

# *Group-feeding complete rations to lactating dairy cows*

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**W**ITH MODERN RAPID MILKING techniques today's high producing dairy cows often are not in the milking barn long enough to consume sufficient concentrates to fulfill their energy requirements for high milk production. Elaborate concentrate feeding guides based on varying milk production levels are useless if the cow does not have time to consume her allotted amount. In many barns and parlors, the correct amount of feed is given to high producing cows but often some is left behind for the next cow.

Some dairymen have attacked the problem by feeding a portion of the concentrates with roughage outside the milking parlor. A base amount of 5 to 10 lbs per cow is fed outside daily and the remainder is fed in the milking parlor.

With this system it is possible to feed high producing cows more in line with their production. However, it does add another chore because concentrates have to be fed both in the milking parlor and outside with the roughage.

Some dairymen and researchers have wondered why it is necessary to feed anything at all in the milking parlor. If all of the concentrates could be fed outside, it would eliminate the need for the milker to feed concentrates and he could concentrate on just milking cows. There would be less dust and wasted feed in the parlor. And surprisingly, those who have tried it report that, after an initial training period, cows are calmer while being milked when they receive no feed. Cows do not move back and forth or bang on

the feeders in attempts to get more feed if the feeders aren't there.

The most important question regarding the feeding of dairy cows in this manner is whether they will produce as well if the production based grain allotment ordinarily fed in the milking parlor is mixed with roughage and group fed in mangers as a complete ration. With this in mind, a cooperative trial between the University of California Agricultural Extension Service and Chico State College was initiated using dairy cows in the Chico State herd.

## **Trial design**

A double-reversal design with two groups of 22 cows each was used for the trial. The main basis for allotment to groups was size and temperament of the cows. Cows were switched between treatments at five-week intervals, the first week of which was used as a change-over period. This design eliminates the possibility of higher producing cows being in only one treatment because all cows go through both treatments.

## **Concentrates**

Concentrate allotments were based upon milk fat production during the first week of each treatment period. Amounts recommended in University of California publication AXT-168, "Concentrate Feeding of Dairy Cows," were used in all cases. Cows on the control treatment received their concentrates in the milking parlor. Eight of the cows could not consume their allotments during milking. These cows were separated at noon and fed the remainder of their daily allotment. While cows were on the complete ration treatment, they received only 2 lbs. of concentrates per milking as a teaser to get them into the parlor. Time did not permit the cows to be trained to no concentrates in the milking parlor before initiation of the trial. The remainder of the concentrate allotment for this treatment group was mixed with alfalfa hay and group fed in outside mangers.

The concentrate mix was in pelleted form and consisted of 31 per cent milo,

Dairy cows at Chico State College eating the experimental complete ration of moistened, shredded hay and concentrates.



13 per cent wheat mixed feed, 11 per cent corn, 11 per cent barley, 9 per cent cottenseed meal, 9 per cent hominy feed, 7 per cent molasses dried beet pulp, 7 per cent cane molasses and 2 per cent minerals. Samples of concentrate were collected during the trial from each delivery for chemical analyses. Average analyses showed 15.3 per cent crude protein and 6.9 per cent crude fiber. During the trial an average of 16.5 lbs of concentrates (90 per cent dry matter) were fed daily per cow. Cows received an average of 1 lb more concentrate per day when fed the complete ration due to the increase in milk production which occurred during the first week of each treatment period every time they were switched from the control ration.

### Roughage

Alfalfa hay was fed free choice to both groups. While on the control treatment, cows received the hay in bale slice form whereas it was moistened, shredded, and mixed with the concentrate allotment for the complete ration treatment. Hay fed was weighted at each feeding and core samples of all bales were obtained for chemical analyses. Average analyses of the hay dry matter during the trial were 21.4 per cent crude protein and 26.7 per cent crude fiber. In each case roughage amounts were adjusted daily to insure a slight excess. Average daily hay fed per cow (90 per cent dry matter) was 32.0 lbs. Mangers were cleaned weekly and refused material was discarded.

### Milk production

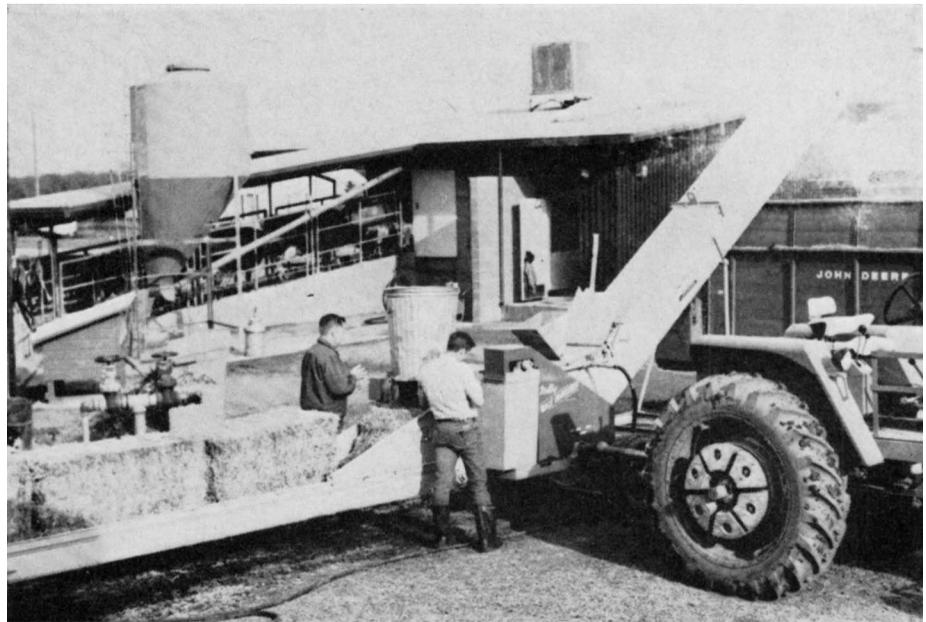
Milk weights were recorded at each milking and samples were drawn to make up seven day composites for milk fat and solids-not-fat (SNF) determinations. Results of the trial are shown in table 1.

TABLE 1. MILK PRODUCTION AND COMPOSITION

	Control	Complete Ration
Milk (lb/day)	45.3 <sup>a</sup>	48.4 <sup>b</sup>
Milk Fat (%)	3.69	3.69
Milk Fat (lb/day)	1.66 <sup>a</sup>	1.79 <sup>b</sup>
Solids-not-fat (%)	8.77 <sup>a</sup>	8.94 <sup>b</sup>
Solids-not-fat (lb/day)	3.98 <sup>a</sup>	4.32 <sup>b</sup>

<sup>a, b</sup> Values with different superscripts are significantly different (P < .001).

Milk production was 48.4 lbs per day on the complete ration compared to 45.3 lbs per day on the control, a difference of 3.1 lbs per day in favor of the complete ration. Milk fat percentage was the same for both treatments, 3.69 per cent. Due to the higher milk production, milk fat was increased from 1.66 lbs per day on the control ration to 1.79 lbs on the complete ration, a difference of 0.13 lb per day.



Hay shredding equipment used in trials for group-feeding complete rations to lactating dairy cows.

An increase in SNF percentage from 8.77 to 8.94 per cent also was observed. This resulted in an increase of 0.34 lb per day of SNF from the complete ration treatment over the control. In all cases except milk fat percentage, the differences in favor of the complete ration were statistically significant at the 0.1 per cent level.

### Cow characteristics

All cows were tape measured to estimate body weights at the beginning and end of the trial. This information plus the initial and final milk fat percentage and amounts as well as ranges are reported for the two groups in table 2.

Note that cows in group 1, eating the same complete ration during the first period, were producing from 35 to 97 lbs of milk per day. The range in milk production during the third period when they were again on the complete ration was from 28 to 88 lbs per day. The decrease in maximum production of only 9 lbs per day over about two months indicates that the higher producers were able to satisfy their energy requirements from the complete ration as well as their lower producing pen-mates. Evidently they ate faster and/or longer than the lower producers because it takes almost twice as much energy for a 1,400-lb cow

to maintain herself and produce 97 lbs of milk as it does for 35 lbs. The same situation was true for group 2, but the spread in production was not as wide in this group. This observation tends to confirm that cows eat to their level of energy expenditure when provided a ration free choice.

Application of this feeding procedure to commercial dairies would vary depending on dairy size. In large dairies, it would be possible to divide the herd into strings according to production and stage of lactation and feed varying combinations of roughage and concentrates according to the needs of the average of the string. This may not be possible in smaller herds due to corral arrangements and the small number of cows that would fall within various production ranges. Even in this latter case, present results indicate that the complete ration system is feasible, nutritionally sound, and gives as good or better results than individually feeding cows in milking parlors.

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TABLE 2. BODY WEIGHTS, MILK PRODUCTION AND MILK FAT PERCENTAGES IN FEEDING TRIAL

	Body Weight (lb)		Milk (lb/day)				Milk Fat (Per cent)			
	Initial	Final	Initial	Range	Final	Range	Initial	Range	Final	Range
Group 1*	1,279	1,372	62	35-97	53	28-88	4.1	2.8-5.3	3.4	2.1-4.5
Group 2*	1,382	1,495	43	20-49	35	17-51	4.3	3.2-5.7	3.9	3.0-5.2

\* Cows in group 1 started this trial on the complete ration, were switched to the control during the second period, and returned to the complete ration during the third period. Group 2 followed the opposite pattern of control, complete ration, and control for periods 1, 2 and 3, respectively.