

## Pelleted hay mixture enables

# Dairy Cattle

### to give more milk with less butterfat

Dairy cows receiving an all-pellet ration produced slightly more milk but with significantly lower butterfat than did cows eating similar amounts of long hay and concentrates. Butterfat tests were reduced by 0.1% to 0.3%.

Two groups of 15 first-calf heifers were used to study the effects of a pelleted hay concentrate ration in Riverside County. All cows received both a long hay concentrate and a pelleted mixture of ground hay and concentrate, alternately, for four-week periods during the course of a 12-week, double-reversal trial.

The pellets used contained approximately 25% concentrate and 75% ground hay. Hay, ground to 1/4" length for the first two periods, and to a 5/16" grind in the latter period, was blended with concentrate and compressed into a 5/8" pellet. The control ration was baled

alfalfa hay fed free choice, with the concentrate level adjusted each period to maintain approximately a 1:3 grain:hay ratio.

The animals were paired according to size, stage of lactation, and production level before the trial was started. All cows had reached their peak of production before the start of the trial. They had been in milk an average of 112 days at the beginning of the trial and were producing a daily average of 45.4 pounds of 3.7% milk. Average body weight of the 30 cows was 1,170 pounds. Daily milk weights for each cow were recorded, and a portion of the milk was saved for a butterfat determination. The butterfat tests were determined from weekly composite samples of the milk from each cow. Body weights were obtained by weighing each cow once monthly, immediately after milking.

Amount of feed used was estimated for each group of cows by weighing all feed offered during the four-week period, and obtaining daily weighbacks of feed refused. Milk and butterfat production and feed used were calculated on a per-cow per-day basis. Body weight changes were analyzed on a per-cow per-four-week period basis.

The data were analyzed statistically to remove the effects of changing environment, between-cow variation in production level, and between-cow variation in the slope of the lactation curve. After these effects were removed, it was found that pellet-fed cows produced 1.69 pounds more milk daily and that daily butterfat production was decreased 0.04 pound. Since milk increased significantly while total butterfat production decreased significantly, the depression of butterfat test must be significant. It was

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Analysis of the feed consumption data after correction for changes in animal size showed a significant shade-by-ration interaction. This indicates that there was some difference in the acceptability of the rations under the two conditions of shade. However, no difference in total dry matter consumption due to the different shade areas was detected.

The results of the trial indicate a definite advantage of increased average daily gain when yearling steers are provided 48 square feet of shade per head, as compared with 27 square feet per head. This result was true whether a ration relatively low in total digestible nutrients—58%—or high in TDN—67%—was fed.

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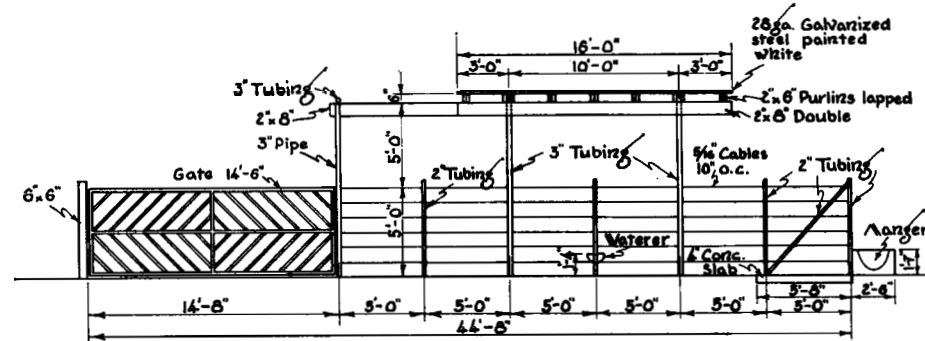
Effect of Shade Area and Ration on Gains and Feed Consumption of Hereford Steers

	48 sq. ft. of shade/steer			27 sq. ft. of shade/steer		
	High-energy ration*	Low-energy ration†	Mean	High-energy ration*	Low-energy ration†	Mean
No. of animals	15	15	30	15	15	30
Av. initial weight, lbs.	627	625	626	627	623	625
Av. final weight, lbs.	823	808	815	814	782	798
Total average gain, lbs.	196	183	189	187	159	173
Av. daily gain, lbs.	2.33	2.18	2.25	2.23	1.89	2.06
Av. daily feed consumption, lbs.	17.8	18.3	18.0	18.2	17.9	18.0
Feed/100 lbs. gain, lbs.	763	841	802	814	946	880

\* High-energy ration: Alfalfa hay 25%; oat hay 10%; barley 48%; molasses beet pulp 15%; and molasses 2%. Estimated total digestible nutrients—TDN—67%.

† Low-energy ration: Alfalfa hay 46%; oat hay 19%; barley 25%; molasses beet pulp 8%; and molasses 2%. Estimated TDN 58%.

A cross section of the shade before removal of the sheets.



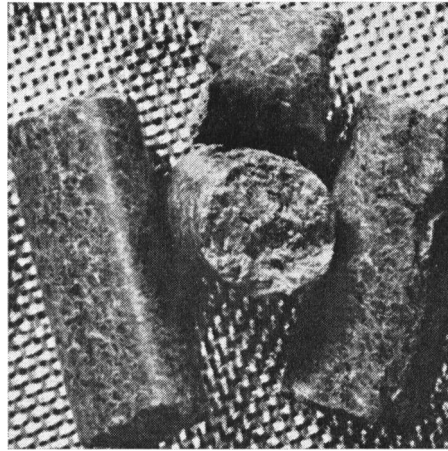
indicated that the butterfat test had stabilized before the end of the four-week period. This observation has been confirmed by more recent observations of weekly butterfat tests with cows in the test herd fed pellets continually. There was no significant difference in body weights and feed consumption between groups.

The results of this feeding trial confirm other work already completed. In a Connecticut trial on pelleted hay, butterfat tests were reduced from 4.2% to 3.8%. This drop, however, was associated with apparent unpalatability because an extremely hard pellet was used. Hay consumption was reduced 30% below that of controls. One trial at Davis resulted in a decided drop in butterfat production. Hay ground through a 1/16" screen reduced butterfat test from a pre-trial level of 3.5% to 2.6%. Feeding a pelleted mixture of this finely ground hay and 30% or more concentrate reduced the butterfat test even more. Oregon work in which hay was ground to 3/16" and pelleted resulted in only a slightly lower butterfat test.

The depression of butterfat can be prevented by feeding six to 10 pounds of long hay. Even lower amounts might be effective, but specific amounts can not be stated with full assurance of safety. Some, but not complete, recovery from fat depression was observed in the Davis trial when pelleted hay rations were supplemented with as little as two to four pounds of long hay daily. Whether or not equivalent amounts of other forage would have a similar effect is not known. No fat-depressing effects were observed when about 20 pounds of pelleted hay were fed in combination with about 40 pounds of corn silage.

Very little information is available regarding the performance of milk cows when fed pelleted hay for long periods of time. Toughening—hyperkeratinization—of the rumen wall has been observed with steers and lambs after relatively short periods of time on pelleted rations. What effect this condition might have upon the performance of the animal is not known. Dairy cows fed pelleted

rations for over six months at Davis have not shown any adverse response with respect to general health, especially from the standpoint of rumen function. Immediately after feeding, all animals demonstrated a mild distention, but no problems with bloat have been encountered. Two cows which had been on pelleted rations for four to six weeks were subjected to exploratory rumenotomies, and in each case the rumen tissue appeared to be in good condition, with no suggestion of hyperkeratinization. Both of these cows had earlier suffered butterfat depression.



Pellets—5/8" x 2"—used in the Riverside County trial.

Consumption of pelleted hay by dairy cows appears to have been reasonably good. One exception was the depressed consumption due to an extremely hard pellet used in the Connecticut study. Another exception was reported from Arizona, where difficulty was encountered in getting the cows to eat prescribed amounts of pellets made from ground, dehydrated alfalfa, although actual amounts consumed were not reported. When supplemented with silage or straw, these pellets were apparently consumed with relish. With the exception of the one trial at Davis, intakes have not apparently been stimulated by pelleting. This is contrary to observations made with meat animals, in which improved performance has, in fact, been explained by the higher rate of consumption.

Many factors may control pellet palatability and consumption. The hardness of the pellet has been observed to have an effect. If a complete ration is included in the pellet, the higher the percentage of concentrate in the pellet the lower intake is likely to be. This was observed in the Riverside County trial when the pellet-fed cows were switched to a 36.5% concentrate pellet at the close of the experiment. The daily consumption of pellets decreased 10 pounds immediately. The hay portion of the pellet was also different since it contained a mixture of new and old hay, the latter being of poorer quality than the hay in the pellet fed earlier. Perhaps the quality of the hay pelleted has some effect on consumption, but this has not as yet been adequately checked.

### Practical Application

If a group of cows on a normal routine of long hay and concentrate were producing 1,350 pounds of milk per month, testing 3.5%, there would be a 48-pound monthly butter production. If these same cows were put on pellets and all other conditions remained constant, these results could be expected: monthly milk production would increase to between 1,383 and 1,416 pounds; butterfat production would drop to a point between 45.6 and 47.7 pounds, and the butterfat test would be lowered by 0.1% to 0.3%.

In the feeding trial in Riverside County, amount of feed used was measured. Because wastage could not be accounted for and since the chemical composition of the feed offered and of that refused was not determined, these measurements could not be used to determine consumption. However, they have some validity for estimating cost of production.

The accompanying table shows the value of milk produced and feed costs for each treatment. It seems, then, that any potential advantage of feeding an all-pellet ration must be realized through 1, convenience of handling; 2, savings in transportation costs; 3, savings in shrinkage, wastage, and refusal; and 4, a decrease in incidence of hardware cases.

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Value of Milk Produced and Feed Costs per Type of Feed

	Long hay and grain	Pelleted mixture	
Monthly production, butterfat, lbs. ....	44.0	42.9	
Value of product @ \$1.25/lb. ....	\$58.20		\$57.90
Daily concentrate, lbs. ....	12.08	11.62	
Daily hay, lbs. ....	39.86	34.98	
Cost of concentrate @ \$60/ton. ....	\$ 0.3624		\$ 0.3486
Cost of hay @ \$30/ton. ....	\$ 0.5979		\$ 0.5247
Cost of pelleting mixture @ \$8/ton. ....			\$ 0.2078
Daily feed cost. ....	\$ 0.9603		\$ 1.0811
Monthly feed cost. ....	\$28.80		\$32.40
Monthly income over feed cost. ....	\$29.40		\$25.50