associated with the CMT scores. The correlation between per cent CMT 2+3 versus per cent culled was found to be .778 (graph 2). The per cent dry versus per cent CMT 2+3 was .842. These two correlations were significant at the 1.0% level and 0.1% level, respectively.

The increase in positive CMT 2+3 scores, together with a higher rate of culling and per cent dry, may be accounted for in part by the fact that cows tend to be culled in late lactation and hence there are a greater number of such cows in the herd at the time more are being culled. The data indicate that while dairymen are using CMT for a culling guide, there are also other factors involving culling.

It is not believed that the effect of temperatures can be discounted completely, since it is possible that a combination of factors associated with winter weather create an environment favorable to mastitis. The reverse would be true for the summer months.

The program has created a high degree of interest among owners whose herds have CMT 2+3 scores above the monthly average as reported by DHIA. The mechanical factors found to be most responsible for mastitis were milking systems that lacked the capacity to handle the volume of milk put into them, malfunctioning equipment, and the improper handling of the milking units by the milkers.

The last six years have seen widespread improvement, not only increased milking system capacities, but more efficient dairy barns and dairy management. Over the last four years an average of only 11.5 per cent of the cows on CMT had a score of 2 + 3, compared with an average of 15% (2+3) in the first two years of the program.

The summary indicates that with present methods of herd management it is possible to maintain an average CMT score at the 10 to 12 per cent level. If the milk of all cows tested had gone into the bulk tank, the tank CMT would be well within the commercially acceptable CMT 1 range (500,000 to 800,000 cells per ml). Since most herd managers withhold many of the CMT 2+3 cows from the milk supply, the bulk tank CMT average is usually in the negative and trace range. It remains to be seen whether it is economical and practical to reduce this score below the present average.

R. N. Eide is Fresno County Dairy Farm Advisor.

A preliminary report . . .

ZYTRON

E. C. LOOMIS · E. L. BRAMHALL · L. L. DUNNING

EARLIER STUDIES of insecticides for fly control have shown that resistance is unequally distributed in California's numerous species of flies and that one chemical used for the control of the little house fly, *Fannia canicularis,* may not result in effective control of the house fly, *Musca domestica.* These differences in chemical effectiveness are particularly noticeable when poor control permits numerous adults to cause a serious nuisance problem on agricultural premises. In some cases, it may be profitable to spray for control of fly larvae in the manure and thereby prevent adult fly emergence.

These tests are of preliminary studies conducted with the herbicide Zytron (O-[2-4 dichlorophenyl] O-methyl isopropyl phosphoramidothioate), which has been found to have fly larvicidal activity. Early studies in 1966 with granular formulations of this chemical applied to animal manures showed excellent fly control, but the methods of granule application were not considered practical or economic. The studies reported here are on the use of Zytron as an emulsifiable concentrate which can be readily mixed with water and easily applied by spraying the surface of the manure piles.

In the three studies reported here, Zytron was applied by means of a two-gallon-capacity Hudson hand sprayer operated at 40 psi. Quantitative manure samples were taken from all treated and untreated replicates before each spray application. The samples were covered by an insect emergence cage for four weeks after which time all adult flies were collected and identified.

A small test plot was established at the University of California poultry ranch, Davis, in which Zytron (at 4.5 per cent) was sprayed at the rate of one gallon per 100 sq ft to coned manure under poultry cages. These spray applications were made during May and June at biweekly intervals, with two weekly applications thereafter. Fly control was not successful following the first biweekly application. These results showed that the insecticide did not penetrate the four-week-old manure droppings to kill developing larvae and thereby prevent adult emergence. Excellent fly control (95 to 100 per cent) was achieved following the second biweekly, and two weekly applications. It was more difficult, however, to prevent the emergence of adult *Fannia* (*F. canicularis* and *F. femoralis*) than to prevent emergence of adult muscid flies (house flies, *Musca domestica;* false stable flies, *Muscina stabulans;* and black garbage flies, *Ophyra leucostoma*). Different habits during immature stages of these flies contributed to the reasons for these differences in effectiveness. The larvae of *Fannia* species are less active than those of the muscid group. Also, larvae of *Fannia* species are more commonly found in drier pockets of manure than are the muscid-type larvae.

Commercial ranches

Additional studies were conducted on two commercial ranches during August to September, 1966, using a 1 per cent concentration of Zytron. At the E. Hodel poultry ranch, Sacramento County, a biweekly to weekly Zytron application resulted in excellent control of house flies, garbage flies, and biting stable flies, *Stomoxys calcitrans*—but from excellent (99 to 96 per cent) to fair (68 per cent) control of *F. femoralis.* Less effective *Fannia* control occurred subsequent to the biweekly applications (September 2 and 16) although the general *Fannia* population started to decline at this time, and more "pocketing" of larvae was evident in the increased amount of poultry droppings.

Adult house fly emergence was satis-

as a larvicide for fly control

factorily controlled (82 to 92 per cent) from biweekly applications of 1 per cent Zytron to calf-pen manure and bedding at the Chase Dairy, Ventura County, 1966. Satisfactory (84 to 99 per cent) to excellent (98 to 100 per cent) house fly control was obtained from spraying these same pens in 1967 with 0.72 per cent Zytron on a biweekly and weekly basis, respectively.

Fannia species are usually not found to develop in the calf-pen environment, but these two species were present in pens at the Chase Dairy in 1967. Although few in numbers, there was better control of adult emergence from the weekly application of Zytron than from the biweekly treatment.

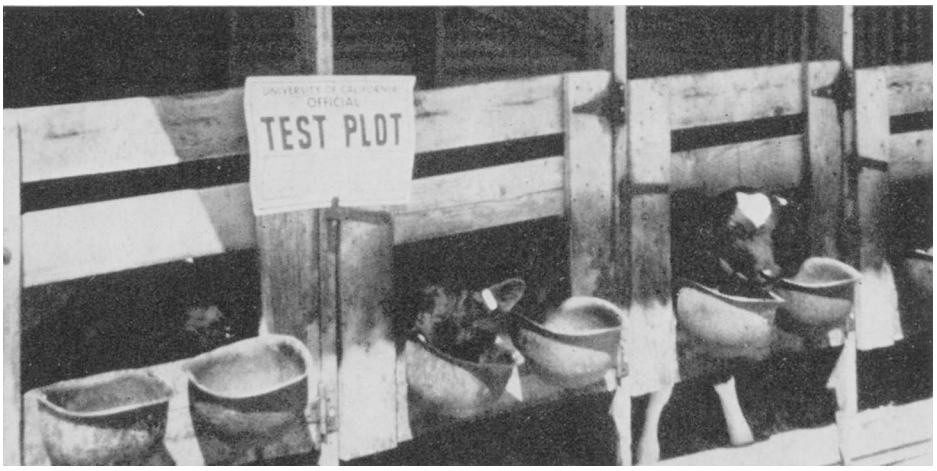
Additional studies

Additional studies are in progress to further evaluate Zytron as a successful larvicide. It is possible that lower concentrations of Zytron, applied at weekly intervals may provide effective fly control, and be economically feasible for most livestock owners. Other insecticides are also being studied for potential use as larvicides to provide a choice of chemicals in meeting the problem of insecticide resistance.

Zytron is not yet registered for use in fly control and is not recommended by University of California at this time.

E. C. Loomis is Extension Parasitologist; and L. L. Dunning is Extension Laboratory Technician, Department of Entomology, University of California, Davis. E. L. Bramhall is Farm Advisor, Agricultural Extension Service, Ventura County.

Top photo, calf pen units used to test Zytron application to floor areas in Ventura County. Bottom photo, Zytron application using a two-gallon-capacity sprayer for control of fly larvae in poultry manure, University of California, Davis.



NUMBER OF ADULT FLIES EMERGED FROM ANIMAL MANURES SPRAYED WITH ZYTRON (CALIFORNIA 1966 AND 1967)

Date	Manure		Fannia species			Muscid group		
	Treated	Sampled	Treated repls.	Untreated repls.	Fly red.	Treated repls.	Untreated repls.	Fly red.
			U. C. POULTRY RANCH, 4.5% ZYTRON					
5–16–66	X				%			%
30	X	X	377	333	0	120	382	0
6–13	X	X	3	385	99	0	194	100
20	X							
27	X	X	8	122	95	0	344	100
7– 1		X	0	139	100	0	172	100
			E. HODEL POULTRY RANCH, 1% ZYTRON					
8–26–66	X	X	1574	1767	..	1455	875	..
9– 2	X	X	20	2370	99	1	963	99
9		X	16	1250	99	6	736	99
16	X	X	17	361	96	24	1549	99
23	X	X	75	178	68	3	1859	99
			CHASE DAIRY, CALF PENS			M. domestica		
8–24–66	X	(1% biweekly)						
31		X				42	239	82
9– 7	X							..
14		X				22	279	92
7–19–67	X	(0.72% weekly)						
26	X	X	2	21	90	1	65	98
8– 2	X	X	2	26	92	0	32	100
9	X	X	3	13	72	1	90	99
16		X	0	6	100	0	12	100
7–19–67	X	(0.72% biweekly)						
26		X	0	21	100	6	65	91
8– 2	X	X	8	26	69	5	32	85
9		X	1	13	92	1	90	99
16		X	1	6	83	2	12	84