving may need to be changed to those for spring calving. Heifers in calf need more care than cows and may be sold along with older animals to avoid wintering. Steers may be fed even more sparingly than dry cows.

The stock should have easy access to good water for a boggy, steep-banked water hole is a good place to lose weak stock. An animal once down or "on the lift" is hard to save.

A phosphorus supplement, fed with salt, such as bonemeal, spent bone black and dicalcium phosphate or disodium phosphate added to the stock water is beneficial.

Several factors help determine the lower limits of feeds to be supplied in emergency feeding:

Stock in fair condition need to be fed only enough to maintain weight.

Fleshy stock may be fed at a level on which they may lose weight without affecting production.

Thin stock need enough feed during pregnancy to offset birth-weight losses. This amounts to a gain above thin condition of about 150 pounds for cows and 18 pounds for ewes.

With a fair condition of flesh in the fall, flesh that can be held during early winter will save feed before spring or after the birth of the young.

The best feed should be saved for use just before and after the birth of the young. Use lower quality feed first. Weak stock and young bred stock need the best quality feed and should be fed separately from the older and stronger stock.

Stock that may lose considerable weight and yet remain strong, drop offspring of normal weight. But the young will not grow normally and the dam likely will not rebreed unless there is good feed afterwards. Weaning weights are affected by the amount of feed during the suckling period. Temporary thinness of the cow, ewe or doe after weaning a good offspring may be expected unless feed has been plentiful.

Vitamin A Deficiency

Vitamin A deficiency can be a problem, particularly after the birth of young. The young animal is born with little storage of vitamin A potency and must get it from milk. If no green feed is available, the young may die within a

Table 1. Comparative costs of essential nutrients at prices shown

Feed	Price per ton*	Crude protein percent	Productive value, therms percent	Unit price of Crude protein	Unit price of Energy in therms
Sorghum grain	$48	11.1	84.8	$.22	$.028
Corn	57	9.7	85.4	.29	.033
Earcorn with husk	45	8.2	72.2	.27	.032
Oats	62.50	12.0	71.2	.26	.044
Cottonseed meal	60	41.0	65.0	.07	.046
Molasses	40	2.4	62.8	.83	.032
Cottonseed hulls	30	4.1	19.3	.37	.078
Hegari bundles	40	7.4	47.2	.27	.042

*Approximate prices February 1957.

few weeks. Hay with green color, particularly alfalfa, supplies carotene, the source of vitamin A, and is one of the best drouth feeds. Numerous pelleted feeds containing vitamin A are available commercially.

Synthetic vitamin A may be mixed with feed, injected intramuscularly and administered in controlled drinking water. Cows require 40,000 international units daily per head and weaned calves require 5,000 international units per head.

Vitamin A loses its potency when exposed to sunlight, air and heat. Storage of this product should be in a dark, cool place. It is available in several different strengths and should be administered according to manufacturers' recommendations.

Cost of Feed Nutrients

The ranchman is interested in low-cost protein, bulk, feed energy and feed utility. "Utility" refers to a feed that may be stored and fed with little waste, is palatable and does not cause digestive upsets.

Protein usually costs more than energy, but is necessary for ration balance. After needs are met, protein becomes expensive as a source of energy, although it may be used as such. The cheapest pound of protein usually is found in the oil seed protein meals and the cheapest unit of productive energy usually is found in feed grains such as corn, sorghum grain and barley. Certain feeds such as cottonseed and gluten feeds are comparatively high in protein and energy. Depending on price, they may furnish protein and energy at low cost. When choosing a ration, determine the unit cost of the essential nutrients and bulk in the common feeding stuffs, keeping utility values in mind. Table 1 shows that cottonseed meal is the cheapest source of crude protein and that sorghum grain is the cheapest source of energy. The two bulky feeds, cottonseed hulls and hegari bundles, appear to be expensive sources of protein, but hegari bundles furnish energy at medium cost.

Roughages and Concentrates

Emergency feeding implies a short supply of forage, the backbone of maintenance feeding for cattle and sheep. It is not practical to attempt maintenance with concentrates alone. Concentrates and roughage supplement each other, and both usually are supplementary to pasture. Concentrates, as supplements, extend the supply of roughage and make it possible to use that of low quality.

The probable high cost of bulk feeds in drouth prompts the use of emergency-type roughages, Table 2. With bulk at high cost and feed nutrients in concentrate compara-

Table 2. Approximate percentage composition by grades of alfalfa and prairie hay

Grade	Excellent		Good		Fair		Poor	
	Alfalfa	Prairie	Alfalfa	Prairie	Alfalfa	Prairie	Alfalfa	Prairie
Protein	18	9	15	6	14	5	12	3
Crude fiber	24	23	28	28	30	30	35	32
Nitrogen-free extract	42	54	38	50	36	48	34	46
Carotene, ppm	50	20	20	15	10	10	4	3

tively cheap, the tendency is to reduce the allowance of roughages and to feed more concentrates.

Legume hay, such as alfalfa, and carbonaceous roughages, such as cottonseed hulls, sorghum hay and sorghum silage, differ principally in content of protein, calcium and carotene. Good quality legume hay shows the higher values; but top-quality carbonaceous hay may be more desirable than low-quality legume hay. Marks of quality in hays are green color, leafiness and absence of weeds and dirt. Low moisture content is important for safe storage and reasonable price.

Methods of Feeding

Attention to stock is necessary to make the best use of feedstuffs—whether the feed is supplied in the pen or on pasture. Pen feeding requires that the stock be separated into groups and troughs used to lessen feed waste. Separations may be made according to age and strength, horned or dehorned and bred or unbred. With extreme limitation of feed, it is better to feed only once daily, but trough room should permit all stock to eat at the same time. Less trough room is needed in self-feeding, bulky mixtures.

In feeding on pasture, the stock is moved to new ground from day to day. There is little waste in feeding bare maintenance allowances of hay, cubes or cottonseed cake on pasture. Daily or alternate day feeding, doubling the daily allowance, are about equally common practices. Conventional allowances of cottonseed cake are about 2 pounds daily per head for cows and ⅓ to ½ pound for ewes. Those practicing daily feeding believe that the stock use the feed to better advantage than when feeding every other day. Caution is necessary in pasture feeding bred ewes to prevent their running. Heavy feeding before lambing, then discontinuance during the height of lambing is recommended. This problem of running to feed and abandonment of lambs is a principal reason for the use of salt-cottonseed meal mixtures in the maintenance feeding of ewes.

Frequency of Feeding Protein

Range cattle in the Davis Mountain area were fed their total protein requirements for 7 days at the rate of 2 pounds of 41 percent crude protein daily, 4 pounds, 4 pounds and 6 pounds three times weekly or 7 pounds and 7 pounds twice weekly. Four-year results indicate that twice weekly was slightly better than daily or three times weekly. The primary reason is that cattle hustled more for pasture forage instead of waiting to be fed.

The quality and quantity of forage being consumed influences performance. Cattle receiving low-quality forage and insufficient amounts may need their protein more frequently.

Salt-Cottonseed Meal and Grain Mixtures

Ranchmen have self-fed mixtures of salt and cottonseed meal or salt, cottonseed meal and ground grain for 25 years. This practice of supplemental feeding lessens the amount of labor required, permits an orderly distribution of feed and eliminates the running problem which may develop in the daily feeding of sheep. Harmful results seldom occur, particularly with ample water and fair amounts of pasture.

This practice conflicts with the conservation of feed energy in that a high intake of salt demands a high intake of water which in cold weather requires a large amount of heat to reach body temperature. Salt mixtures are less practical in humid than dry climates. Stock left on salt-meal feeders in cold, rainy weather are likely to be unfed because of the absorption of water by the salt.

Salt and feed mixtures range from 10 to 40 percent of salt. A common self-fed mixture consists of 34 percent ground sorghum grain, 33 percent cottonseed meal, 31 percent salt and 2 percent trace mineralized salt. Cattle will limit themselves to about 5 pounds of this mixture daily depending upon quantity and quality of forage.

Feeding salt in combination with cottonseed meal to limit the consumption of the meal, to save labor and equipment and to lessen the handling of livestock is deemed an emergency drouth measure. An adequate supply of clean water and roughage; hay, grass or browse should be available if salt-meal feeding is to be practiced for very long. The greater the ratio of cottonseed meal to salt, the greater the consumption of cottonseed meal or other feed which may be in the salt mixture. The mixtures usually are designed to limit cattle to about 2 pounds of cottonseed meal daily and to limit ewes to about ½ pound daily.

Some ranchmen feed salt-cottonseed meal mixtures 3 or 4 weeks, then include high-energy grain feeds such as ground sorghum grain for a like period. Such ration changes as may reduce the intake of salt, particularly in cold and wet weather, seem desirable.

The distance of the salt-meal self-feeder from the stock water affects the amount of salt needed in the mixture to restrict feed consumption. With a feeder located about a mile

from water, livestock ate no more of a 10 percent salt mixture than they did of a 25 percent salt mixture in a feeder near the water. Stock eating the 10 percent mixture made greater use of available forage.

Feeding Judgment

How much to feed depends largely on individual judgment. Roughages vary in quality, livestock differ in condition, weather is a factor and the amounts and kinds of feeds on the pasture vary. More feed is needed in bad than in good weather, and fewer pounds of high-quality than of low-quality forage are needed. Silage and hays vary in feed value and in moisture. Caution dictates that safe, adequate amounts, whether of concentrates or roughages, should be supplied. Such amounts of concentrates for cattle wintered on mature pasture are 2 to 4 pounds of cottonseed cake or the equivalent, and for a ewe ⅓ to ½ pound of cottonseed cake. About 16 pounds of good hay per cow per day and 4 pounds for a ewe are considered good maintenance. Approximately half these amounts may provide subsistence for short periods. The feeder should determine the amounts to be supplied.

Feeding Weak Stock

Stock are often starved for green feed. Rest, water, salt and a light feed are initial steps in building weak, drouthy stock up to stronger condition. Perhaps the best initial feed is a mixture of equal parts alfalfa and grass hay. A mixture of 90 percent cottonseed hulls and 10 percent cottonseed meal can be used for an initial fill. Even better would be a mixture of 45 percent cottonseed hulls, 45 percent ground alfalfa hay and 10 percent cottonseed meal. Some stockmen give new stock bonemeal in addition to salt to detect mineral starvation and to put them in good condition.

Drouthy, small calves or lambs require extra protection from bad weather and a good supply of palatable feed. A small amount of alfalfa is almost essential. Wheat bran often is used as a starting feed; 1 to 2 pounds daily per head along with alfalfa and grass hay or cottonseed meal and cottonseed hulls. Most of the stock can be handled with ordinary feeds. It is good practice to avoid turning stock to green grazing until after rest and a fill of dry roughages. The usual dry roughages, except alfalfa hay, may be full fed.

Trap or Drylot Feeding

Maintaining livestock in feedlots or traps near water and shelter conserves the animals' energy. Hays can be used as the sole feed, but without a small amount of legume hay, a protein supplement should be supplied. With as much as 4 pounds of alfalfa hay daily per head for cattle and ¾ pound for sheep, fed with sorghums, prairie or Johnsongrass hay, the protein supplement is not entirely necessary. Four pounds of alfalfa hay supply about as much protein as 1 pound of cottonseed meal.

Creep Feeding Calves and Lambs

Creep feeding young animals results in increases in weight and flesh and insures higher condition in the dams at weaning time. Creep-fed lambs and calves tend to grow out uniformly and shrink little at weaning if continued on the creeps or placed on drylot feed.

The creep is an enclosure with an opening large enough for young animals to enter, but too small for dams. Calves and lambs should be creep-fed in separate pastures.

Preferable locations for creeps are at watering places, bed grounds and near shade. Young livestock should have access to the creep at all times.

Farm grains, such as oats, corn and sorghum grain, pea-sized cottonseed cake and pellets or cubes, are good feeds for creep feeding. Wheat and sorghum grain should be ground for calves. Shelled corn and oats may be fed unground. Ground ear corn and home mixtures of ground ear corn, 85 to 90 percent, and cottonseed meal, 10 to 15 percent, may be used. Lambs and kids may be fed any of the unground grains. Self-feeding any of the concentrate feeds in creeps is safe as long as the young animals get even a small amount of milk.

Concentrate feeds ordinarily are used in creep feeding, but concentrate and roughage mixtures in various combinations may be used, particularly if pastures are short.

Common and Emergency Feeds-Roughages

In addition to the ordinary roughage feeds, numerous materials are used in emergency feeding to reduce the cost of bulk in the rations. Many of them are coarse, fibrous, unpalatable and require special preparation for feeding. Their worth compared with the common hays or roughages is debatable.

Cattle and sheep get their feeds rather finely divided before final passage through the digestive tract. Grinding saves the stock some labor in the use of feeds, but it does not change a roughage to a concentrate. Several roughage feeds are described as follows:

Cottonseed hulls form a standard, widely-used roughage, about 45 percent in crude fiber; but low in protein and productive value. Hulls have high utility value, mix readily with ground grains, cottonseed meal and ground alfalfa hay and are palatable. The hulls should be free of dirt, low in moisture content and carry enough lint to mix easily with cottonseed meal.

Ground cotton burs and cotton stalks have not been used successfully as the only roughage in rations for cattle, although they may show higher values for protein and a lower content of crude fiber than cottonseed hulls. These materials are unpalatable.

Ground cotton gin trash, including leaf trash, a small percentage of immature seed, lint and burs, can replace cottonseed hulls in roughage mixture with ground alfalfa hay. It may contain from 5 to 8 percent crude protein and no more than 30 percent crude fiber. Supplemented with cottonseed meal and molasses or ground sorghum grain, it has been used as the only roughage in maintenance rations. It lacks the palatability of cotton seed hulls and if it contains much lint, it should not be used.

Peanut hulls are extremely high in crude fiber, varying from 55 to 65 percent. Finely ground peanut hulls may be used as bulk in rations for cattle, but are better in combination with alfalfa. If used as the only roughage at the start of feeding, they may cause impaction. They are less palatable in mixtures than cottonseed hulls and have little productive value.

Rice hulls, sometimes finely ground and used in mixed rations, contain less crude fiber than cottonseed hulls, but are extremely high in total ash, principally silica. While they may be used as a source of bulk in complete rations, they have no productive value.

Corncobs contain little protein, but are high in nitrogen-free extract. They are much lower in crude fiber than cottonseed hulls, but are less palatable when forming a large percentage of the ration. They should be ground finely if included in mixed rations with ground grain and cottonseed meal. When used with ground earcorn, they are a satisfactory source of bulk.

Straws from small grain, such as oats, wheat, barley and rye, are low in protein and comparatively high in crude fiber. Oat straw is preferred, but all may be used as bulk when supplemented with cottonseed meal. Hay from the small grain crops harvested in the dough stage may be of excellent quality and sufficient for maintenance. Barley hay and straw are the least desirable because of possible trouble from the beards.

The carbonaceous hays and forage crops, whether cured dry or stored as silage, have much the same value. In most cases, the quality of the particular forage is more important than the kind or variety; but preferences are based on quality or utility. Forage sorghum stover, for example, is preferred to grain sorghum stover, and North Texas prairie hay is preferred to South Texas prairie hay. All of the grass and sorghum hays require additional protein for balance and more efficient use; yet if fed liberally, they have sufficient quality for the maintenance of cattle and sheep.

Silage is a good feed for drouthy livestock. An advantage of silos is that bulk forage crops can be preserved in palatable condition for long periods. The dry matter in silage and the dry matter in a good quality dry roughage from the same crop, have about equal feeding value. Silage may not furnish dry matter at low cost. Most sorghum silages contain 70 to 75 percent water. Dry roughages contain about 10 percent water. At $10 per ton and 75 percent moisture content, dry matter in sorghum silage would cost 2 cents per pound. At $36 per ton and 10 percent moisture, dry matter in sorghum hay would likewise cost 2 cents per pound. As with the sorghum and grass hays, sorghum silages should be supplemented with protein concentrates for most efficient use. In addition to bulk and energy, silage supplies sufficient carotene for the maintenance of body reserves of vitamin A potency.

Singed prickly pear and *finger pear,* often used in drouth maintenance feeding, are succulent roughage high in moisture and minerals and low in protein. Comparatively large amounts are required daily unless additional roughage is fed. Cows may consume up to 60 pounds daily and ewes, 10 pounds, if available. As with other low protein feeds, results are improved by the addition of protein concentrates. The palatability of broad-leaved and finger pear is about the same. The latter is well used by sheep and goats. The cost of pear in 1956-57 is about $5 per ton for singed, chopped pear loaded on trucks. The cost of singed pear is about $2 per ton for fuel and $1 for labor.

Sotol, chopped or ground, is good for the maintenance of cattle and sheep, particularly if fed with a supplement high in protein and phosphorus. Livestock losses have been reported with the feeding of sotol, but the plant apparently is not poisonous. Losses among sheep fed sotol have been identified as caused by enterotoxemia, or overeating, which may be controlled largely by vaccination. Cattle allowed 2 pounds of cottonseed cake daily and sheep allowed ⅓ to ¾ pound do well when full-fed sotol.

Ground mesquite sapwood branches 3 inches in diameter or less have been fed as part of the roughage in steer fattening rations without ill

effect. Its value has not been determined as a replacement for feeds such as cottonseed hulls and silage. It may be used as part of the bulk in rations if it should be lower in price than cottonseed hulls.

Other feed materials incident to grazing and which may contribute to the maintenance of stock are listed in Table 3. The percent chemical compositions of the different feeds indicate possibilities of use and supplements needed for good feeding results.

Common and Emergency Feeds-Concentrates

Sorghum grain usually supplies feed energy at lower cost than any other Texas farm grain. It should be ground or rolled for feeding and used in mixtures with cottonseed meal, cottonseed hulls, sorghum silage and ground roughages. It is used widely in range cubes or cakes and drouth feed mixtures containing approximately 20 percent crude protein. A 20 percent protein feed mixture may be prepared by combining approximately 33 pounds of 41 percent protein cottonseed meal and 67 percent ground sorghum grain.

Ground earcorn is a common energy feed in Central Texas and is well adapted to a variety of uses. It contains approximately 25 percent roughage, making it comparatively safe to use in either maintenance or fattening rations. Combinations of ground earcorn with 10 to 15 percent cottonseed meal are good as a creep feed. Shelled corn or corn chops may be the best single fattening grain because of its palatability and high productive value. Shelled corn should be ground for cattle except at the outset of creep feeding, but it need not be ground for sheep and goats. The corn grains are large enough to permit feeding to sheep and goats on pasture.

Oats are a well balanced grain feed, particularly valuable in the development of young breeding stock. They need not be ground for calves or sheep, but should be ground or rolled if fed to cattle. Because of high utility and high value for growing young stock, oats usually do not compete with sorghum grain as a source of energy for fattening.

Wheat is a highly nutritious grain and may be used much as corn and sorghum grain in drouth or fattening rations. If used alone, it should be hand fed in limited amounts because of danger from founder. It should be crushed or rolled for cattle and is used to better advantage when mixed with other ground grain.

Barley is available for feeding in some areas and has much the same value as the other feed grains. It should be ground or rolled for feeding. It usually is fed with sorghum grain or corn and in such combination as one-third barley and two-thirds sorghum grain.

Fineness of grinding the grains is a consideration in drouth feeding. Generally the grains should be ground coarsely for full-feeding. However, fine grinding is recommended in feeding small amounts of grain as in maintenance feeding and in mixing small percentages of grain with ground roughages or cottonseed hulls.

Feeding molasses is a carbonaceous feed containing little protein. It is high in minerals and has about 70 percent of the energy value of sorghum grain. Beet, corn, citrus and cane or blackstrap molasses seem to have about equal feeding value. Cane or blackstrap molasses, most commonly available in Texas, contains 20 to 25 percent moisture and about 65 percent nitrogen-free extract. It varies in price and often is competitive with sorghum grain as a source of energy. It improves the ease of handling ground mixed feeds and adds palatability to ground, low-grade roughages. It may be self-fed, but this method often is wasteful. Its best utility seems to be in whole mixed rations and at an 8 to 12 percent level.

The *oil seed protein meals* such as cottonseed meal, soybean meal, linseed meal and peanut meal, if equal in percentage of crude protein, have much the same value in maintenance feeding for cattle and sheep.

These meals provide energy and protein, and are palatable. A chief function of the protein meals is to supplement grain and roughage which are comparatively low in protein. They provide balance and improve the efficiency of rations. Prepared as cubes, pellets or as broken cake, these byproducts of the oil seeds have high utility.

Sorghum gluten meal, 41 percent protein content, is a satisfactory source of protein for cattle, but is less palatable than the oil seed meals. The meal is satisfactory in rations for fattening lambs if alfalfa is used as the roughage.

Sorghum gluten feed, about 25 percent crude protein, is comparatively high in energy and may be used as a source of both protein and energy for cattle. For example, in fattening heavy yearling steers, 5 pounds of sorghum gluten feed may be fed to replace 3 pounds of 41 percent protein cottonseed meal and 2 pounds of ground sorghum grain. It follows that if 5 pounds of gluten feed cost less than 3 pounds of cottonseed meal and 2 pounds of ground sorghum grain, gluten feed may be used in the ration. Lack of palatability limits the use of the sorghum gluten feed as the only concentrate in full feeding.

Cottonseed is a medium protein feed comparatively high in energy. It contains approximately 20 percent crude protein and about 77 therms of energy per 100 pounds. Subject to some lack of palatability, if fed in large amounts in fattening rations, it can be used to supply both protein and energy. It also can be fed for maintenance, subject to comparative cost of feed nutrients as may be supplied by cottonseed meal and the grains. Light cottonseed from the planting seed delinting plants are lower in protein and fat than heavier cottonseed, but may be used satisfactorily in livestock feeding.

The *20 percent protein commercially mixed* cubes, pellets or meals contain about 50 percent nitrogen-free extract. Most of these mixtures are fortified with vitamin A and trace minerals. Unless the stock being fed have definite need for the vitamins and minerals in the feed, costs of the protein and productive energy supplied should be considered.

Rice bran, which contains more protein than sorghum grain, is high in energy because of a high fat content. It may become rancid in storage and in warm weather, is not very palatable and if fed in large amount may cause scouring. However, price often favors its use, and a small amount may be used as a replacement for sorghum grain in maintenance and fattening rations.

Converted rice bran and polishings with added calcium carbonate may contain 25 percent limestone flour. It does not become rancid, but lacks palatability because of a high mineral content. It may be used in combination with other feeds in maintenance rations, but mineral content and cost of protein and energy are to be kept in mind.

Meat and bone scraps, 50 percent protein and 60 percent digestible tankage, may be used to supply a part of the protein in rations for cattle and sheep. These products are high in calcium and phosphorus and supply good amounts of energy. They lack palatability and perhaps should form only 3 or 4 percent of full-fed rations. Since the animal proteins are probably less efficient than the vegetable proteins for cattle and sheep, their use is not recommended unless protein is supplied at low cost.

Urea

Urea is a nitrogenous compound and through bacterial action in the rumen and in the presence of a readily available carbohydrate it may be converted into protein usable by ruminants. Do not feed it to other livestock.

Urea and molasses as a free choice supplement have been used in pasture feeding. Such a mixture containing alcohol and phosphoric acid also is used in the same manner. These mixtures are economical when their cost is no more than 70 percent of the price of cottonseed meal.

Preparing a protein supplement high enough in protein or equivalent protein so that 1 pound per head daily would supply cattle needs for supplemental protein in either fattening or maintenance rations is possible. According to general feeding practices, .8 pound of crude protein, as would be supplied in feeding 2 pounds of 41 percent crude protein cottonseed meal daily per head, is deemed adequate for supplemental protein needs. A combination of 82 percent of 41 percent protein cottonseed meal and 18 percent of urea feed compound, 262 percent equivalent protein from nonprotein nitrogen would meet such requirement. This mixture would show a total of 81 percent equivalent protein and 1 pound *daily* per head would supply the .8 pound of supplementary protein. Also, such mixture fed at the rate of 1 pound *daily* per head would be safe from the standpoint of urea toxicity. One pound would contain approximately 3 ounces of 262 feed urea compound, and 4 ounces is a relatively safe daily allowance. Such a mixture would have to be fed *daily* at no more than the 1-pound level. Urea consumption would be greater than 4 ounces if more than 1 pound were consumed daily and death losses could occur from nitrogen toxicity.

Urea, Cottonseed Meal and Ground Sorgum Grain Mixture

By using 5 pounds of urea, 60 pounds of cottonseed meal and 35 pounds of ground sorghum grain, the resulting combination would be a 41 percent equivalent protein supplement. The total digestible nutrients would approximate that of 41 percent cottonseed meal. This mixture would have to be fed *daily* at no more than the 2-pound level.

The danger of misuse of urea mixture is a significant disadvantage. Mixtures containing urea require thorough mechanical mixing with high carbohydrate feeds. Overfeeding and the restriction of use to ruminants must be considered. A readily available source of energy such as is supplied in grains and molasses is essential when feeding urea.

The grain to urea ratio should be no less than 8 to 1 or 8 pounds of grain to 1 pound of urea. Urea should not exceed one-third of the total protein of a mixture.

Cattle should have access to a phosphorus supplement at all times, such as recommended on page 3. Under some conditions, the above mixture could be changed to include 2 percent

dicalciumphosphate or steamed bonemeal by reducing the sorghum grain by 2 percent.

The percentage chemical composition of several common and emergency-type feed materials are shown in Table 3. The chemical composition indicates the comparative value and manner in which the feed materials may be used. Some materials of undetermined value are listed because of numerous questions about them. The principal use for Table 3 is to determine the cost of protein and nitrogen-free extract. The comparative costs of feed nutrients are important in the purchase of feeds and in planning for drouth emergency feeding.

References:

For detailed information see Morrison's "Feeds and Feeding" and Texas Agricultural Experiment Station Bulletin 461.

Table 3. Percentage chemical composition of various feeding materials*

Feed	Crude Protein	Ether extract	Crude fiber	Nitrogen-free extract	Water	Ash
Alfalfa hay	14.8	2.0	29.1	37.4	8.3	8.4
Alfalfa leaf meal	20.3	2.6	18.4	38.2	7.5	13.0
Beargrass, Yucca	4.0	1.1	20.7	21.3	48.3	4.6
Bonemeal, feeding	25.3	3.6	1.2	1.5	6.6	62.4
Carelessweed, green	3.4	.3	2.2	6.0	83.4	4.7
Corn grain	10.1	4.9	2.6	69.7	10.9	1.8
Corn cobs	3.1	.5	23.0	54.0	7.3	2.1
Corn shucks	3.2	.7	30.3	54.5	7.8	3.5
Earcorn with shuck	8.7	3.2	10.0	66.6	9.6	1.9
Cottonseed	20.9	17.9	23.8	26.9	7.0	3.5
Cottonburs	8.0	2.6	34.3	38.7	8.7	7.7
Cotton gin trash from "bollies"	7.7	1.6	27.9	43.9	9.3	9.4
Cottonseed hulls	4.1	.9	47.6	35.3	9.4	2.7
Cotton stalk hay	10.4	3.0	28.1	40.8	9.3	8.4
Cottonseed meal, 41% hydraulic	41.0	5.0	12.0	25.0	6.8	4.8
Cottonseed meal, 41% solvent	41.7	1.6	11.7	31.6	7.4	6.0
Digester tankage	60.5	8.8	2.1	2.1	7.5	17.2
Hegari fodder	7.3	1.9	16.0	53.8	10.0	11.0
Johnsongrass hay	7.4	1.4	35.3	41.9	6.3	7.7
Liveoak acorns	4.3	4.0	2.2	47.8	40.0	1.7
Liveoak leaves	9.2	2.6	27.9	47.1	6.4	6.8
Maguey leaf	6.3	1.1	13.6	53.5	15.1	10.4
Mesquite beans	12.8	2.2	27.0	48.2	5.5	4.3
Mesquite meal	5.9	.8	48.7	35.4	5.6	3.6
Mistletoe	9.0	2.3	8.1	19.2	59.0	2.4
Molasses, blackstrap	2.4	.0	.0	65.0	27.3	6.3
Oats	12.0	5.0	10.9	58.8	9.3	4.0
Peanut hulls	8.0	2.5	52.6	22.1	8.7	6.1
Peanut hay with nuts	13.2	10.5	22.1	33.7	8.4	12.1
Peanuts, whole	26.8	38.1	15.1	11.4	5.7	2.9
Pecan hulls	1.9	.6	54.6	32.6	8.1	2.2
Prairie hay	4.2	1.5	30.5	48.3	7.7	7.5
Prickly pear	1.3	.4	4.7	17.6	68.3	7.7
Pear, finger	2.6	.5	3.1	14.0	75.2	4.4
Rice, rough	8.0	1.4	8.4	65.6	11.7	4.8
Rice bran	12.8	13.1	12.7	41.7	9.0	10.7
Rice hulls	3.1	.9	40.1	28.9	8.1	18.9
Rice straw	3.7	1.5	31.6	40.1	7.1	16.0
Salt, cord grass	4.3	2.5	31.7	48.7	7.1	5.6
Spanish moss	4.1	1.6	24.5	53.8	8.2	7.8
Sorghum grain	11.1	2.9	2.5	70.9	10.7	1.9
Sotol	2.2	.6	10.4	24.8	60.3	1.7
Sorghum hay	5.7	2.2	19.0	48.5	18.6	6.0
Sorghum silage	2.1	.8	7.9	17.5	69.1	2.6
Sorghum, honey silage irrigated	.9	.5	4.9	11.6	80.6	1.5
Wheat grain	14.0	1.7	3.0	69.4	10.0	1.9
Wheat bran	16.8	4.1	9.4	53.9	9.7	6.1

*References, Texas Agr. Exp. Sta. Bul. 461 and State Chemist.

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Cooperative Extension Work in Agriculture and Home Economics, Texas A&M University and United States Department of Agriculture Cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.
10M—4-64, Revised