N, Mg, Na, Cu, and B were found in the roots sampled from the 30- and 40-inch depths than in the upper layers. Higher amounts of P, zinc (Zn), and Fe were found in the roots from the upper layers than from the lower. A solution of phosphoric acid was used to drench the soil of all of the pots and apparently was fixed in the surface soil.

Previous reports indicated that citrus seedling leaves from plants infected with citrus nematode contained lower concentrations of Cu and Zn than the leaves from noninfected plants. Even though the Cu and Zn concentrations are slightly affected by nematode infections of the plant roots, the concentrations of Cu and Zn in the leaves of navel orange trees in both experiments were above the deficiency range and, therefore, had no detrimental effect on the growth of the plants.

Copper sprays

One-half of the nematode-infected navel orange trees and one-half of the non-infected trees in the second experiment were sprayed with copper Bordeaux to eliminate any possibility that copper deficiency may affect the citrus growth. The plants did not show any Cu-deficiency symptoms in the presence or absence of nematodes, so the vegetative growth did not benefit from Cu foliar applications. Therefore, the reduction in vegetative growth of navel orange leaves and stems of trees infected with nematodes was not due to Cu deficiency but directly or indirectly to nematode soil infestation. A reduction in K and Ca concentrations in the leaves due to nematode infection occurred in both experiments. There again, even though the concentration of K was found lower in nematode-infected citrus plants, the reduction in dry weight of plants apparently was not due to K deficiency, since the K values in the leaves were adequate for optimum growth. The results obtained in this experiment demonstrate that under optimum soil conditions the citrus nematode has little effect on nutrient concentrations of host plants and that severe growth reduction must then be related to the quantity and/or quality of feeder roots.

Soil moisture

The roots from "dry soil" contained more nematode larvae than did comparable samples from the "wet soil." According to previous findings, nematode reproduction processes are slowed down because of lower oxygen availability in "wet soils." Therefore, the smaller number of citrus nematodes found in the "wet soil" may be due to reduced supply of oxygen. The increase in Mn concentration in the roots of plants grown in "wet soil" is probably due to lower amounts of oxygen in these soils. In poorly aerated soils, soluble Mn ions are increased due to reduction from manganic to the more readily available manganous form.

Micronutrients

Root sampling for macro- and micronutrient determination from cylinders that are not provided with drainage is very important. The data obtained in this experiment clearly show that soluble nutrients were being leached into lower layers of the soil; therefore, the roots from these layers contained higher concentrations of soluble nutrients (table 3). The less soluble nutrients like P, K, and Zn remained closer to the surface of the soil; as a result, roots in the upper layers contained higher concentrations of these nutrients than did roots in the lower layers. Thus, nutrients taken up by the feeder roots are not distributed uniformly within the root system. Nutrient accumulations in the roots may occur in the same manner in fields where hardpans exist. Therefore, sampling of roots under such conditions is of critical importance. Samples should be taken from the same depth. Otherwise, erroneous conclusions might be drawn concerning the concentrations in roots.

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THE CONTINUING SHIFT of market milk production from a farm-oriented operation to a factory-type enterprise increases the importance of making management decisions based on factors other than feed production and family labor. Selection, economical purchasing and wise use of feeds will always be important profit factors, since feeds make up more than half the cash cost of dairying in California. Labor costs may have a major influence on profits in smaller herds, but are usually of decreasing importance as herds become larger and certain efficiencies are realized.

Cost studies

Cost studies conducted in past years have indicated that herd size, production levels and the percentage of Class I milk usage have often been the most important factors in determining profits. These factors are interrelated and changes in any one will affect the others. Class I usage is that portion of market milk sold to the consumer as fluid milk, cream and similar products. The minimum price for this milk is set by the state and is considerably higher than the price of milk used for manufacturing purposes. Profit is what remains after cash costs are paid—and all labor, interest on investment, depreciation and a charge for management have been allocated as costs.

Operation

In this study the dairy operation is considered separately from feed production and the raising of replacement animals. Home-produced feed is charged for at current market levels. All calves are considered sold at market value and replacements purchased at market value. The cost of management is figured at 5% of total income. These figures are based on cost data sheets developed by farm advisors in cooperation with dairymen in the North Bay production area of Marin and Sonoma counties.

The larger herd obviously has the

PROFIT FACTORS IN DAIRY MANAGEMENT

greatest possibility for economic success; however, a smaller herd with higher production and greater Class I usage is more efficient than a large herd with low usage, low production, or both, as shown in table 1. The herd with low Class I usage can often be made more profitable by reduction in size since this increases the average production per cow through the culling process and increases the percentage of Class I usage.

If Class I usage can be increased by obtaining additional contracts, it usually pays to increase herd size up to the point where the existing labor supply will suffice. Since an additional milker will increase costs $6,000 to $7,000 per year, a fairly large increment of cows and Class I usage must be added to offset it.

Changes in production level are usually made slowly as inherited milk production ability of the herd is increased and management improves. Herd size can be increased by purchasing cows likely to have an effect on the average production level of the herd, up or down. Greater Class I usage is sometimes possible by purchasing quotas from other dairymen.

Dairymen considering major changes should first prepare an income and expense sheet based on present conditions. After this has been completed, a similar sheet based on the projected conditions can help determine the advisability of making major changes. An example of such a data sheet is included as table 2, below.

W. L. Engvall is Farm Advisor, Marin County. Sample income and expense data by W. L. Engvall and E. W. Holtz, Farm Advisor, Sonoma County.

TABLE 1. EFFECT OF USAGE, PRODUCTION AND HERD SIZE ON PROFITS

PRODUCTION PER COW		CLASS I USAGE 60%	70%	80%	90%
		100-COW HERD			
10,000 lbs. milk	Income	$ 54,200	$ 56,500	$ 58,800	$ 61,100
400 lbs. milk fat	Expense	63,400	63,500	63,600	63,800
	Profit	–9,200	–7,000	–4,800	–2,700
11,250 lbs. milk	Income	60,300	62,900	65,500	68,100
450 lbs. milk fat	Expense	68,300	68,400	68,600	68,700
	Profit	–8,000	–5,500	–3,100	– 600
12,500 lbs. milk	Income	66,400	69,300	72,200	75,100
500 lbs. milk fat	Expense	73,400	73,600	73,700	73,900
	Profit	–7,000	–4,300	–1,500	1,200
13,750 lbs. milk	Income	72,500	75,700	78,900	82,000
550 lbs. milk fat	Expense	77,700	77,900	78,000	78,200
	Profit	–5,200	–2,200	900	3,800
		150-COW HERD			
10,000 lbs. milk	Income	81,600	85,100	88,600	92,100
400 lbs. milk fat	Expense	87,100	87,300	87,400	87,600
	Profit	–5,500	–2,200	1,200	4,500
11,250 lbs. milk	Income	90,800	94,600	98,500	102,400
450 lbs. milk fat	Expense	94,400	94,600	94,800	95,000
	Profit	–3,600	000	3,700	7,400
12,500 lbs. milk	Income	99,900	104,200	108,500	112,800
500 lbs. milk fat	Expense	102,700	102,900	103,100	103,300
	Profit	–2,800	1,300	5,400	9,500
12,750 lbs. milk	Income	109,100	113,800	118,500	123,200
550 lbs. milk fat	Expense	109,200	109,400	109,600	109,900
	Profit	– 100	4,400	8,900	13,300
		200-COW HERD			
10,000 lbs. milk	Income	108,500	113,100	117,700	122,300
400 lbs. milk fat	Expense	113,700	114,000	114,200	114,400
	Profit	–5,200	– 900	3,500	7,900
11,250 lbs. milk	Income	120,700	125,900	131,000	136,200
450 lbs. milk fat	Expense	122,500	122,800	123,000	123,300
	Profit	–1,800	3,100	8,000	12,900
12,500 lbs. milk	Income	132,900	138,600	144,400	150,100
500 lbs. milk fat	Expense	131,100	131,400	131,700	132,000
	Profit	1,800	7,200	12,700	18,100
13,750 lbs. milk	Income	145,100	151,400	157,700	164,100
550 lbs. milk fat	Expense	139,800	140,000	140,400	140,700
	Profit	5,300	11,400	17,300	23,400

TABLE 2. SAMPLE INCOME AND EXPENSE—MARKET MILK DAIRY

PRODUCTION DATA			
200 cow herd selling 11,200 lbs of 4% milk per cow			
70% Class I sales	@ $5.80 per cwt		
30% Class II & III sales	@ $3.50 per cwt		
2% mortality—30% replacement—	90% calf crop		
INCOME (70–30 contract)			
Milk—2,240,000 lb, blend price	@ $5.11 per cwt		$114,464
Cull cows—56	@ $140 ea.		7,840
Calves—180	@ $ 20 ea.		3,600
			$125,904
EXPENSES			
Feed, Alfalfa hay, 6–1/3T/cow, 1,000 T	@ $31/T		31,000
Concentrate, 2500 lb/cow 250 T	@ $66/T		16,500
Pasture 600 AUM	@ $8/AUM		4,800
Total feed costs			$52,300
Replacement heifers, 60 @ $280 ea.			16,800
Labor, 2 men @ $550/mo., 1 man @ $500/mo.			19,200
Breeding fees, 190 @ $8/head			1,520
DHIS, 12 mos			590
Dues and Assessments			600
Veternary & Medicine @ $9/head			1,800
Supplies			1,500
Electricity			600
Taxes			2,000
Insurance			1,000
Milk hauling @ .35¢/100			7,875
Clipping			220
Equipment, Maintenance and Repairs			480
Misc. cash costs			1,200
Total other costs			$ 55,385
Total costs			107,685
NET CASH INCOME			$ 18,219

INVESTMENT		DEPRECIATION		INTEREST @ 6%
Land	$10,000			$ 600
Buildings & Corrals	30,000	20 yr.	$1,500	@ ½ cost 900
Equipment	20,000	10 yr.	2,000	@ ½ cost 600
Cattle	60,000			3,600
	$120,000		$3,500	$5,700
Less Interest and Depreciation				9,200
Management Income				9,019
Less Management cost @ 5% of total income				$6,295
PROFIT				$2,724