

SELF-FEEDING DAIRY REPLACEMENTS UNDER DRY LOT CONDITIONS

A. H. Rakes
North Carolina State University, Raleigh

The traditional system for feeding herd replacements involves the offering of both roughage and concentrate feeds at least once daily. If this method is used with proper precautions, excellent results can be obtained. However, there are a number of potential problems associated with it. Some of the disadvantages are:

1. It is difficult to obtain uniform growth rates within heifer age groups. A few heifers are "dominant" in the group and consume more than their share of concentrate feed. On the other hand, the less aggressive heifers are not able to obtain a sufficient quantity and balance of nutrients to grow at an acceptable rate. Although the "timid" heifers tend to overcome their growth deficiencies when ample quantities of good roughage are available, many of them are either bred later than desirable or enter the milking herd in poor condition.
2. The daily transportation of feed to heifers causes labor problems. This is particularly true during weekends, holiday periods, and the cropping season.
3. Heifers tend to consume their concentrate allowance in one large meal each day. In extreme cases the adding of large "slugs" of feed to their rumens in a few minutes may cause digestive upsets. At the least, decreased feed utilization efficiency can be expected.

In order to minimize these difficulties, we have worked with two other feeding systems for herd replacements; (1) using complete blended rations, and (2) using salt as a regulator of concentrate intake.

Complete Rations

Total blended rations or complete feeds contain all ingredients in the desired proportions and are balanced nutritionally. The heifers are allowed to consume the rations ad libitum with the fiber and/or bulk of the ration being used to regulate intake. Dry complete feeds can be made available in gravity-flow self-feeders which require refilling only periodically; for example, weekly rather than daily. Silage based complete feeds can be stored in bunker silos with self-feeding gates. The labor saving aspects of these systems are obvious. They are particularly advantageous on weekends and holidays. With the exception of checking for health problems and/or illness, no effort during these inconvenient times is required.

A major advantage associated with the complete feed systems is the minimizing of competition among heifers for feed. Since the ration is available at all times, all animals are able to obtain their share. The dominant or "boss heifers" simply do not have the patience to guard the feeder throughout the entire 24-hour period. Additionally, the constant

availability results in the consumption of several smaller meals spread throughout the day, rather than one or two large meals. This system also provides the opportunity for utilizing by-products and low quality roughages. When such ingredients are offered separately, heifers tend to eat only minimum quantities. However, when they are mixed with grains or protein concentrates, heifers consume much larger amounts.

In areas where soybean hulls are available at a reasonable price, they have been used as the sole source of protein and energy for weaned heifers. A mineral-vitamin supplement is made available on a free-choice basis. Of course no mixing is required. Also, the handling qualities of soybean hulls are very desirable.

Complete rations for heifers younger than six months

It has been demonstrated that heifers can be placed on complete rations as soon as they are two months of age. However, those younger than approximately six months require a ration with higher concentrations of energy and less fiber than the older heifers. Although no major problems were encountered with a complete ration containing only 10.5% crude protein, the overall condition and/or appearance of the calves were improved when higher protein levels were used. Examples of rations used successfully for heifers in this age group are presented in tables 1 and 2.

Complete rations for heifers six months and older

After heifers are approximately six months of age, it is generally necessary to raise the percentage of roughage in the ration to prevent over-conditioning. At the same time the protein percentage can be lowered. Some complete rations that have been successfully used for heifers between six months and calving are shown in tables 3 and 4.

Limitations of complete feed system for feeding heifers

With some roughages (cottonseed hulls and ground hay) bridging may occur and the feeders may require attention periodically. This problem can be minimized by lining the feeders with sheet metal and not overloading or packing them. With other roughages (soybean hulls and ground corn cobs) these precautions may not be necessary. No major health problems have been encountered when heifers are fed these feeds. In one study using soybean hulls as the sole protein and energy source a few animals appeared to have distended rumens. Although they were neither treated for bloat nor removed from the feeding trial, they soon returned to normal without any apparent ill effects. When animals have been slaughtered after at least 100 days on these feeds no abnormalities of either the rumen wall or the liver have been detected.

If it is advantageous in a given management system to handle all heifers over six months of age in one group, this can be done successfully. The growth rate data shown in tables 3 and 4 were obtained with heifers fed in this manner. However, growth rate can be more precisely controlled by separating the heifers into two groups and offering rations containing different energy levels. Basically the group assignments are made on the

basis of age. However, in some instances it is necessary to formulate groups with a wide variation in age to compensate for previous over or under feeding or other factors affecting growth rate. Heifers can be switched from one group to the other according to their condition at a given time.

Using salt as a regulator of concentrate intake

If concentrate intake can be controlled, allowing the heifers free access to concentrates and roughages separately has many of the advantages of the complete ration system without the problems and expense associated with mixing high fiber rations. Using salt to control concentrate intake is practiced widely in beef operations and to some extent in feeding dairy herd replacements. This practice involves mixing large quantities of salt in the concentrate mixture and allowing free choice consumption. In some preliminary studies this procedure has been successful. Heifers have gained at a satisfactory rate, and no health problems have been encountered. There are a number of factors that apparently influence the consumption level of concentrates containing a given level of salt (age, roughage, water, etc.). Adding 20 to 30 percent salt is a reasonable starting point. The amounts can be adjusted if heifer response is not satisfactory.

Many users of this system of feeding herd replacements have expressed satisfaction with it. However, there are potential problems associated with its use. First, the consumption of other mineral mixtures is reduced. It is probably desirable to incorporate all of the minerals in the concentrate at the desirable levels. Also, the consumption of such large amounts of salt could alter the requirements of the heifer of other minerals. Of course, salt taken in sufficiently large doses is toxic, especially if the availability of water is limited. It is desirable to hand feed the heifers until they have adjusted to the high salt ration and to maintain a readily accessible water supply. Since there is evidence that even normal amounts of salt in the diet of heifers increases the severity of udder edema at calving, salt should not be used to limit the concentrate intake of heifers nearing the end of gestation. Although there are no data to measure this, there may be some salt accumulation in the soil of areas where this procedure is practiced for extended periods.

TABLE 1. COMPLETE RATION FED TO HOLSTEIN HEIFERS
(2-6 MONTHS OF AGE)

<u>Ration composition</u>	
<u>Ingredients</u>	<u>Concentration</u>
Corn (ground, shelled) (%)	53.75
Soybean oil meal (%)	15.00
Cottonseed hulls (%)	30.00
Dicalcium phosphate (%)	.75
Trace mineralized salt (%)	.50
6 million IU of Vitamin A supplement	
Avg. daily gain (lb)	2.2

Rakes and Davenport, 1973.

TABLE 2. COMPLETE RATIONS FED TO HOLSTEIN AND
JERSEY HEIFERS (2-6 MONTHS OF AGE)

<u>Ingredients</u>	<u>Ration concentration</u>	
	1	2
Corn (ground, shelled) (%)	44.2	39.6
Cottonseed meal (%)	22.1	19.8
Citrus pulp, dried (%)	8.8	7.9
Coastal Bermudagrass pellets (%)	8.8	7.9
Peanut hulls, unground (%)	15.0	--
Cottonseed hulls (%)	--	24.0
Vitamins A, D, E, salt and Dical. Phos. (remainder)		
Avg. daily wt. gain (lb)	2.0	2.2

Clifton and Fowler, 1975.

TABLE 3. RATIONS SUPPORTING 1.5-2.0 POUNDS AVERAGE DAILY GAINS

Ingredients	Ration concentration		
	3	4	5
Ground corn cobs (%)	75.3		
Cottonseed hulls (%)		78.5	82.5
Ground corn (%)	6.3		
Soybean oil meal (%)	17.0	12.0	
Feather meal (%)		8.0	16.0
Dicalcium phosphate (%)	1.0	1.0	1.0
Trace mineral salt (%)	.5	.5	.5
Vitamin A (IU/lb)	3,000	3,000	3,000
Daily gain (lb)	1.7	1.5	1.5
Daily consumption (lb)	25.0	25.7	24.1
Range daily gain (lb)	1.0-2.5	1.1-2.0	1.0-2.1

TABLE 4. RATIONS SUPPORTING MORE THAN 2.0 POUNDS AVERAGE DAILY GAIN

Ingredients	Ration concentration	
	1	2
Ground corn cobs (%)	58.3	
Cottonseed hulls (%)		41.5
Ground yellow corn (%)	26.2	43.0
44% soybean oil meal (%)	14.0	14.0
Dicalcium phosphate (%)	1.0	1.0
Trace mineralized salt (%)	.5	.5
Supplemental Vitamin A (IU/lb)	3,000	3,000
Average daily gain (lb)	2.2	2.2
Average daily consumption (lb)	25.4	28.6
Range average daily gain (lb)	1.5-2.9	1.6-2.9