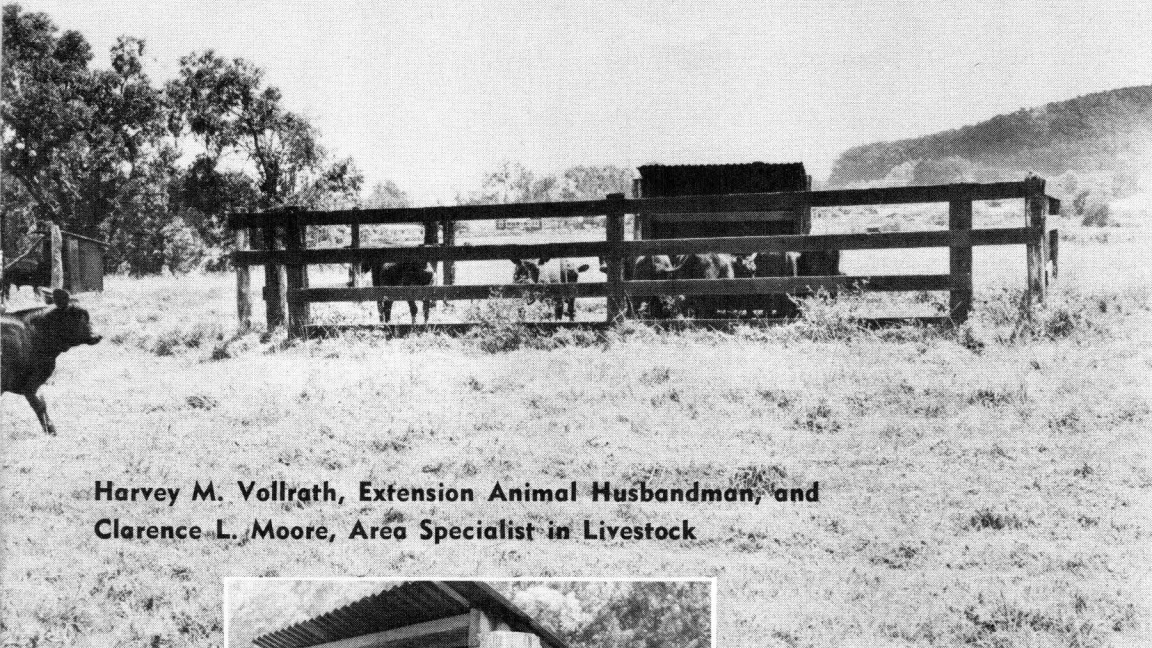
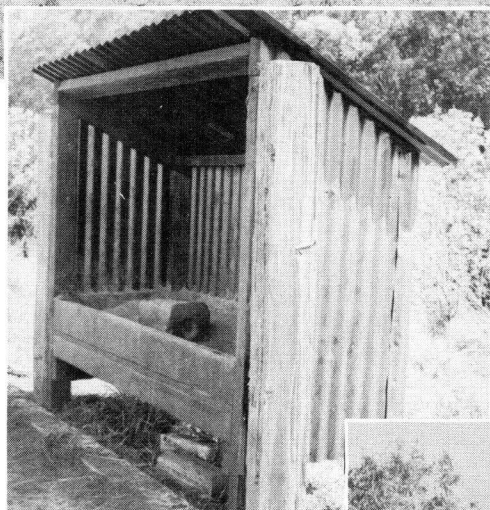


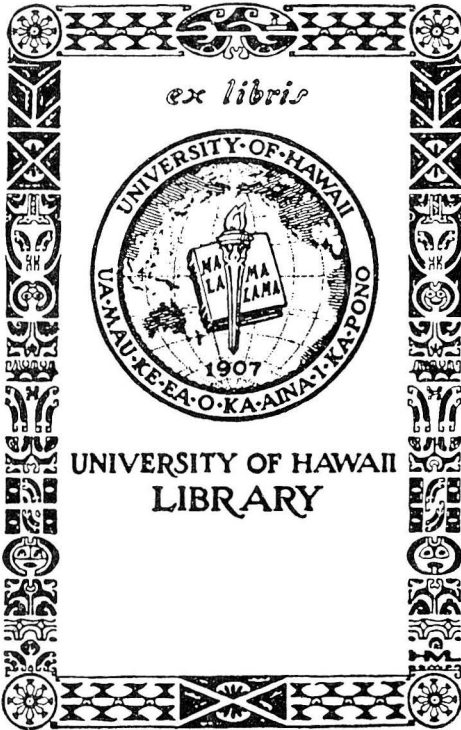
# Supplemental Feeding of Beef Calves on Pasture



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# **Supplemental Feeding of Beef Calves on Pasture —Pre and Post Weaning— in Hawaii**

**By  
Harvey M. Vollrath  
and  
Clarence L. Moore**

Supplemental feeding, as used in this publication, refers to providing cattle with feed other than just pasture. This practice has not been carried on extensively in Hawaii, but during recent years Hawaiian ranchers have shown increased interest in it. Supplemental feeds normally aid in attaining faster growth, making possible earlier marketing of higher-grading cattle. The amount of added return is variable, much depending upon the quality of cattle, quality of pasture, and the kind and amounts of supplements fed. Supplemental feeding is done both before and after weaning, but in Hawaii just after weaning seems to be the most critical period.

A limited number of supplemental feeding trials have been conducted in Hawaii. Recently, trials in supplemental feeding of cattle on pasture were conducted at 3 ranches, which will be identified as A, B, and C in this publication. Results of these trials are included in this circular.

## **Pre-weaning Period (Creep Feeding)**

Feeding concentrates to calves in an enclosure which excludes their dams is called creep feeding. A feed such as cane molasses supplied to calves as well as their dams in addition to pasture would be referred to as supplemental feed.

No research results on creep feeding in Hawaii are available to report at this time. Research conducted in a number of other states generally shows little or no advantage in creep feeding where nursing calves and their dams are on good pasture.

Results of four years of research at the South Dakota station with calves going to a feed lot after weaning showed that the non-creep fed calves produced beef more economically than did the creep-fed calves (7). The creep-fed calves were slightly more profitable, however, when they were sold as weaning calves.

**Table 1. Feed cost for additional liveweight gains.**

	Cents				
At feed cost per pound	2	3	4	5	6
Feed cost for extra pound gain	18	27	36	45	54

Morrison summarizes 31 creep-feeding trials in which calves gained an average of 1.83 pounds daily, or 0.38 pound more than the control animals (8). This represents a gain of 58 pounds more during a 153-day period. It required an average of 524 pounds of feed per calf, including that eaten by cows while calves were learning to eat. For each pound of additional gain over the non-creep fed calves, 9.03 pounds of feed were needed. The added feed cost per pound of gain on this basis is shown in Table 1.

In determining the gain or loss from creep feeding, cost of equipment and added labor must also be considered.

### **When Will Creep Feeding Pay**

Creep feeding is usually profitable if the calves are sold at weaning time as feeders or for slaughter. The calves will be heavier, neater in appearance, developed more uniformly, and should command a higher price. Creep feeding is advisable in purebred herds where finish and maximum growth exhibited by the calves at weaning have advertising value. During drought conditions, where pasture is limited, or in cases where the dams' milk production is low, creep feeding is also desirable. If the breeder plans to feed the calves himself after weaning, creep feeding will pay if it is done during the end of the nursing period and the calves are kept on grain until slaughter time.

When pasture is short, the amount of milk the dams can produce is naturally limited. Under such conditions, a supplemental feed such as cane molasses fortified with a protein supplement, such as cottonseed meal or soybean oil meal, supplied to both the nursing calves and their dams would be beneficial to both calves and dams.

In a feeding trial in California, cows lost weight on unsupplemented range (5). Their calves weaned out at an average weight of 386 pounds, and the following year's calf crop was 61 percent. The range supplemented with enough cottonseed cake and barley for cows to maintain flesh, weaned calves which average 481 pounds or 95 pounds heavier. Those cows had a 91-percent calf crop the following year or 50 percent greater than those not given extra feed.



**Figure 1. Pangola pasture.**

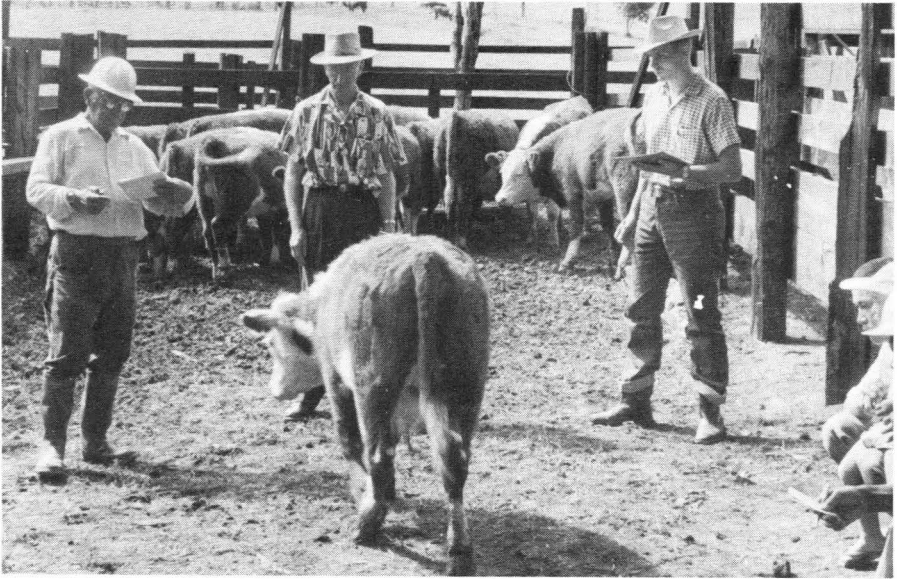
### **When Will Creep Feeding Not Pay**

Creep feeding ordinarily will not pay if calves are carried as stockers and not put on a good fattening ration following weaning. Creep feeding done on good quality pasture at a time when the dam's milk production is good probably would not be profitable for the commercial producer. Cattle buyers often prefer calves for fattening to be in a thrifty, moderate condition because they will make the cheapest gains.

The following example illustrates what can be done in Hawaii on good pasture without creep feeding:

On ranch A, 6 steer calves gained an average of 2.10 pounds daily and 10 heifers gained an average of 1.93 pounds daily on good pasture plus free-choice minerals. These were early 1959 calves on rotated pasture, largely Pangola grass and in an area of relatively heavy rainfall (Figure 1). Weights were adjusted to 240 days of age (8 months). On the same ranch in 1958, 8 steers gained an average of 1.71 pounds daily, and 6 heifers, 1.90 pounds daily up to weaning time (Figure 2). These results were all from a grade Hereford herd. The calves graded equivalent to U. S. Choice in 1959; steers graded Good and heifers High Good in 1958.

Normally, creep feeding of calves would not seem feasible under such conditions.



**Figure 2. Grading calves at weaning.**

### **When To Begin Creep Feeding**

A question that commonly arises is whether to creep feed throughout the nursing period of the calf or only during the latter part.

If full advantage of the calf's growth and finish is desired, then creep feeding should begin as soon as the calves are old enough to eat, which is usually around 4 or 5 weeks of age. In most cases, the time to begin creep feeding will depend upon such factors as system of marketing, condition of pasture, and milk production of the dam. The time will vary from ranch to ranch and from year to year.

### **Equipment For Creep Feeding**

The creep should be placed where the herd gathers to drink or rest so calves will have ample opportunity to enter the creep. Some creeps require a fence around the feeder, others do not. Plans for creep feeders can be found in "Beef and Dairy Equipment Plans," a University of Hawaii Agricultural Extension Service publication which is available at your county agents' office. The creep or creep fence should have openings of such size that the calves can enter while the cows are kept out. At first, the cows should be allowed to feed with the calves so the calves will learn to eat. An open trough can be used for this period. Openings should be made in at



least two different places of the creep fences. This affords an entrance when one of the openings is blocked by a calf standing halfway in the pen after he has finished eating.

A portable creep feeder for calves should be a self-feeder with sufficient bin capacity to hold several days' feed supply. Since all of the calves will seldom enter the creep at the same time, it need only be large enough to accommodate part of them at one time. Roughly 6 to 8 inches of self-feeder space is required per calf, so a self-feeder 10 x 12 feet with a capacity of 55 bushels (approximately 1½ tons) would be of sufficient size to feed 25 to 35 (and probably up to 50) calves for a 2- to 4-week period. This is assuming that a calf will consume an average of 5 pounds of grain per day.

### What To Feed

Grain without a protein supplement is a satisfactory feed if cows are producing ample milk. However, if the dam's milk production is low or the pasture is poor, then a protein supplement should be added to the grain mixture. The protein supplement will also add to the palatability of the ration.

A good mixture for creep-fed calves would be 4 parts grain to 1 part protein supplement. Cracked corn, rolled barley, or crushed oats are satisfactory grains. Cottonseed meal, soybean meal, and linseed meal are protein supplements commonly used. The cheapest of these protein supplements should be used. Corn is usually considered the best grain for fattening animals. It is very palatable and produces more energy than any other grain commonly fed to farm animals. It should be coarsely cracked for best results.

Barley is worth about 88 to 90 percent as much as corn for fattening cattle. It may replace all the corn in the ration but it would be advisable to use half barley and half corn to add variety. Barley should be ground or rolled for best results.

Oats is worth 85 percent as much as corn if it makes up no more than 50 percent of the grain and is worth 90 percent if it makes up to 30 percent of the grain in the ration. It is considered a growing feed more than a fattening feed. Oats are good for getting calves on feed. For best results it should be crushed or ground.

Pineapple bran is often included in the grain ration to add bulk and to help satisfy the calf's appetite. It is very low in protein, and therefore cannot be used to substitute any part of the protein in the ration.

Molasses is the cheapest concentrate in Hawaii. It adds palatability to the ration and helps maintain the calf's appetite. It can be fed free choice or fed as part of a mixed ration. Suggested creep-feeding rations are given in Table 2. Various combinations of these rations may be made.



**Table 2. Suggested creep feeding rations.**

Ration	Corn	Barley	Oats	Pineapple bran	Molasses	Protein Supplement.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
<b>1</b>	<b>2</b>	<b>2</b>	..	..	..	<b>1</b>
<b>2</b>	<b>2</b>	<b>1</b>	..	..	..	<b>1</b>
<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	..	..	<b>1</b>
<b>4</b>	<b>1</b>	<b>1</b>	..	<b>1</b>	<b>1</b>	<b>1</b>
<b>5</b>	<b>1</b>	<b>1</b>	..	<b>1</b>	<b>1</b>	..
<b>6</b>	<b>2</b>	<b>2</b>	..	..	..	..
<b>7*</b>	..	..	..	..	<b>4</b>	<b>1 free choice</b>

\*Supplied in an open trough to calves only or to dams and calves.

Mineral should be made available to the cows and calves at all times. The most essential minerals are sodium, chlorine, phosphorus, and calcium. Common salt as a source of sodium and chlorine, steamed bone meal or dicalcium phosphate as a source of phosphorus and calcium, and ground limestone as a source of calcium are recommended. Feeding mineral free choice is usually sufficient, as animals will normally consume adequate amounts.

### **Post-weaning Period**

Calves usually grow slowly for some months after weaning. They may actually lose weight. Eight months is a common weaning age in Hawaii.

Normally the best economical feed for calves after weaning is good pasture. Using cane molasses, normally a low-cost supplemental feed, will economically increase the rate of gain in many cases. In some cases either a protein supplement in the molasses or grain fed separately will be necessary to maintain reasonable gains.

Free-choice feeding of minerals seems to be good insurance for all cattle on the range (3). Illustrations for two types of mineral feeders can be found in the publication "Beef and Dairy Equipment Plans" (1). A commonly used mineral mixture is made up of equal parts of stock salt and steamed bone meal or a comparable product.

### **When Should Supplemental Feeding Be Considered**

Supplemental feeding should be considered (1) when growing out herd replacements, (2) when getting cattle to market earlier, and (3) during feed shortage conditions. Examples are given below which indicate the value of each.

### (1) When Growing Out Herd Replacements

Figures obtained at ranch B illustrate the value of supplemental feeding beyond weaning and are shown in Table 3. In this trial at ranch B, the females received no supplemental feed. The males after weaning received supplemental feed consisting of a protein supplement, pineapple bran, and

**Table 3. Weight gains of animals on supplemented pasture and on unsupplemented pasture, ranch B.**

Calves	Average weights at			Total gain 240 to 605 days
	240 days	365 days	605 days	
		pounds		pounds
13 Angus males	465	622	928	463
10 Angus females	436	409	567	131

some commercial feed. Cost of feed per extra pound of gain was about 13 cents. These bulls were ready for service by 18 to 20 months of age, while other bull calves not given supplemental feed never did develop into satisfactory breeders.

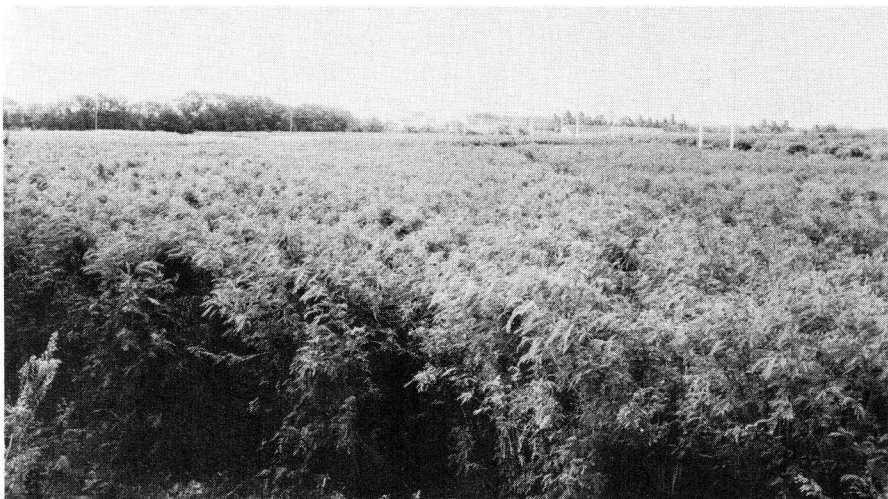
The biggest contrast can be noted between weights at 240 days and 365 days of age. The bulls gained an average of 157 pounds while the heifers lost an average of 27 pounds.

### (2) When Getting Cattle to Market Earlier

Getting cattle finished for market at an earlier age can often result in a higher-grading carcass. It will also allow for enlarging the breeding herd. Supplemental feeding will also increase pounds of beef produced per acre. For example, irrigated Koa haole, napier pasture supplemented only with cane molasses resulted in steers gaining an average of 2.19 pounds daily (Figure 3). This will get steers to a desirable market weight of 1,000 to 1,100 pounds by around 20 months of age.

On ranch C, cane molasses proved to be an economical supplement with both a pigeon pea pasture and a pasture of improved grasses (6). This was shown in the figures obtained from two sets of feeding trials conducted on these pastures, with and without molasses as supplement. The first trials were for 179 days and the second for 202 days. Kikuyu and rhodes were the dominant grasses in the improved pasture areas. Pasture rotation was used with both the pigeon pea and improved grass pastures. Grade Hereford steers averaging about 14 months of age were used for both trial sets.

In the first trials, the daily gains on the pigeon pea pasture were increased from 1.60 to 1.85 pounds with the use of a molasses supplement, and in the second from 1.65 to 2.05 pounds. On the improved grass pasture, daily



U. S. Soil Conservation Service Photo

**Figure 3. Irrigated koa haole.**

gains were increased from 1.57 to 1.73 pounds with molasses and to 1.77 pounds when molasses plus soybean oil-cake meal were fed. In the second trials, daily gains were 1.52 pounds on pasture only, 1.53 on pasture supplemented with molasses, and 1.68 pounds on pasture supplemented with molasses plus meal.

The average molasses consumption per head per day during the first trials was 4.39 pounds on the pigeon pea pasture, 6.08 pounds on pasture when molasses was the only supplement fed, and 3.87 pounds when molasses plus soybean oil-cake meal were the supplements fed. During the second trials, the average molasses consumption per head per day was 5.34, 8.32, and 7.43 pounds, respectively. Consumption of soybean oil-cake averaged .86 pound daily during the first trials and 2.42 pounds during the second trials. Soybean meal was fed separately from the molasses except for the first part of the trials when it was mixed with the molasses. The soybean oil-cake meal did not prove to be economical supplement in these trials.

### **(3) During Feed Shortage Conditions**

During temporary feed shortage conditions, it is sometimes advantageous to supplement feed until conditions improve. This would prevent the setback in growth which commonly occurs following weaning and during dry weather. The amount of supplement should be adjusted to the pasture conditions. As the pasture improves, the amount of supplement can be subsequently reduced and possibly under certain conditions gradually eliminated.

## When Would Supplemental Feeding Be Questionable

Supplemental feeding would be questionable when calves continued to make reasonable gains beyond weaning on pasture alone. The following examples are given:

As previously shown, heifer calves on ranch A in 1958 averaged 528 pounds at 8 months of age and 804 pounds at 20 months. The actual gain from weaning to 20 months was 276 pounds with an average daily gain of .76 pound. This represents an average gain from birth to 20 months (adjusted) of 1.25 pounds (Table 4). No comparable figures were obtained for the steers.

To get additional information on growth rates beyond weaning, the 1959 heifer calves were weighed 125 days following weaning. These heifers gained nearly 1 pound per day beyond weaning without any supplement other than minerals, which seems satisfactory. The results are shown in Table 4.

Extra costs of supplemental feed, labor, and equipment have to be considered to determine the feasibility of supplemental feeding beyond weaning. The amount of extra income from early-maturing cattle of better quality is the other important factor.

If a steer can be finished earlier at a better grade to command a sufficiently high price, supplemental feeding would seem practical.

If once-a-year seasonal breeding is practiced, some supplemental feeding of replacement heifers may also be practical so that they could be bred at 15 to 16 months of age instead of being carried over another year. If split-seasonal breeding is practiced, carryover of these heifers for another 6 months on good pasture should provide ample growth for breeding at 21 to 22 months of age. This same practice could be applied to replacement bulls.

**Table 4. Heifer weights and gains, ranch A.**

	1959 calves*		1958 calves
	Weaning	Post-weaning 125 days	20 months
	pounds		pounds
Average weight	527	650	804
Gain from birth	457	580	734
Gain from weaning	..	123	276
Average daily gain from weaning	..	0.98	..
Average daily gain from birth	1.93	1.60	1.25

\*Actual weights at weaning and post-weaning were used for 1959, instead of weights corrected for age.

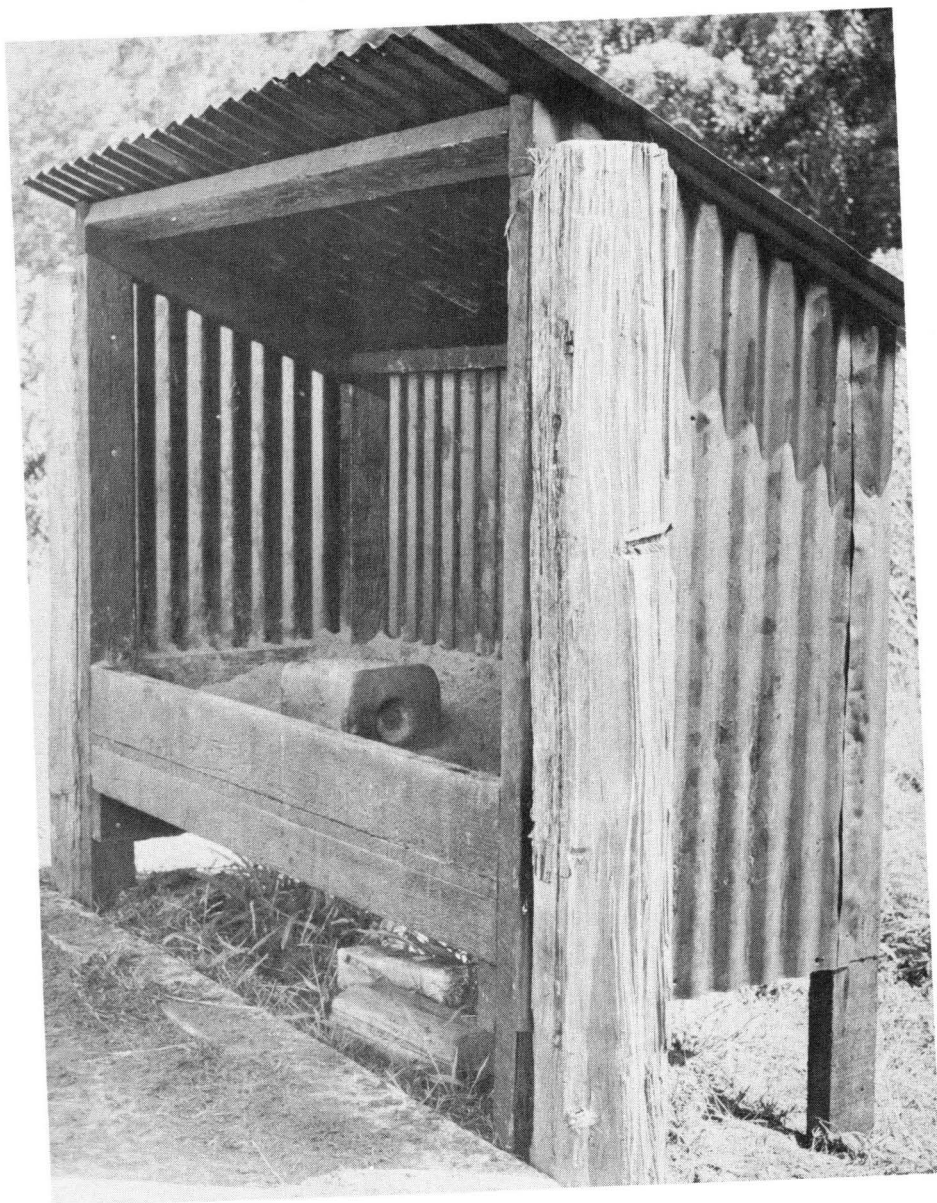
## What To Feed

Either the ingredients previously suggested for creep feeding or commercial feeds may be used as needed to supplement calves on pasture beyond the weaning period. The 3 or 4 months beyond weaning seem to be most critical period for young calves.

One should use supplements which are cheapest for the purpose needed. The quantity of supplement can be determined by the quality and quantity of grass available. At the beginning of the grazing season, the forage contains a higher percentage of protein than it does later. Accordingly, the supplemental feed for the first part of the grazing period may consist of grain exclusively.

As the grass becomes mature or during periods of drought when the grass is brown and dry, it is desirable to add some protein supplement such as cottonseed or soybean meal to the grain mixture. The idea is to maintain the proper ratio between protein and carbohydrates in the ration. Young animals require more protein per unit of body weight than older animals and consequently the ratio of protein to carbohydrates can be larger for older animals.

To permit the use of a self-feeder, salt is often used to regulate consumption of the supplement. Ground barley, cottonseed meal, or a combination of the two are supplements commonly used. The amount of salt needed to regulate consumption will vary from 10 to 35 percent of the total mixture, depending upon the level of consumption desired. Feed consumption should be checked regularly. When the consumption of the supplement exceeds the desired amount, more salt may be added. The amount consumed will also vary considerably with the pasture conditions. During sparse feed conditions, the amount of salt necessary to limit consumption becomes high and the money spent for salt might be better spent for grain. The economics of hand-feeding versus self-feeding should also be examined. Figure 4 shows a simple feeder.



**Figure 4.** Simple feeder, cottonseed meal-salt mixture,  
and a block of salt.

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### **For Further Information**

University of Hawaii College of Tropical Agriculture publications are available at your county Extension office or at the Cooperative Extension Service's Distribution Center, Gilmore Hall 103, University of Hawaii, Honolulu 14, Hawaii.

Ranchers who wish to conduct trials in supplemental feed may receive help from College of Tropical Agriculture specialists through county Extension offices.

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