TABLE 1: MOISTURE CONTENT AND PROXIMATE ANALYSES OF FEED INGREDIENTS

| | Moisture Content (as fed) | Crude Protein | Crude Fat | Crude Fiber | Ash | NFE |
|---|---|---|---|---|---|---|
| | % | Per cent (dry matter basis) | | | | |
| High-moisture barley | 28.0 | 12.6 | 2.2 | 7.5 | 3.8 | 73.9 |
| High-moisture milo | 27.8 | 9.3 | 3.6 | 3.2 | 2.7 | 81.2 |
| Concentrate mix | 12.0 | 15.4 | 2.6 | 6.8 | 5.6 | 69.6 |
| Alfalfa hay with molasses | Variable | 20.1 | 1.3 | 29.6 | 9.6 | 39.4 |

TABLE 2: AVERAGE MILK PRODUCTION AND WEIGHT GAINS

| | Control group | High-moisture group |
|---|---|---|
| Daily milk (lb.) | 43.5 | 42.9 |
| Milk fat (%) | 3.65 | 3.78 |
| Daily milk fat (lb.) | 1.58 | 1.59 |
| Daily 4% fat-corrected-milk (lb.) | 41.1 | 41.3 |
| Daily gain (lb.) | 0.5 | 0.6 |

A 450-ton high-moisture-grain tank with the out-auger at the bottom right of tank, leading to a roller mill. The rolled grain falls through the roller mill onto a conveyer and is then carried to the elevator where it is elevated and dumped into the feed truck. The large, sealed-storage tank to the right of the grain storage tank contains alfalfa haylage.

WILLIAM B. HIGHT
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# HIGH-MOISTURE GRAIN

## *for lactating dairy cattle*

**Results of this trial with high-moisture milo and barley were similar to previous studies with corn—all can satisfactorily replace a major portion of a concentrate mix in a dairy ration on an equal dry matter basis. However, it takes from 20 to 30 per cent more high-moisture grain than dry grain to obtain equal dry matter intake and, subsequently, equal milk production.**

HIGH-MOISTURE CORN has gained considerable popularity in midwestern states as a feed for both dairy and beef cattle. Feeding trials at midwestern experiment stations have shown equal performance from high-moisture corn and dry corn per unit of dry matter fed. To replace 1 lb of dry corn takes from 1.2 to 1.3 lbs of high-moisture corn (depending on its moisture content). Barley and milo are used as dairy feeds to a much greater extent than corn in California and other western states. A seven-month-long field trial was conducted in Madera County during the fall and winter of 1965 and 1966 by the University of California Agricultural Extension Service to test the performance of dairy cows fed high-moisture barley and milo. The results of the trial demonstrated that high-moisture milo and barley could also satisfactorily replace a major portion of the concentrate mix in a dairy ration.

Fifty-six head of first-lactation Holstein heifers were allotted alternately to two groups as they freshened. Both groups were fed chopped alfalfa hay, free choice, to which was added some water and about 2 lbs of molasses per head per day (about 5% of the total amount of hay fed). This mix was fed in corral mangers once daily in sufficient amounts that there was always feed available.

One group had an average of 15 lbs of high-moisture grain per head added to the hay and molasses each day. The control group was fed 12 lbs per head of a commercial concentrate mix as a top dressing on their hay-and-molasses mix. The concentrate mix was composed of 50% barley, 25% wheat-mixed feed, 15.4% hominy feed, 4.6% cottonseed meal, 3.5% molasses, 0.5% rice bran, and 1% salt. Three thousand international units (I.U.) of vitamin A and 6,000 I.U. of vitamin D were added per pound of feed. Because of the difference in moisture content, 12 lbs of the concentrate mix was approximately equal to 15 lbs of the high-moisture grain on a dry-matter basis. Both groups of cattle received the concentrate mix free choice in the barn during milking. Each group consumed an average of 8 lbs of this mix per head daily throughout the trial. Daily feed schedules for the two groups were:

| | Control | High-moisture |
|---|---|---|
| | lbs | lbs |
| Alfalfa hay | Free choice | Free choice |
| Molasses | 2 | 2 |
| Concentrate mix | 20 | 8 |
| High-moisture grain | .. | 15 |

The high-moisture grain was stored in a 450-ton, air-tight metal silo. High-moisture barley was fed during the first 42 days of the trial, followed by high-

moisture milo for the balance of the trial. The change from barley to milo was not abrupt, since the milo was stored on top of the barley and some mixing occurred as the grain was augered from the tank. Prior to blending with the hay-and-molasses mix, the high-moisture grain was run through a crimper which was powered by a 10 h.p. electric motor. The speed setting on the auger motor had to be adjusted from time to time to insure a precalculated delivery rate of high-moisture grain from the tank. An error in the setting during part of the trial resulted in the high-moisture-grain group receiving somewhat less than 15 lbs per head daily over a three-week period.

Once each month during the course of the trial the heifers were weighed individually. Standard monthly DHIA production records were used in determining the milk production of the cows in the trial. The moisture contents and proximate analyses of the feed ingredients (on a dry matter basis) fed during the trial are shown in table 1. Milk production and weight gain data are shown in table 2. None of the differences between the two groups shown in table 2 was statistically significant. Five cows in the control group and two in the high-moisture grain group were culled during the trial. This left 23 in the control and 26 in the high-moisture grain group from which the milk production data was calculated. Weight gain data were used from all 56 cows while they were in the groups, whether or not they completed the full seven months of the trial.

Even though production data from the two groups were not statistically different, an economic analysis of the input-output relationships showed a monetary advantage for the high-moisture-grain group—under the price structure and operating conditions at this particular dairy.

Whether high-moisture grain is more economical to feed than dry grain, or a concentrate mix, is dependent on several factors: (1) the price of the high-moisture grain; (2) the price of dry grain or a concentrate mix; (3) whether the silo is filled once or twice each year; and (4) overhead charges (silo cost, interest, electricity, repairs, etc.). These factors are variable from one dairy to the next and each dairyman must figure the economics of high-moisture-grain feeding for his own situation.

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# *Effects of hay quality on milk production and hay intake by dairy cows*

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ALFALFA HAY usually provides at least half of the roughage used for California milk production by dairy cows during some portion, if not all, of the 365 days of the year. It may be the only source of nutrients for dairy cows on grade B dairies during the winter season. Selection of alfalfa hay is a major management consideration for California dairymen because the nutritive value and feeding quality are highly variable. An accurate gauge of the nutritive value of a given lot of hay is the level of crude fiber it possesses. A method for evaluating nutritive value from the crude fiber content has been developed by the California Experiment Station. Commercial laboratories, using this method, have been available to test samples of hay submitted by progressive dairymen.

A special opportunity to test the hay sampling and evaluation concept occurred in 1965 when, on August 12, a 0.97-inch rain fell in the Sacramento Valley town of Orland, wetting approximately 10 tons of fourth cutting alfalfa hay in the swath. It was sold to Chico State College dairy at a discounted price. The previous cutting of hay from the same field, which had a lower crude fiber content, had also been purchased by the college. Both lots of hay were leafy, retained good green color, were free of weeds or any signs of mustiness, and showed bloom in the bale.

A trial testing production response of milk cows fed the low quality hay as compared with higher quality hay (made from the same field at the previous cutting) was conducted at the Chico State College dairy in cooperation with the University of California Agricultural Extension Service. The higher quality, lower fiber hay is referred to as the "control hay" in this report.

Twenty-two cows were selected for a double reversal trial, and were divided into two groups of 11 cows each, penned in adjoining lots. One cow became ill and was removed from her group; a like animal was taken from the other group to compensate. One group of cows was fed the low quality hay for the first three weeks of the trial. For the next three weeks they were fed the control hay, and then returned to the low quality hay for the final three weeks of the trial. The other group started on the control hay, was switched to the low quality hay during the second period, and returned to the control hay during the third period. Milk production and feed consumption data from the last two weeks of each period were used in the analysis of the results, with the first week used as a changeover period.

**CALIFORNIA AGRICULTURE**

Progress Reports of Agricultural Research, published monthly by the University of California Division of Agricultural Sciences.

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