Feed Mixtures for Milk Goats

feeding trials with milking does compared simple and complex concentrate mixtures as the needed supplements to roughage

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High-milk-producing goats require concentrates in their ration—in addition to roughage—because they are physically incapable of consuming enough bulky food to meet their production requirements.

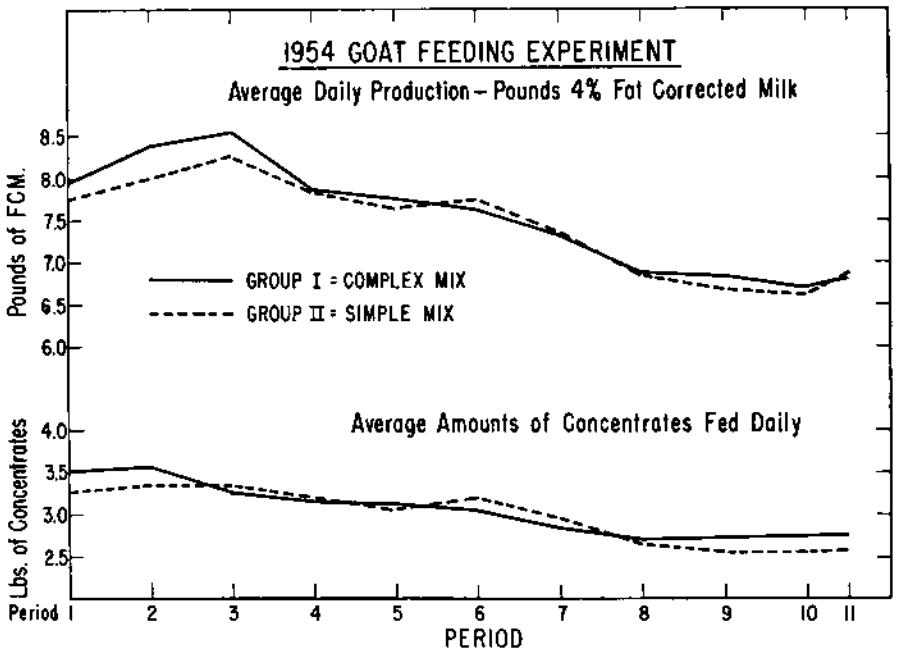
Roughages are high in fiber and relatively low in total digestible nutrients, while concentrates—such as the grains, grain by-products, and by-products of the oil-bearing seeds—are high in digestible nutrients and relatively low in fiber. Both roughages and concentrates are further subdivided into high-, medium-, and low-protein feeds. For example, alfalfa hay has a digestible protein content of around 10%–11%, with some of excellent quality ranging up to 14%. Grain hays, on the other hand, are low, having around 4%–5% digestible protein. Oil meals, such as cottonseed, linseed, and others, run from 30%–38% in digestible protein, while grains are relatively low, being between 5% and 7%.

Concentrates in general are higher in price than roughages, but there are some that supply digestible nutrients at less cost than others and there are seasonal differences in the prices of comparable feeds.

The principal cost involved in the production of goat milk is the feed bill, which makes up about 65% of the total. Therefore, to supply most economically the needs of the animals for proteins and carbodydrates, minerals and vitamins, concentrates should be purchased on the basis of cost per pound of digestible nutrients rather than cost per pound of feed. Two feeds may cost the same but one may have a considerably higher percentage of digestible nutrients.

Two feeding trials—one in 1953 and the second in 1954—were conducted to gain specific information concerning the comparative values of complex and simple concentrate mixtures for milk production. The first trial—completed during the summer of 1953—demonstrated that a concentrate mixture consisting of either rolled barley, or 85% rolled barley plus 15% cottonseed meal, was equal to a complex mixture for medium-producing goats when these mixtures were fed with 4.5 pounds of alfalfa hay and 1.5 pounds of almond hulls daily.

The second feeding trial involving 36 high-producing does was conducted during the summer of 1954 on a dairy three miles southwest of Atwater in Merced County.



The does used in the trial—selected for their uniformity in age, date of kidding, milk and fat production, and body weight—were separated into two equal groups.

The does in Group I received the complex concentrate mixture. Two of the does had kidded in February, 15 in March, and one in April.

In Group II—receiving the simple concentrate mixture—three does kidded in February, 13 in March, and two in April.

At the start of the feeding trial, the goats in Groups I and II averaged 128.3 and 126.8 pounds in body weight, respectively. Their final weights were 134.6 and 133.0 pounds. Group I goats, therefore, gained an average of 6.3 pounds and Group II goats 6.2 pounds during the 104 days of the trial.

Both groups received alfalfa hay at the rate of five pounds per goat per day. Concentrates—composition of the mixtures is shown in the first table on the next page—were fed in the proportion of one pound per head daily for each pound of butterfat produced during the preceding 10 days. Butterfat production was determined through daily individual morning and evening milk weights and a one-day butterfat test conducted during each 10-day period.

Although both mixtures contained 10% molasses and for the first 10 days the barley and oats were coarsely ground, the mixtures appeared dusty and were disliked by some of the goats. Consumption improved when steam-rolled barley and oats were substituted for the ground grains.

During this same period, the complex mixture contained 3.5% of soybean meal. It was suspected that even this small amount might be adding to the unpalatability of the mixture. When the soybean meal was removed and the coconut meal increased by the same amount, the mixture appeared more palatable. There is little doubt that the goats preferred the rolled grains. Whether or not soybean meal is unpalatable to goats must await further investigation.

The two concentrate mixtures were perfectly balanced in percentage of digestible protein before the removal of the soybean meal, and the change re-

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GOATS

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duced the content of digestible protein by 0.9%. As good quality alfalfa hay would in itself supply an adequate amount of protein, this difference is considered insignificant.

Concentrate Mixtures

Group I—Mixture 1 (Complex) Feed	Amount lbs.	Group II—Mixture 2 (Simple) Feed	Amount lbs.
Barley (rolled)	32.0	Barley (rolled)	73.0
Corn (cracked)	15.0		
Molasses (cane)	10.0	Molasses (cane)	10.0
Milo Grain (cracked)	15.5		
Oats (rolled)	10.0		
Coconut Meal (expeller)	8.5		
Cottonseed Meal (41%)	7.0	Cottonseed Meal (41%)	15.0
Bone Meal	1.0	Bone Meal	1.0
Salt	1.0	Salt	1.0
Total	100.0	Total	100.0
Digestible Protein	9.1%	Digestible Protein	10.0%
Total Digestible Nutrients	73.8%	Total Digestible Nutrients	73.4%

Cottonseed meal was included in the simple mixture as a safety factor in case good quality alfalfa hay could not be obtained during the entire feeding trial. In addition, it was desirable for both mixtures to be nearly equal in digestible nutrient content, differing only in the number of feeds making up the mixture.

Because the milk produced by individual goats varies in percentage of butterfat, it was necessary—for purposes of analysis—to convert all production records to a common basis of 4% milk, known as fat-corrected milk. Thus, it was possible to compare the energy output of Group I and Group II goats on a common basis during each one of the 10-day periods.

Although the two groups differed by an average of only 0.18 pound of fat-corrected milk per goat per day during the first 10-day period, there was a difference of 0.4 pound during the second period, due possibly to some difficulty in adjusting the goats to the new feeds. During the third period there was a difference of 0.3 pound, and thereafter the difference between the two groups was never greater than an average of 0.2 pound daily per goat. During the 104 days of the feeding trial, Group I goats averaged 7.52 pounds of fat-corrected-milk and Group II goats averaged 7.44 pounds. This difference is well within the limits of experimental error.

Average Daily Production per Goat of Fat-Corrected Milk

Dates	Period No.	Group I—Complex Mix: Pounds of milk	Group I—Complex Mix: Number of goats	Group II—Simple Mix: Pounds of milk	Group II—Simple Mix: Number of goats
4/14–4/24	1	7.94	18	7.76	17
4/24–5/3	2	8.39	18	8.00	16
5/3–5/13	3	8.55	18	8.26	17
5/13–5/23	4	7.89	18	7.85	18
5/23–6/2	5	7.77	18	7.63	18
6/2–6/12	6	7.63	17	7.77	18
6/12–6/22	7	7.33	18	7.35	16
6/22–7/2	8	6.89	18	6.88	17
7/2–7/12	9	6.84	18	6.70	18
7/12–7/22	10	6.70	18	6.61	18
7/22–7/26	11	6.80	18	6.84	18
Average		7.52		7.44	

The average daily consumption of concentrates by 10-day periods is given in the table in column 2. Group I goats consumed an average of 1.11 pounds and Group II an average of 1.10 pounds of concentrates daily for each pound of butterfat produced in 10 days.

Average Daily Consumption of Concentrates by 10-Day Periods

Period No.	Group I: No. of goats	Group I: Concentrates lbs.	Group II: No. of goats	Group II: Concentrates lbs.
1	18	3.51	17	3.29
2	18	3.54	16	3.37
3	18	3.28	17	3.36
4	18	3.17	18	3.20
5	18	3.12	18	3.06
6	18	3.08	18	3.20
7	17	2.86	16	2.96
8	18	2.70	17	2.68
9	18	2.71	18	2.59
10	18	2.75	18	2.57
11	18	2.76	18	2.58

The results from the two concentrate mixtures—the simpler and more complex—were equally good. Furthermore, the 1954 feeding trials confirmed the first year's study and showed that the simple concentrate mixtures are satisfactory for both medium and high producing goats. However, neither of the concentrate mixtures used in the 1954 study could be expected to be satisfactory had they not been fed with the high-protein roughage alfalfa. A suitable mixture for use with a low-protein roughage, such as oat hay, would contain 5% to 6% more digestible protein, equal to the 18% to 20% total protein given in the analyses of commercial feeds.

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LETTUCE

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compensate for spoilage occurring within the distributive system, but discarded at the retail level.

The preretail margin was $1.50 per crate, or 30%. Somewhat over three fifths of this margin—92¢—consisted of charges for packing and container. About one seventh—21¢—was spent for transportation. The remaining one fourth—37¢—was the wholesaling margin including all charges, fees, commissions, and net profit for dealers between packers and retailers.

The farm price of $1.84, or 36% of the consumer's dollar, is derived by subtracting the retail and preretail margins from the price charged consumers. It is specified at the farm gate in order to include the amount received by growers for harvested but unpacked lettuce.

Variations

Spoilage, retail margins, and consumer prices vary among the stores surveyed. Location, size, and type of store provide a partial explanation for such differences.

Generally, spoilage losses were considerably higher in southern California, in small stores, and in cash-carry stores than in the north, in larger stores, and in credit-delivery stores. Retail margins and consumer prices, on the other hand, were lower in the first two categories but higher in the third.

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This article is based on a study undertaken jointly by the California Agricultural Experiment Station, the California Farm Bureau Federation, and the former Bureau of Agricultural Economics—now largely in the Agricultural Marketing Service—U.S.D.A.

A more complete report, the seventh in a series, entitled California Lettuce: Marketing Channels and Farm-to-Retail Margins, 1948–1949 *is available by addressing the Giannini Foundation for Agricultural Economics, 207 Giannini Hall, University of California, Berkeley 4.*