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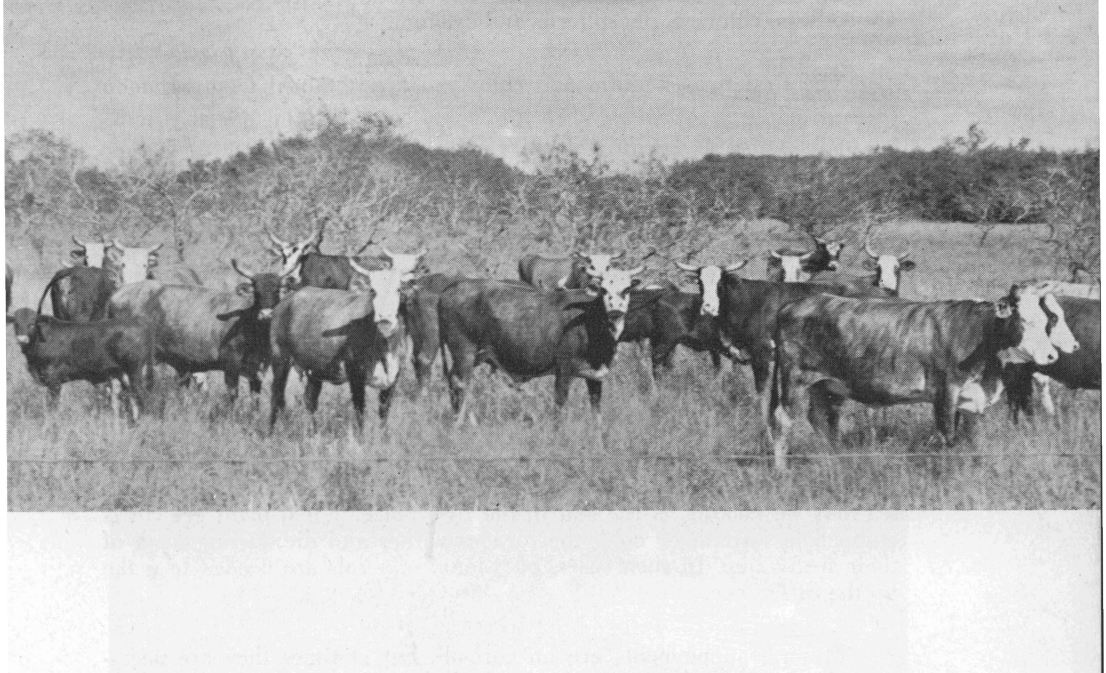
MINERALS FOR BEEF CATTLE



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MINERALS FOR BEEF CATTLE

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Beef cattle need minerals. They need phosphorus, calcium, sodium, chlorine, magnesium, manganese, iron, copper, cobalt, iodine, boron and zinc. Most of these they get in natural pasturage and well-balanced rations. But some may be lacking. The ones most likely to be short are sodium, chlorine, phosphorus and calcium.

The first two—sodium and chlorine—are obtained from common salt.

The other two—phosphorus and calcium—quite frequently require special measures. This bulletin is intended to explain when, where, and how phosphorus and calcium should be supplied as mineral supplements.

Good pasturage, depending on the soil and climate, may supply all of the elements essential to the well-being of growing animals. If the minerals are present in the soil, they pass from the soil through the pasture forage to the animals—and then back to the soil.

But adequate amounts of the essential elements are not always supplied from natural sources. Soils become worn out. Certain minerals may be lacking in the soil in the first place. When plant growth is stopped by drouth or cold, the forages wither and die, losing much of their feed value. In such cases, additional minerals are needed to make up the difference.

Mineral supplements are no cure-all, but at times they are necessary for successful grassland and feedlot cattle production. Minerals will not make up the deficiency in production caused by a shortage of feed. Neither can minerals properly function without certain vitamins and vice versa.

Table 1. Calcium and phosphorus composition of certain mineral supplements

Mineral Supplement	Calcium		Phosphorus	
	Percent	Grams per pound	Percent	Grams per pound
Bone meal, raw, feeding	22.7	103	10.1	46
Bone meal, special steamed	28.7	130	13.9	63
Bone meal, steamed	30.0	136	13.9	63
Defluorinated superphosphate	28.3	128	12.3	56
Dicalcium phosphate	26.5	120	20.5	93
Disodium phosphate	——	——	8.6	39
Limestone	38.3	174	——	——
Monocalcium phosphate	16.0	72	24.0	109
Monosodium phosphate	——	——	22.4	102
Oyster shell flour	36.9	167	——	——
Spent bone black	22.0	100	13.1	59

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PHOSPHORUS DEFICIENCY

The Texas Agricultural Experiment Station has shown that phosphorus is the mineral most commonly lacking in Texas pastures. This deficiency can be damaging and expensive unless it is made up by phosphorus supplement.

The cattle in Fig. 1 tell one part of the story; the cattle on the cover tell the other. Both groups of cattle are of the same age and

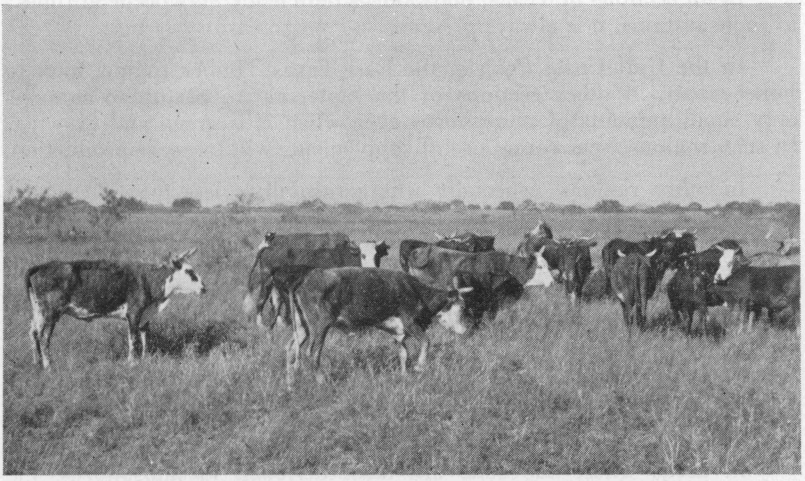


Fig. 1. These cattle show the effects of a phosphorus deficiency.

breeding. The cattle in Fig. 1, however, show the effects of a phosphorus deficiency. Note particularly in the left foreground the "creepy" cow affected with acute phosphorus deficiency. Those on the cover were fed a phosphorus supplement.

Behind that "creepy" condition lies a series of contributing factors:

1. Deficiency of phosphorus in the soil.
2. Deficiency of phosphorus in the grasses.
3. Deficiency of phosphorus in the animal.

The earliest symptoms of phosphorus deficiency in cattle are decrease in blood phosphorus, in appetite, and in rate of gain. Milk production falls off and as a consequence, weaning weights of calves are low. These effects are followed by an abnormal appetite. Depraved appetite may lead to the chewing of bones, sticks, stones, old hides and dead animal material. This lack of phosphorus may result in a secondary disease, characterized by paralytic symptoms and commonly called "loin disease." This disease is caused by toxins produced by microorganisms of the botulinus type ingested with the putrid flesh. Long continued phosphorus privation results in low percentage calf crop, poor condition, lameness, and stiffness of joints.

On pasturage deficient in phosphorus, cows fed phosphorus supplements may average as much as 200 pounds heavier than cows not fed the supplements. Calves may be from 50 to 70 pounds heavier at weaning age. It is possible to increase the calf crop as much as 30 per cent. Breeding dates are more completely stabilized.

WHEN AND WHERE DEFICIENCIES OCCUR

In all sections of Texas, phosphorus deficiency may occur at times; in some sections, it is always present.

In the Gulf Coast Prairie, the East Texas Timber region, and, to some extent, in other sections of the State, native pasturage contains only small amounts of phosphorus even when it is green and growing. In such regions, year-round use of supplements will increase production.

In other regions, especially where rainfall is less than 30 inches a year, the young growing grasses are usually rich in phosphorus. But the phosphorus content diminishes with maturity. Dry and mature grasses may be very low in the mineral. In such areas, phosphorus supplement may be necessary at certain times of the year. Generally, however, the deficiency in such areas seldom becomes serious because of the excellent forage during part of the year, and because stockmen in those areas usually feed concentrates which contain phosphorus during the winter. Cottonseed cake and cottonseed long have been known as good feeds for "creepy" cows.

In areas where the soils are most deficient in phosphorus, the phosphorus deficiency becomes much worse when the forage matures,

when cold or drouth stops forage growth, or when the old forage leaches. Experiments have shown that production will increase if phosphorus is supplied by pasture fertilization or by feeding various phosphorus supplements.

CATTLE WILL CONSUME BONE MEAL WHEN THEY NEED PHOSPHORUS

There is very good evidence that cattle will consume appreciable amounts of bone meal only when they need phosphorus in addition to that which they may receive from the forage or other feeds. When on good forage and gaining in weight they will consume only small amounts of a bone meal and salt lick, but when on poor forage, losing in weight and idle, they will consume large amounts. There is no harm in the consumption of excessive amounts of bone meal except cost.

In Fig. 2 note that the weight of the mature cows forming the herd begins to decline about the first of November of each year. Weights continue to decline until about the first of March. However, if cottonseed meal is fed during the winter weight losses are not so marked. When spring grazing becomes available supplementary feeding is dis-

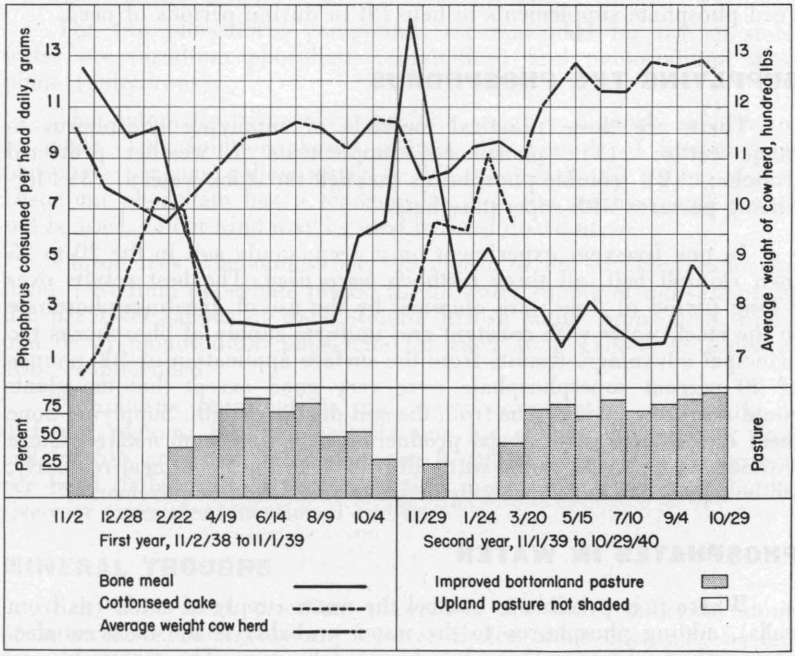


Figure 2. Average grams of phosphorus consumed in bone meal and cottonseed meal, days of grazing on highly fertilized pasturage, and average weight of cow herd during a two year period at th East Texas Pasture Investigations Station, Lufkin, Texas.

continued, and the herd makes rapid increase in weight which is well maintained until fall.

What happened in the consumption of the bone meal (2 parts) and salt (1 part) lick during this time? A perfectly natural thing. With poor forage in November and weight losses the cows began to consume a large amount of the lick, but before the period of poor forage was over they began to consume less of the lick when cottonseed cake, a source of phosphorus, is fed. Receiving phosphorus from cottonseed cake, they did not need to eat as much of the bone meal and salt lick to get their requirement of phosphorus. But when feeding of cottonseed cake was stopped, the cows did not again begin to consume large amounts of the bone meal lick. Why? Because by that time fresh, green forage—clovers grown on high phosphated land—was available, which supplied ample phosphorus.

The graph (Fig. 2), affords a very good and a natural picture of the reaction of cattle to grazing conditions and phosphorus supply. It is applicable in any section of the state. Poor grazing means loss of weight; good grazing = gain in weight; poor grazing = low phosphorus supply; good grazing = ample phosphorus supply. Feed protein supplements to supply both a balanced ration and phosphorus. Feed phosphate supplements to help fill in during periods of need.

SUPPLYING THE PHOSPHORUS

There are three practical methods of supplying phosphorus to range cattle: (1) phosphorus supplements in weather protected troughs; (2) soluble phosphorus through the stock water; (3) fertilizing pastures with superphosphate.

In one five-year experiment on a deep, sandy soil in the 20 to 25 inch rainfall belt, all three methods were used. The best results over a long period of time were obtained by the use of disodium phosphate in the stock water with constant and uniform supply of phosphorus the principal advantage. Results from the surface application of 400 pounds of 20 percent superphosphate were very good except that the plants could not draw phosphorus from the soil during drouth. Supplying bone meal in self-feeders increased production over that from native pasture without supplements. Some cattle did not take the bone meal regularly, while others did not consume enough to meet their requirements.

PHOSPHATES IN WATER

Where it is possible to control the water supply of cattle (as from wells), adding phosphorus to the water probably is the most satisfactory method of preventing phosphorus deficiency. The materials may be added to the water troughs by hand, but an automatic dispenser (Fig. 3) has been developed which adds the desired amount of phos-

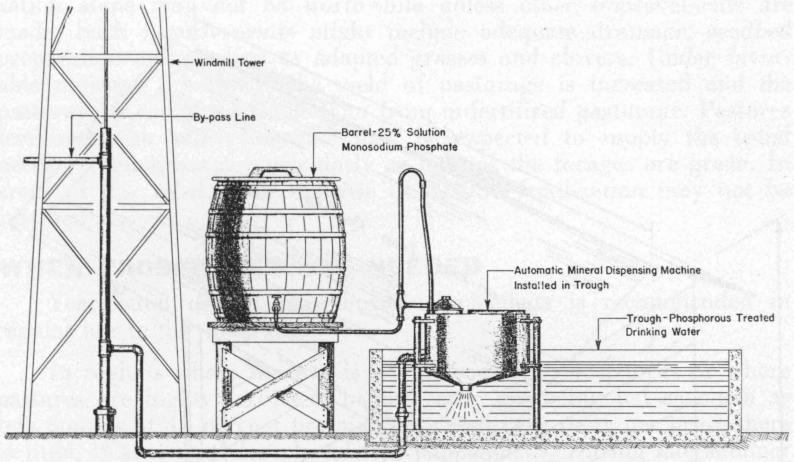


Fig. 3. An automatic dispenser which can be used with almost any type water system.

phate solution to a given amount of water. It can be used with almost any type of water system.

The two phosphorus compounds recommended for use in stock water are disodium phosphate (crystalline) and monosodium phosphate (anhydrous).

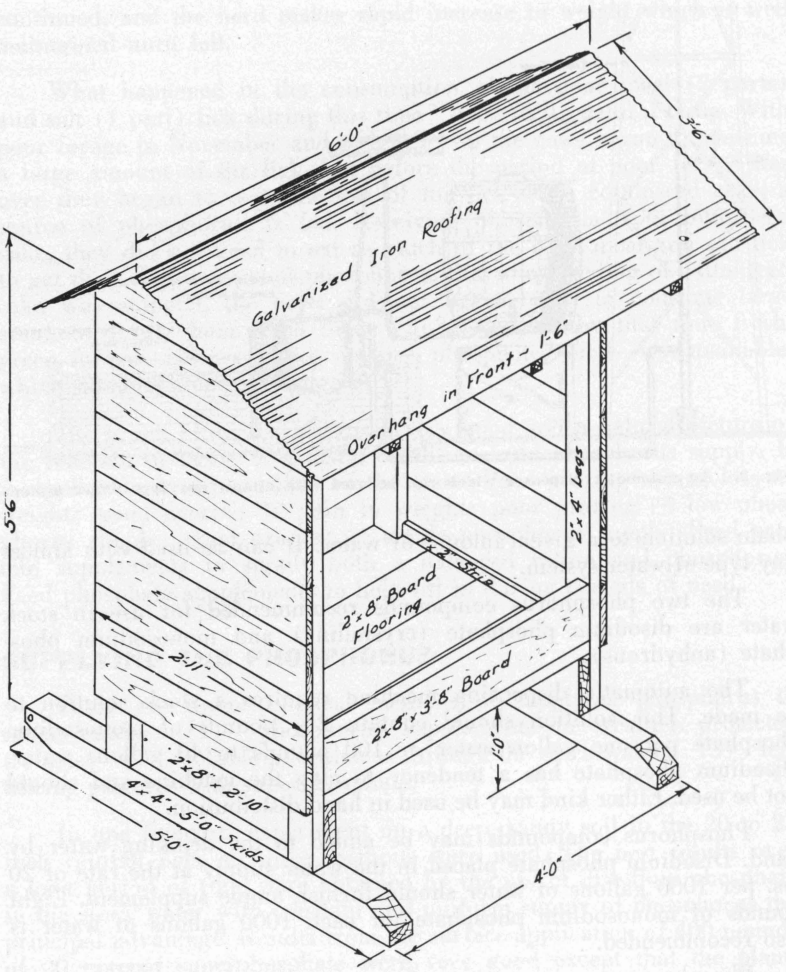
The automatic dispensing machine requires a stock solution to be made. This solution should contain 2½ pounds of monosodium phosphate per one gallon water or 100 pounds to 40 gallons water. Disodium phosphate has a tendency to clog the machine and should not be used. Either kind may be used in hand distribution.

Phosphorus compounds may be added to the drinking water by hand. Disodium phosphate placed in the water supply at the rate of 20 lbs. per 1000 gallons of water should furnish ample supplement. Eight pounds of monosodium phosphate for each 1000 gallons of water is also recommended.

Phosphorus requirements and water consumption may vary in different regions, but recommendations for general use at this time call for 6½ grams of phosphorus per 8 gallons of water or 6.5 grams per head daily. This is the proportion most successfully used in the five-year experiment mentioned earlier.

MINERAL TROUGHS

Salt, bone meal, disodium phosphate, and other minerals, alone or in mixtures, commonly are fed free choice. Bone meal may be fed free choice or mixed with granulated salt. A mixture of two parts feeding bone meal and one part salt by weight is widely recommended. Disodium phosphate (crystalline) can be fed in the same proportions



MINERAL TROUGH
SCALE: 3/4" = 1'-0"

Fig. 4. Mineral troughs prevent waste.

as bone meal. Troughs affording protection from wind and rain (Fig. 4) prevent waste and help insure constant supply.

PASTURE FERTILIZATION

Fertilized pastures have a place in supplying minerals to livestock. In areas having very high rainfall and impervious soils, pasture fertili-

zation alone may not be worthwhile unless other improvements are made. Such improvements might include adequate drainage, seedbed preparation and seeding to adapted grasses and clovers. Under favorable moisture conditions the yield of pasturage is increased and the pasturage is more nutritious than from unfertilized pasturage. Pastures fertilized with superphosphate may be expected to supply the usual needs for phosphorus particularly as long as the forages are green. In areas of low rainfall the expense of pasture fertilization may not be justified.

WHEN PHOSPHATES ARE NEEDED

Year-round use of phosphorus supplements is recommended in regions low in the mineral.

In regions where the soil is not deficient in phosphorus or where pastures are highly fertilized, or the cattle are being fed as much as two pounds of 43 percent protein cottonseed cake daily per head, there is little, if any, need for phosphorus supplements. During late summer and fall, or if the cattle are being poorly wintered, phosphorus supplements probably are needed.

Numerous mineral mixtures have found ready markets and sometimes are used when not needed. Certain mixtures contain very small amounts of phosphorus, and stockmen should check the percentage and cost of the available phosphorus.

The practical stockmen know that pasturage is the principal and cheapest source of minerals. At the same time, he uses mineral supplements when they are needed.

CALCIUM DEFICIENCY

Pasturage and forage in almost all parts of Texas contain enough calcium. At the same time, the plentiful sunlight provides the Vitamin D necessary to retain the calcium and phosphorus. Rations of grains and grass hays, however, do not contain enough calcium for the growth and fattening of weaned calves, and rickets are found only in barn-reared young calves.

SUPPLYING THE CALCIUM

Pulverized limestone and oyster shell or finely disintegrated limestone containing from 92 to 98 percent calcium carbonate are the common calcium supplements. Lumberyard lime is not recommended for use as a calcium supplement since it may not be completely slaked.

Legume hays, such as alfalfa, are high in calcium, compared with grass hays such as Johnson grass or other sorghums. When cattle are fattened on grain and grass hays, it is advisable to feed about 1/10 pound of limestone flour or pulverized oyster shell daily per head as a calcium supplement. This should be mixed with grain. Fattening rations allowing three to four pounds of alfalfa hay daily per head for yearling

or older cattle need not be supplemented. Calves, however, should get the supplement even with the alfalfa, since they need considerable calcium for growth and since they have a limited capacity for hay.

RECOMMENDED DAILY ALLOWANCES

The mineral requirements vary with the age, sex, and purpose of the animal. Table 2 shows the daily requirements for dry feed, calcium and phosphorus for beef cattle.

Table 2. Recommended daily dry feed calcium and phosphorus allowances for beef cattle *

	Weight in lbs.	Daily feed lbs	Calcium Ca grams	Phosphorus P grams
Normal growth, heifer and steers	400	12	20	15
	600	16	18	15
	800	19	16	15
	1000	21	15	15
Bulls, growth and maintenance, moderate activity	600	16	24	18
	800	18	23	18
	1000	22	22	18
	1200	24	21	18
	1400	26	20	18
	1600	26	18	18
	1800	26	18	18
Wintering weaning calves	400	11	16	12
	500	13	16	12
	600	15	16	12
Wintering yearling calves	600	16	16	12
	700	17	16	12
	800	18	16	12
	900	18	16	12
Wintering pregnant heifers, weights are for beginning of winter period	700	20	18	16
	800	20	18	16
	900	18	16	15
	1000	18	16	15
Wintering mature pregnant cows, weights are for beginning of winter period	800	22	22	18
	900	20	18	16
	1000	18	16	15
	1100	18	16	15
	1200	18	16	15

	Weight in lbs.	Daily feed lbs	Calcium Ca grams	Phosphorus P grams
Cows nursing calves up to 4 months after parturition	900-1000	28	30	24
Fattening yearling cattle	600	18	20	17
	700	21	20	18
	800	22	20	19
	900	24	20	20
	1000	26	20	20
	1100	27	20	20
Fattening two-year old cattle	800	24	20	20
	900	26	20	20
	1000	27	20	20
	1100	29	20	20
	1200	29	20	20
Fattening calves finished as short yearlings	400	12	20	15
	500	14	20	16
	600	16	20	17
	700	18	20	18
	800	20	20	18
	900	21	20	18

* Data from TAES Bulletin 461 Revised 1947.

There are several closely related problems in livestock production and no one phase can be overlooked. The variability in individual animal requirements, climate, and soils make it even more important for the cattleman to provide the essential food elements to keep his livestock healthy.

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