tion with its toxicity to aphids, is responsible for the perceived selectivity of Zolone to wild *T. pallidus* populations.

Supracide, periodically applied to control scale insects in walnut orchards, is considered to be disruptive to *T. pallidus*. Survival of the Base colony after 72 hours on 28-day-old residues was 56%, suggesting that Supracide should be applied in ways to enhance selectivity to *T. pallidus*. If Supracide were applied in strips or alternate rows in walnut orchards, wild parasites might be preserved in the untreated reservoirs. *Trioxys pallidus* might then recolonize the treated portion of the orchard within a month or so from these reservoirs.

Thiodan has a relatively short residual activity against the wild strain of *T. pallidus*. This material is applied to control aphids, and its use has rarely resulted in aphid resurgences. Perhaps this observation is due, in part, to the fact that the residues are not highly toxic to *T. pallidus*, thereby allowing the parasite to control residual patches of aphids not controlled by Thiodan.

Lorsban is applied to control codling moth and navel orangeworm, and its residues are highly toxic to the wild strain of *T. pallidus*. After 72 hours, only 10% of the wild strain survived on 14-day-old residues. Based on these results, we would predict that Lorsban would stimulate aphid outbreaks in walnut orchards through destruction of the parasite populations.

The data from our tests describe the effects of different-aged pesticide residues on *T. pallidus* adults held in clip cages on field-treated walnut foliage. The relationship between this test method and mortality in the orchard is unknown, because field conditions can differ substantially from those in the laboratory. The test provides no information on the effect of the pesticides on aphids, or sublethal or indirect effects on *T. pallidus*. Such indirect effects can have significant impacts on host or parasite populations. However, the information may help growers and pest control advisers to make more informed decisions about using pesticides commonly used in walnut IPM.

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Computerized corral feed stations for dairy cows

Thomas A. Shultz

The mechanical feed stations monitored the feed intake of individual cows fed in large groups, making it easier to spot changes in each animal's condition.

The dairy cow of today has a greater genetic capacity to produce milk than capability to consume energy for that production. The intensive dairying practiced in California depends on adequate feed intake to maximize cow performance. Managers of the relatively large herds in central and southern California have evolved a group feeding system, in which several dozen cows are fed in a corral, based on average milk yield per cow. Attention to individual cow nutritional needs are therefore limited, and some over- and underfeeding of a particular cow may occur.

The use of computerized, mechanical feed stations has proved beneficial in meeting individual cow nutritional needs by reducing feeding errors and monitoring feed intake as an indicator of cow health. This system has been used successfully for several years with small groups of cows. Information is scarce concerning its use in the larger production groups common in California. A 2-year study was therefore conducted on a dairy in Tulare County, in central California, to observe computerized corral feed system use in large group feeding circumstances.

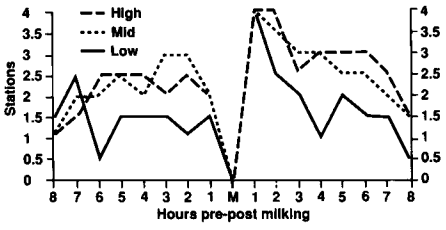

Fig. 1. Overall average feed station use shows similar patterns in high- and medium-production groups and lower use, before and after milking, by low-production cows.

Dairy study

The feeding system consisted of a bulk concentrate feed storage tank with a flex auger that automatically moved feed to a small hopper in a specially designed feed dispensing stall. Here the cow, with a coded transponder hanging from her neck, emitted an electronic identification specific for that cow. This signal was received by a transmitter-receiver connected to the feed delivery motor, which was connected by cable to a computer. The computerized feeding system used in these observations was "Surge Infarmation."

The computer had been programmed to feed each cow according to her previous milk yield. Feed delivery was set for six equal feedings during a 24-hour period, and any one visit was limited to 25% of the total.

Each corral, with an average of 86 cows, had one feed tank and four feed stations. Previous research has shown that one station is adequate for 22 cows, as a general recommendation. The cows were production-grouped by daily milk yield as high (70 to 90 pounds), medium (50 to 70 pounds), or low (30 to 50 pounds) to observe milk production effects on feed station use.

Cows received all of their daily concentrate allocation via the corral computerized feeder, except for 3 pounds during each milking twice daily. Feed stations were shaded, and each corral had shaded rest areas. Alfalfa hay and corn silage were fed to all cows on the opposite side of the corral from the concentrate feeder stations. Percent concentrate intake was averaged from computer printouts, and feed station occu-

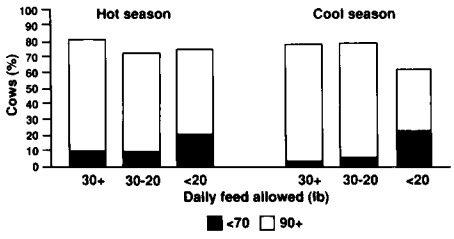

Fig. 2. Fresh cow feed station use. A fifth of the fresh cows allotted less than 20 pounds of feed concentrate daily consumed less than 70% of the expected amount. Most of those allotted more showed high consumption.

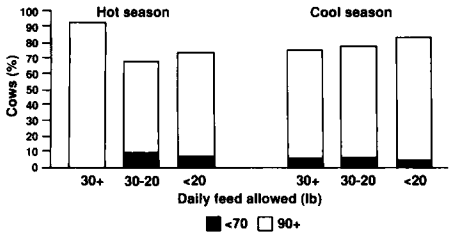

Fig. 3. Bred cow feed station use. Only a small proportion of the bred cows had intake problems, regardless of the amount allotted.

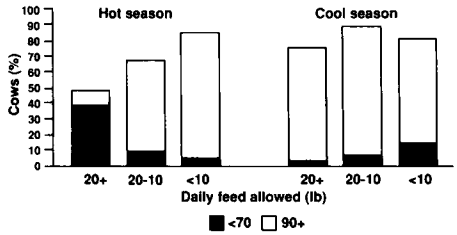

Fig. 4. Gestating cow feed station use.

pancy was visually monitored on several days per season of year.

Results

Cow activities during 8 hours before and after afternoon milking show similar patterns of use frequency in the high and medium production groups (fig. 1). All stations were in constant use for 2 hours after milking. The low production group showed lower station use, both before and after milking.

There was relatively little excess crowding around the feeder stations after milking, because two-thirds of the cows went to the forage manger and returned to eat concentrate later. Stations had flank guards on each side of the entrance, so that few cows molested animals that were eating. Having water troughs near the stations did result in some minor caking of concentrate in the delivery hopper.

The results were analyzed by physiological status of the cows—fresh, bred or gestating. Management arbitrarily set a minimum daily feed intake at 70% of the total expected for the computer to flag or signal potential problem cows. Printout results were further divided for cows eating 70% to 90% of the amount expected and for those consuming more than 90% of their allotted total.

Cows with less than 70 days in milk were designated fresh cows. From 20% to 22% of those allotted less than 20 pounds daily concentrate consumed less than 70% of the expected amount (fig. 2). These were mainly cows with lingering problems from freshening. Cows allotted from 20 to over 30 pounds daily from the feed station generally were in good health, and most showed high consumption results.

Bred cows were those having more than 70 days in milk, but not yet with a 60-day nonreturn rate conception status. A 60-day nonreturn rate was defined as a cow having been bred for 60 days without additional breeding service used. Only a small proportion had intake problems, and a high percentage had near maximum consumption, regardless of quantity allotted (fig. 3). Management used a 2-consecutive-day printout flag to call for individual cow attention.

Animals with at least a 60-day nonreturn rate were classified as being in gestation (fig. 4). A numerically small number of these cows received more than 20 pounds of concentrate. Coincidentally, a relatively large percentage of these animals were seen to have a problem during the observation days, as shown in the first bar of the graph. A large number of gestating cows were allotted less than 20 pounds of concentrate, and a high percentage had optimal consumption.

Transitional feed changes from dry cow to production rations, or "lead feeding" of cows to calve within a couple of weeks, are shown in figure 5. It is of interest to note that cows allotted less than 5 pounds of concentrate had relatively lower intake results, while those raised to over 5 pounds had improved consumption. This effect was more noticeable in cool weather than in the summer. These observations suggest that cows need time to adjust their feeding habits, and some animals are less prone to readjust in colder months. The capability to monitor individual feed intake during this transition is noteworthy.

Feed station use by the whole herd showed that most cows had near maximum intake, while an average 10% of cows were flagged on computer printouts for individual attention (fig. 6). This was listed by individual cow identification for accuracy. Seasonal effects were minimized by the physical characteristics of the corral facilities on this dairy.

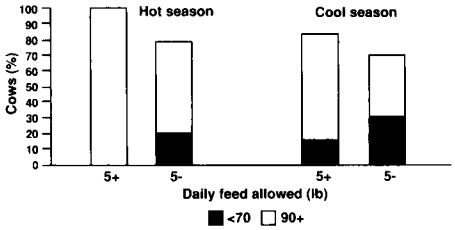

Fig. 5. Feed station use during transition from dry cow to production rations.

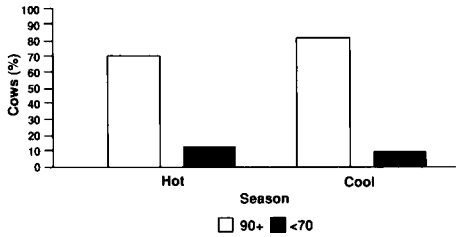

Fig. 6. Whole herd feed station use. Most cows had near maximum intake, but about 10% were singled out as needing attention.

At the time of these observations, management estimated an investment of $200 per cow for the complete feed system and a 5-year payback. Based on grain expenditures and feeding labor savings, under their dairy circumstances, they experienced a 3-year payback. They mentioned as limitations of the computerized feeding system that some commodities were incompatible and that occasional delivery plug-ups occurred. Feeds containing more than 15% moisture or feeds that absorb moisture during humid or foggy days can cause problems. Examples of absorbent feeds were dried beet pulp and whole cottonseed with lint. Pelleted feeds and rolled grains were more compatible.

Conclusions

Observations of corral computerized feed stations in use at a large dairy showed them to be useful management tools. They were especially helpful, when managing large cow groups, in monitoring individual cow feed intake to spot animals with health problems or those in estrus. Integration of this system into an existing dairy feeding program would involve consideration of overall feed and labor efficiency under the specific conditions of the farm.

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