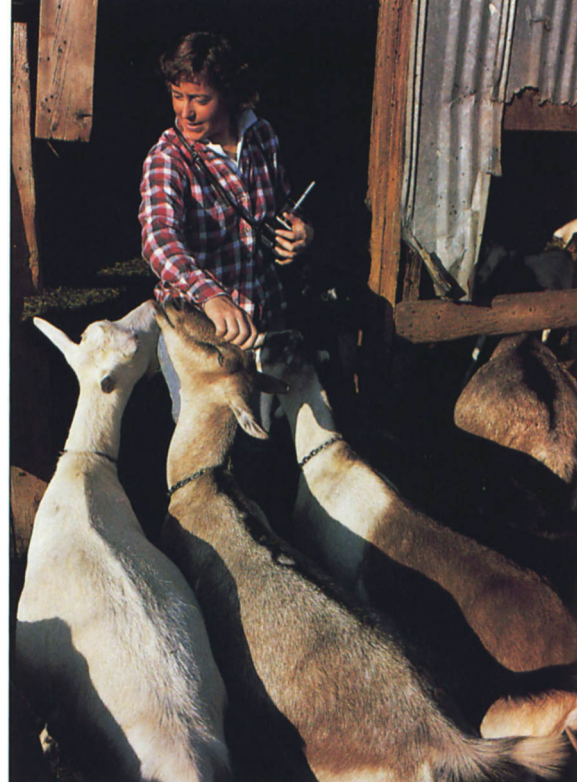


Feeding California's dairy goats

Barbara A. Reed □ Dan L. Brown

A survey of producer practices showed that dairy goat operations could lower costs by incorporating crop by-products into rations



Jack Kelly Clark

California has the largest population of dairy goats in the United States. Author Barbara Reed is in charge of the dairy goat barn at UC Davis, where research on nutrition and herd management is conducted.

Until recently, most dairy goat herds in California have been kept as a hobby and have not been a primary source of income for their owners. But with greater consumer demand for specialty foods, sales of goat cheese and other goat milk products have increased, and most manufacturers of these products are working at capacity. Although some manufacturers do not have capital available for expansion, in other cases, production is limited only by raw product availability.

Fortunately, availability of goat's milk is increasing. Last year in California, at least six dairy owners who participated in the whole-herd buy-out program recognized the shift in consumer tastes and converted their dairies to goat milk production. Their average herd size is over 300 goats. In contrast, 94 percent of all California Dairy Herd Improvement Association (DHIA) goat herds had less than 31 goats

per herd in 1986. Increasing herd size will significantly affect the way goat dairies are managed. As the industry develops and its hobbyist aspects decline, financial success will become more important.

The economics of goat milk production in the United States show higher costs than cow milk production under similar conditions. Since feed can represent more than 50 percent of all production costs, reducing input costs and maximizing output per unit of input are two ways dairy producers can improve profitability. Dairy cow producers have commonly sought to do this by using low-cost agricultural by-products, such as low-quality roughage and certain non-cereal concentrates, and by formulating least-cost or maximum-profit-over-feed-cost rations.

California not only has the largest population of dairy goats in the United States, but also produces millions of metric tons

of crop by-products annually. We conducted a survey to find out if dairy goat producers in the state use this cheap and abundant feed source, and to what extent. We also wished to learn the sources of information producers use in designing rations. Results from the survey, which was a preliminary effort to gather information on dairy goat feeding practices, were considered in designing a feed trial for lactating goats at the University of California, Davis.

Procedure

In December 1984, we sent a feed composition survey to California dairy goat producers who were members of the DHIA. The member dairies offered diversity in herd size and location. At the response deadline of January 15, 1985, a follow-up mailing was sent, thanking respondents for their help and reminding

TABLE 1. Responses to questions: Do you feed agricultural by-products? Which goats in your herd receive these feeds?

| Response | Percent |
|---------------------------|---------|
| Feed by-products*: | |
| Yes | 53 |
| No | 47 |
| Feed to†: | |
| Milking does | 100 |
| Dry does | 75 |
| Bucks | 73 |
| Kids | 60 |

*n=93 †n=49

TABLE 2. Questions: How are by-products fed? How are they processed?

| Response* | Percent |
|---|---------|
| Fed as: | |
| Pre-mixed concentrate | 64 |
| Free choice or top-dressed in addition to standard ration | 36 |
| Processed: | |
| Raw (not changed after purchase) | 38 |
| Chopped, ground, rolled | 21 |
| Pelleted or cubed | 26 |
| Other | 15 |

*n=49

TABLE 3. Question: Which of the following feeds do you use?

| Response* | Percent |
|-------------------|---------|
| Almond hulls | 12 |
| Bakery waste | 14 |
| Beet pulp | 31 |
| Brewer's grains | 18 |
| Citrus pulp | 12 |
| Cottonseed, meal | 39 |
| Cottonseed, whole | 14 |
| Cull carrots | 27 |
| Molasses | 61 |
| Rice bran | 16 |
| Straw | 8 |
| Other | 51 |

*n=49

others to return their responses in the postage-paid envelope attached to the survey.

Two basic groups of questions were posed: those relating to ration content and those concerning ration formulation. Except for ranking responses in reasons for not feeding by-products, we tabulated information from the surveys as a percentage of individuals responding.

Results

Of the 180 surveys mailed, 93 (52 percent) were returned. First, respondents were asked if they fed by-products. A list of by-products was provided, along with space to add any feeds not listed. Just over half of those replying fed agricultural by-products in some form (table 1). All respondents who used by-products fed them to their lactating does, but not all fed by-products to dry does, bucks, or kids.

Producers were asked to indicate how by-products were fed and what feeds were used. Respondents most often (64 percent) fed by-products as part of a milled premixed concentrate (table 2). This finding is reflected in the percentage of feed processed. Two-thirds of all by-products were chopped, ground, pelleted, cubed, or subjected to some other mechanical changes before being fed. Feeds most often incorporated into the premix were cottonseed meal, sugarbeet pulp, brewer's grains, and molasses (table 3). Other by-products were purchased in bulk or were residues of the producer's own farming or gardening operations. Bulk and home-grown items were fed free-choice or as a top-dressing to the standard ration (table 2). Cull carrots were the most common unprocessed by-product, while other feeds, such as rice bran, bakery waste, whole cottonseed, almond hulls, and citrus pulp, were used to a lesser extent.

Slightly more than half of the respondents fed by-products other than those listed (table 3). These included fruit by-products such as pear culls, dried apple pulp, figs and fig leaves, grape stems, cantaloupe, honeydew, watermelons, and fruit tree cuttings. Other tree cuttings included redwood and Douglas fir chop-pings, elm leaves, "Christmas trees," and poplar and willow branches. Various vegetable crop residues reported were cull yams, sweet potatoes, kale, pumpkins, zucchini, comfrey, sugarbeet tops and whole sugarbeets, garlic, tomatoes, broccoli, cauliflower, and bean hay. Tumbleweeds, although potentially toxic, were cited by several southern California producers as a particularly popular delicacy of their goats.

Whether or not any by-product was fed free-choice was primarily determined by

TABLE 4. Question: If you don't feed by-products, please rank your reasons for this decision

| Reason | Rank |
|---------------------------------------|------|
| Unfamiliar with sources | 1 |
| Awkward handling | 2 |
| Concern over chemical residues | 3 |
| Concern for product spoilage | 4 |
| Inconvenient to change ration formula | 5 |
| Awkward storage | 6 |
| Awkward transport | 7 |
| Can't obtain desired quantity | 8 |
| Unfamiliar with nutrient composition | 9 |
| Supplier problems, other reasons | 10 |
| Goats refused feed | 11 |

*n=44

TABLE 5. Question: How do you determine the nutritional value (protein, fat, fiber, vitamins, etc.) of all feeds used (including by-products)?

| Response* | Percent |
|---|---------|
| Manufacturer's labeling | 94 |
| Personal experience (observing animals) | 17 |
| Various livestock publications | 17 |
| Advice of veterinarian | 17 |
| NRC guidelines | 17 |
| Laboratory analysis of feeds | 10 |

*n=93

its effect on animal health. If no problems occurred, intake of feed was restricted only by its availability. It is interesting to note that many of the feeds mentioned have a detrimental effect on milk flavor and therefore quality. Producers did not specify if such potentially detrimental feeds went to their lactating animals or only to dry stock.

Respondents who did not feed by-products were asked to rank the reason(s) behind their decision. Primarily, producers did not know where they could find by-products (table 4). Awkward handling and concern about chemical residues ranked second and third as obstacles, followed by product spoilage, ration formula changes, and storage or transport problems. Producers also cited concern for obtaining certain feed quantities and unfamiliarity with nutrient composition as influencing them against by-product use. Producers listed various complaints against by-products or suppliers as "other." Only a few stated they had been unsuccessful in their attempts to feed by-products because the goats refused the feed.

The respondents relied heavily on manufacturers' labeling for nutrient information in determining ration formulation (table 5). Many producers included the feed sack's guaranteed analysis tag when they returned the survey. Personal experience, information from livestock publications, veterinary advice, and National Research Council (NRC) guidelines were used equally, in conjunction with manufacturers' data. Only 10 percent of those responding used laboratory analy-

sis to determine feed value as an aid in ration formulation.

Conclusion

This study indicates that dairy goat producers are utilizing agricultural by-products, but on a substantially smaller scale and less systematically than do cow dairies in California. This result is not surprising, considering that the average DHI goat herd in 1986 was 13 goats. By-product use may change as more large herds appear, especially if they are housed in facilities equipped to handle large volumes of feed, as cow dairies are. Although cost was not an important consideration in the decision to feed by-products, ease of obtaining and handling feeds and feed quality were.

The predominance of feed manufacturers as a source for concentrate feeds and nutrition information demonstrates goat producers' dependence on this resource and a lack of information readily available elsewhere. Research and extension efforts could benefit goat producers here, through continued basic research on goat nutrition and more visible distribution of technical bulletins.

As a preliminary study, this survey was useful in obtaining general information on feeding practices, but many more questions are unanswered. Do producers find published guidelines accurate in terms of dry matter intake? Exactly how are rations formulated, and are computerized formulation programs used?

A feeding trial conducted at UC Davis following this study is one of the first attempts of its kind in the United States to quantify lactation performance of goats on a diet including agricultural by-product feeds. Almond hulls and urea were substituted for alfalfa in a cubed diet. Feed digestibility, and milk yield and composition were measures of performance on the experimental diets. The results of the study indicate that when the farm gate price of alfalfa is higher than that of a 25:1, 30:1, or 35:1 mixture of almond hulls and urea, such mixtures can be substituted for the alfalfa (up to 15, 25, and 35 percent of the diet, respectively) and provide for lower feed costs without losses in milk production. (These results were reported at the 1986 American Dairy Science Association annual meeting at Davis, California.)

Barbara A. Reed is Facility Supervisor, Dairy Goat Facility, and Dan L. Brown is Professor, Department of Animal Science, University of California, Davis. The authors thank Frank Murrill, Dairy Specialist, Animal Science Extension, UC Davis, for making available the list of DHIA members.