An Analysis of Beekeeping Production Costs and Returns

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AN ANALYSIS OF BEEKEEPING PRODUCTION COST AND RETURNS

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INTRODUCTION

Beekeeping for honey production in the United States is not profitable. The unit price received by beekeepers for bulk, extracted honey has not changed in the last 25 years, while the cost of production has increased. Thus, beekeepers who rely on honey production for income must supplement their income from other sources, such as crop pollination or outside employment.

The United States Department of Agriculture estimated in 1970 that there were 4.6 million colonies in the United States with a total honey and wax production of 38.7 million. Beekeepers receive about $5 million annually from pollination fees. The value of these crops, estimated at $1 billion annually, more nearly reflects the true economic importance of the honey bee and beekeepers than the value of honey and beeswax.[1] Consequently, the beekeeping industry is unique in providing services (pollination) as well as products.

PURPOSE OF THE STUDY

Despite the value of honey bees to agricultural production, numbers of honey bee colonies have declined steadily since about 1954. Although research has been done within States on honey production cost, there has been no nationwide study that is primarily concerned with analysis of production costs and returns. Therefore, in 1969 a pilot study was made covering the economics and practices of typical beekeepers in the Midwest (Wisconsin and Illinois) and Southwest (Arizona and California) for the 1968 production year.[2] These data are still valid today as the beekeeping industry continues to be unprofitable. The primary objective of the study was to determine annual production costs and returns of beekeepers who had between 300 and 6,000 colonies, and to recommend to beekeepers ways of reducing costs and increasing income. Information was gathered from 18 beekeeping enterprises in the Midwest and 41 in the Southwest. These enterprises varied from 300 to 5,500 colonies and were classified into four classes as follows:

Class number	*Colony-size group*
I	300–499
II	500–999
III	1,000–2,999
IV	3,000–6,000

Names of beekeepers were randomly drawn from lists supplied by State bee inspectors. The beekeepers were engaged in honey production, pollination, or production of package bees and queens. Information was obtained directly from beekeepers by personal interviews and was recorded on prepared forms made up for this study.

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[1] LEVIN, M. D. BEEKEEPING IN THE UNITED STATES. U.S. Dept. Agr., Agr. Hand. 335, 77 pp. 1969.

[2] SCHNEIDER, R. E. AN ECONOMIC SURVEY OF COMMERCIAL BEEKEEPING IN THE ILLINOIS-WISCONSIN AND CALIFORNIA-ARIZONA AREAS. 1970. (Master's thesis, copy on file in the library at the University of Illinois.)

ANALYTICAL PROCEDURE

Annual costs were divided into two major groups: Cash and noncash. Cash costs are the expenses that must be covered on an annual basis. These costs include maintenance and repair, except for buildings; current operating expenses (feed, drugs, rent, hauling, and utilities); general cash business expenses (taxes, insurance, marketing assessments); bee purchases; paid labor; and use and purchase of trucks and tractors, hereafter termed "power equipment." Noncash costs are those that are not immediate and include depreciation of all equipment other than trucks, interest costs on investment, and costs for unpaid family and operator labor. Investments were valued on the basis of new replacement value.

Depreciation was charged at the annual rate of 5 percent of replacement cost of buildings and 10 percent for all other equipment. In addition, a 1.5 percent charge for building repair was added to the depreciation.

The replacement value for the investment in various categories was determined as follows:

- Land investment was valued at the prevailing market price in the area in question.
- Buildings were evaluated on the basis of the size and type of construction according to established engineering cost standards. Only those buildings, or parts thereof, used in honey production and extracting and the space for workshop were included.
- Value of bee equipment (all parts of the hive and equipment used in working bees) was determined from actual inventory and assessing at replacement cost as given by commercial suppliers. Cost of labor for assembling the equipment was omitted.
- Honey and wax equipment, such as uncapping knives or machines, extracts, handtrucks, and other equipment used in the honey house, was evaluated the same way as bee equipment.
- Shop equipment was determined by cost of power tools and the beekeepers' estimates of replacement cost of the handtools.
- Power equipment included trucks, tractors, forklifts, and truck-mounted loaders. Most operators were able to give the new replacement value for these items.

The bee replacement value was based on purchase cost of $6 for two pounds of package bees with queen. The change in number of colonies from the beginning to the end of the reporting period was treated as an adjustment to the total expenses. Although depreciation is not a relevant cost in the bee inventory, an interest cost is added to the investment. This cost was at 7 percent of the value of the November 1967 inventory of bees. A working capital account was constructed for cash expenditures over the year and interest was charged at the rate of 7 percent.

Unpaid labor was valued at $2 per hour for the operator and others who did not receive actual payment.

INVESTMENTS IN BEEKEEPING OPERATIONS

Table 1 shows the investments in land, buildings, and equipment for the beekeepers in the study areas. Total investment per colony of beekeepers in the Southwest shows a downward trend from smallest to largest group because land, buildings, and equipment do not increase directly with increase in size (table 1). Beekeepers in the Midwest show a different trend. Class II beekeepers have a much higher total investment than those in classes I and III, due mostly to the much higher investment per colony in buildings and bee equipment. The difference in total investment per colony between those in classes I and III is $2.18 per colony. Beekeepers in the Southwest show a difference of $27.43 between classes I and III and $34.61 between classes I and IV.

Investment differences between the two areas show that:

- Land investment in each class is higher in the Southwest.
- Building investment in the Southwest is less than half the building costs in the Midwest.

TABLE 1.—*Colonies per operation and investment costs per colony, by size of operation, Southwest and Midwest study areas, 1968*

Size of operation, number of operators, and range in size [1]	Colonies per operation	Investment per colony						
				Equipment				Total [2]
		Land	Buildings	Bees	Honey and wax	Shop	Power	
	Number	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Southwest								
Class I, 5 operators:								
Low	300	2.14	2.56	29.81	[3] 0	0.47	12.00	69.76
High	395	16.00	15.14	69.95	2.37	3.54	29.23	98.01
Average	349	6.88	6.93	40.41	1.22	1.52	23.10	80.06
Class II, 10 operators:								
Low	500	1.45	[3] 0	27.74	[3] 0	.19	0	43.70
High	900	6.56	37.80	62.68	9.06	2.95	17.50	99.04
Average	646	3.83	10.24	41.18	3.21	1.02	11.19	70.67
Class III, 21 operators:								
Low	1,000	.40	1.44	19.75	0.98	.18	4.00	34.66
High	2,500	9.36	14.83	54.31	5.83	2.18	16.38	81.91
Average	1,430	2.62	5.95	32.11	2.53	.87	8.55	52.63
Class IV, 5 operators:								
Low	3,000	.10	1.03	20.54	1.09	.64	4.20	36.85
High	5,500	3.00	8.00	51.87	6.24	1.13	12.70	74.54
Average	4,000	1.23	3.80	29.95	2.18	.79	7.50	45.45
Midwest								
Class I, 6 operators:								
Low	310	.41	3.18	28.19	1.44	.08	9.09	53.91
High	490	9.09	28.93	44.12	8.44	5.97	14.10	96.02
Average	374	2.79	12.49	36.03	4.32	1.47	12.05	69.15
Class II, 6 operators:								
Low	510	.29	16.31	38.05	1.74	.74	4.71	67.74
High	640	7.27	41.13	62.10	10.46	2.98	19.35	108.44
Average	576	1.72	24.21	47.17	4.89	1.34	10.34	89.67
Class III, 6 operators:								
Low	1,180	.12	12.11	29.47	1.51	.43	4.81	57.80
High	2,500	3.57	21.95	45.89	5.71	1.56	12.36	73.82
Average	1,559	1.22	15.03	38.75	3.91	.90	7.16	66.97

[1] Size of operation as follows: Class I, 300 to 499 colonies; Class II, 500 to 999; Class III, 1,000 to 2,999; Class IV, 5,000 to 5,999.
[2] Excludes value of live bees.
[3] Another beekeeper extracted all honey for this beekeeper.

- Investments in both bee equipment (except for class I) and honey and wax equipment are lower in all classes in the Southwest than in the Midwest.
- Power equipment costs are higher in all classes in the Southwest largely because 81 percent of all beekeepers studied in the area did commercial pollination of farm crops.

CASH EXPENSES

Table 2 compares cash expenses among classes for beekeepers in the study areas. Total cash expenses and labor increased with size of operation in the Southwest. The larger operators had more paid help and less family help. In the Midwest both paid labor and the total cost were lowest for class II operators. Class I operators in the Midwest hired help because most of them were older compared with class II operators who were mostly younger and could perform most of the work alone. Class III operators required help to handle the larger number of colonies.

Expenses for power equipment were a major part of total cash expenses for all classes in both areas. Cost per colony for power equipment decreased 58 percent from classes I to IV in the Southwest. In the Midwest, however, class II had the highest expenses for power equipment. Management practices were responsible for the extremes; for example, the high-cost operator averaged 30 to 35 visits annually to each yard, while the low-cost operator visited only 5 to 10 times each year.

Bee-purchase cost had a definite downward trend from the smallest to largest classes in both areas. In the Midwest, the average cash expense in class I was high because one operator killed all colonies in the fall and restocked in the spring with package bees.

General cash business expense on a per colony basis was lowest in class I and highest in class II in both areas. Taxes and insurance accounted for most of this. Class II operators had higher taxes on buildings and land and spent more money on travel.

Current operating expenses were 10 to 24 percent of the cash expenses and increased, generally, with size of operation. Feed and drugs, the major items of expense, varied widely because of operators' practices. The amount spent was not related to the honey production.

In general, maintenance and repairs were the lowest costs, especially in the Southwest.

LABOR REQUIREMENTS

Seasonal differences and differences in types of production accounted for much of the differences in use of labor between beekeepers in the Southwest and Midwest. Differences in labor were partly due to management practices. For example, one beekeeper may start the honey harvest as soon as the first super in each hive is full; another may wait until two or more supers in each hive are full, thus making less trips to the bee yards.

Beekeepers in the two areas are compared in table 3 on their use of labor throughout the calendar year. November to February was a dormant period for beekeepers in the Midwest. In the Southwest, however, beekeepers started pollination in February.

The honey production period for the Southwest is March through August, while in the Midwest, it is June through September. Labor use was lowest in November and December for most beekeepers, except for those in class I in the Southwest who sold package bees and queens.

In the Midwest the highest proportion of total time was required from July to October. In the Southwest it was from March to June, which included labor for both pollination and honey harvest. In both areas, labor per colony decreased as size of operation increased. The greatest decrease was in class IV in the Southwest where beekeepers averaged 4,000 colonies and had labor-saving equipment. Generally,

TABLE 2.—*Colonies per operation and annual cash costs, by size of operation, Southwest and Midwest study areas, 1968*

Size of operation, number of operators, and range in size[1]	Colonies per operation	Annual cash cost per colony						
		Maintenance and repair	Current operating expense	General cash business	Bee purchase	Paid labor	Power equipment	Total
	Number	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Southwest								
Class I, 5 operators:								
Low	300	0	0	0.09	0	0	3.86	5.89
High	395	.14	1.13	.45	1.26	1.78	6.05	8.47
Average	349	.07	.72	.19	.55	.78	5.04	7.35
Class II, 10 operators:								
Low	500	0	.04	.09	0	0	0	.83
High	900	2.44	2.34	1.36	2.59	5.73	6.46	12.26
Average	646	.47	.87	.63	.52	.89	4.15	7.53
Class III, 21 operators:								
Low	1,000	0	.21	.04	0	0	1.19	4.72
High	2,500	4.92	1.25	8.77	2.28	4.88	15.90	16.68
Average	1,430	.51	.76	.57	.51	2.12	3.48	7.95
Class IV, 5 operators:								
Low	3,000	0	.59	.03	0	2.86	1.98	7.08
High	5,500	.70	2.55	.63	.17	6.17	4.03	10.52
Average	4,000	.26	1.32	.49	.05	3.74	2.94	8.80
Midwest								
Class I, 6 operators:								
Low	310	.13	.57	.07	0.05	0	1.33	3.46
High	490	2.51	4.25	2.22	6.00	9.00	2.77	23.35
Average	374	.86	1.73	.70	1.93	2.17	2.14	9.53
Class II, 6 operators:								
Low	510	.01	.31	.50	0.10	0	1.04	4.04
High	640	1.05	2.26	3.08	1.82	.87	8.64	11.32
Average	576	.51	1.30	1.18	0.83	.19	3.11	7.12
Class III, 6 operators:								
Low	1,180	.15	1.39	.51	0.07	0	1.06	7.23
High	2,500	1.85	3.37	1.49	1.36	8.62	3.39	16.48
Average	1,559	.61	2.27	.91	.37	3.13	2.30	9.59

[1] See table 1, footnote 1, for explanation of size of operation.

higher honey production required more labor per colony. Labor-saving equipment and methods are more advanced for honey extraction and subsequent handling than for moving honey supers from the hive in to the honey house.

TABLE 3.—*Average labor used per colony for specific months, by size class of operators, Midwest and Southwest, study areas, 1968*

Size of operation[1]	November to February	March to June	July to October	Total
	Man-hours	*Man-hours*	*Man-hours*	*Man-hours*
Midwest				
I	0.6	1.9	2.7	5.2
II	.7	1.4	2.0	4.1
III	.7	1.0	1.6	3.3
Southwest				
I	1.2	2.3	1.8	5.3
II	.8	1.9	1.5	4.2
III	.7	1.5	1.1	3.3
IV	.4	1.0	1.0	2.4

[1] See table 1, footnote 1, explanation for size of operation.

TOTAL COSTS

Total noncash costs of Southwest beekeepers were 45 to 71 percent of total cost per colony (table 4). These costs decreased as size of operation increased. Similar total noncash costs of Midwest beekeepers were 56 to 72 percent of the total costs with class II, unlike their Southwest counterparts, having the highest total noncash costs. Unpaid labor was one-sixth to one-half of total noncash expense in the two smaller classes. Class I operators used the most labor per colony. Classes III and IV had more hired labor, but their total labor per colony was less than class I. Depreciation and interest together made up half or more of the total noncash expenses except for class I beekeepers. Gross total costs and adjusted total costs per colony decreased as size of operation increased for both Southwest and Midwest beekeepers.

Bee inventory values are subject to change throughout the year. Healthy bee colonies maintain themselves but damages from pesticides resulted in heavier losses to beekeepers pollinating than to those not pollinating. Only 8 in 41 beekeepers in the Southwest had net losses in colonies for the entire year. Table 4 shows the bee inventory change. Only four beekeepers in the Midwest received income from pollination. In the Southwest, 80 percent of both classes I and II, 81 percent of class III, and all of class IV did some crop pollinating. Table 4 shows that classes I and IV in the Southwest had net losses of bees.

Transportation costs were a large part of total cash costs. Paid labor was a major part of total cash costs in classes III and IV of the Southwest and classes I and III of the Midwest. Size and number of trucks, dispersal of bee yards, and number of visits to bee yards determined most of travel costs.

Table 4 shows that adjusted total costs decreased as size of operations increased. This decrease was greater for the Southwest than for the Midwest beekeepers.

INCOME

Honey production depends largely on weather, especially for honey from native plants. In the Southwest some of the best sources and quality of honey are from native

TABLE 4.—*Annual costs per colony: Noncash, cash, and total, by size of operation, Southwest and Midwest study areas, 1968*

Size of operation, number of operators, and range in size[1]	Colonies per operation	Noncash costs				Cash Costs	Total costs	Change in bee inventory	Adjusted costs	Noncash costs as percentage of total costs
		Depreciation	Interest	Unpaid labor	Total					
	Number	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Pct.*
Southwest										
Class I, 5 operators:										
Low	300	3.76	3.46	4.29	11.85	5.89	18.78	−3.51	21.56	71
High	395	8.00	4.34	13.76	25.04	8.47	30.93	+1.60	30.59	
Average	349	4.94	3.84	9.80	18.58	7.35	25.93	− .19	26.12	
Class II, 10 operators:										
Low	500	3.23	1.71	0	4.94	.83	5.77	−1.13	4.81	69
High	900	8.36	4.34	9.20	19.67	12.26	28.63	+2.27	28.10	
Average	646	5.31	3.45	7.06	15.82	7.53	23.35	+ .93	22.87	
Class III, 21 operators:										
Low	1,000	2.61	1.85	1.57	6.28	4.72	12.68	−1.91	9.95	61
High	2,500	6.23	3.53	7.58	17.61	16.68	23.51	+6.00	29.66	
Average	1,430	4.09	2.63	4.08	10.80	7.95	18.75	+ .93	17.82	
Class IV, 5 operators:										
Low	3,000	2.63	2.04	1.03	6.09	7.08	13.17	−1.71	12.62	45
High	5,500	6.15	3.52	1.70	11.32	10.52	21.31	+ .55	20.91	
Average	4.000	3.69	2.49	1.26	7.44	8.80	16.24	− .14	16.38	
Midwest										
Class I, 6 operators:										
Low	310	3.75	2.49	4.20	14.41	3.46	18.93	−1.78	18.29	65
High	490	6.98	4.64	14.11	22.06	23.35	39.16	+2.80	39.16	
Average	374	5.10	3.20	8.63	16.93	9.53	26.46	+ .53	25.93	
Class II, 6 operators:										
Low	510	5.52	2.95	4.57	13.41	4.04	17.46	− .76	17.04	72
High	640	8.54	4.69	11.07	20.73	11.32	32.05	+ .78	31.94	
Average	576	6.89	3.88	6.89	17.66	7.12	24.78	+ .22	24.56	
Class III, 6 operators:										
Low	1,180	4.56	2.90	1.42	9.12	7.23	18.57	− .11	17.98	56
High	2,550	5.83	3.39	6.90	14.69	16.48	25.60	+ .73	25.51	
Average	1,559	5.32	3.19	3.45	11.96	9.59	21.55	+ .33	21.22	

[1] See table 1, footnote 1, for explanation of size of operation.

plants. Here, the rainfall in 1968 was lower than normal, resulting in a very low yield of honey for most beekeepers (table 5). Two beekeepers in Arizona and two in California produced over 100 pounds per hive, which was considerably below their average. The other 37 varied from 5 to 85 pounds of honey per hive.

Honey production was much higher for the Midwest beekeepers and averaged from 70 to 95 pounds per colony for the three classes studied. Honey production per beekeeper ranged from 30 to 200 pounds per colony.

Pollination income was far more certain than honey income for most beekeepers. Most beekeepers who had pollination income also used contracts for their pollination service.

SUMMARY OF COST AND INCOME

Table 6 shows the principal cost items considered in commercial beekeeping. The total labor, power equipment, and interest were consistently high in proportion to the total cost. Total labor was the largest expense for all classes. This cost assumed $2 per hour wage paid to the beekeeper and all family labor. Management earnings (gross returns minus total cost) shows a net loss for all classes of beekeepers. Business and family earnings (management earnings plus unpaid labor and interest) were positive for class I in the Midwest and classes II, III, and IV in the Southwest.

Cash earnings of all beekeepers in the study were in excess of cash cost. This item is the basis on which almost all beekeepers operate and pay their living expenses. Therefore, they must rely on an occasional exceptional yield of honey to replace equipment.

EXTREMES WITHIN CLASSES OF COST AND INCOME

The main differences between beekeepers who have high and low management returns and those with high and low total costs are discussed in this section and tabulated in table 7.

Operators with low-cost expenses varied between 33 and 70 percent of those with high-cost expenses. The primary reasons for these differences were variations in investments for buildings and honey equipment and operating expenses. In addition, some beekeepers had large cash expenses for travel and labor. The amount of labor was not related to production or to the type of operation. Management returns were based on all income and expenses. Those receiving pollination fees of $15 or more per colony and those selling bees and queens netted more profit from their operation than those relying only on sales of honey.

The following are specific examples of the causes of high costs or high returns of the various classes and areas. Operator A (table 7) had the highest total cost of all beekeepers surveyed. He had 6.95 sq. ft. of building per colony while operator B, with the lowest costs in this class, had only 0.9 sq. ft. Operator A replaced all bees each year at $6 per colony and paid $9 per colony for labor. Although he had the highest yield of honey per colony of all those surveyed, A's cash returns did not pay his cash expenses.

Operator C was the only beekeeper in the Midwest to show a profit for management earnings. This profit resulted from a good honey yield and an income of 17.82 per colony from pollination. He had a low investment cost and an average cash cost.

In the Midwest, keeping cost down did not necessarily mean increased profit. Operator B had the lowest cost but also the lowest management earning for his class. His low earning was due to a poor yield of honey. This low yield may have resulted from poor colony management as he spent only 3.4 hours per colony compared with an average of 5 hours per colony for the other beekeepers in his class.

Poor management planning increased the cost of operator D, who drove 30,000 miles a year in a pickup and 4,000 miles with a 4-ton truck. Others in D's class drove about 4,000 miles a year and visited each colony half as many times. Paid labor can raise cost above income. Operator I had one full-time and two

TABLE 5.—*Beekeeping production: Colonies per beekeeper, production of honey and beeswax per colony, and income per colony from various activities, Southwest and Midwest study areas, 1968*

Size of operation, number of operators, and range in size [1]	Colonies per operation	Production		Income from—					Total income	Average gross income [3]
		Honey	Beeswax	Honey	Beeswax	Polination [2]	Bee sales [2]	Other		
	No.	*Lbs.*	*Lbs.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Southwest										
Class 1, 5 operators:										
Low	300	0	0	0	0	0	0	0	10.50	----
High	395	120	2.9	13.83	1.71	10.50	7.67	0	17.16	----
Average	349	32.4	0.7	3.75	.43	5.37	2.07	0	11.63	4,652.00
Class II, 10 operators:										
Low	500	0	0	0	0	0	0	0	6.59	----
High	900	147.5	3.3	17.82	1.81	16.84	2.75	0	24.63	----
Average	646	55.1	1.1	6.69	.72	6.02	.28	0	13.79	10,342.50
Class III, 21 operators:										
Low	1,000	0	0	0	0	0	0	0	4.91	----
High	2,500	144	2.4	17.28	1.51	14.55	18.46	0	26.82	----
Average	1,430	35.7	0.7	4.34	.49	5.23	2.81	0	12.87	25,740.00
Class IV, 5 operators:										
Low	3,000	0	0	0	0	1.87	0	0	10.95	----
High	5,500	85.7	1.4	10.61	.95	10.25	19.83	.30	21.70	----
Average	4,400	33.5	.6	4.09	.40	5.40	5.78	.60	15.74	70,830.00
Midwest										
Class I, 6 operators:										
Low	310	30.3	.3	3.89	.20	0	0	0	4.10	----
High	490	200	2.9	30.00	1.82	17.82	0	.48	31.13	----
Average	374	95.3	1.4	13.89	.91	3.89	0	.07	18.76	7,504.00
Class II, 6 operators:										
Low	510	41.1	.4	4.93	.26	0	0	0	6.10	----
High	640	102.4	2.2	15.35	1.43	0	0	.52	16.78	----
Average	576	70.0	1.3	9.69	.84	0	0	.09	10.62	7,965.00
Class III, 6 operators:										
Low	1,180	53.9	.9	7.50	.63	0	0	0	8.65	----
High	2,500	106.3	2.1	14.88	1.36	18.00	0	.30	16.23	----
Average	1,559	72.2	1.5	10.52	1.01	1.42	0	.08	13.03	26,000.00

[1] See table 1, footnote 1 for explanation of size of operation.

[2] Number of beekeepers with income from polination and bee sales:

	Southwest		*Midwest*
	Polination	*Bee sales*	*Polination*
Class I	4	2	1
Class II	8	1	0
Class III	17	7	3
Class IV	5	3	--

[3] Percentage gross income of Southwest beekeepers is to that of Midwest: Class I, 63 percent; Class II, 130 percent; Class III, 99 percent.

TABLE 6.—*Summary of costs and returns per colony in commercial beekeeping, Southwest and Midwest, by size of operation*

(1) Size of operation [1]	(2) Replacement	(3) Gross returns	(4) Cash costs	(5) Total costs	(6) Labor	(7) Labor	(8) Labor	(9) Power equipment	(10) Depreciation	(11) Interest	(12) Earnings	(13) Earnings	(14) Earnings
					Paid	Unpaid	Total				Management (3–5)	Business family (7+11+12)	Cash (3–4)
	Dol.	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Midwest													
Class I	75.15	18.76	9.53	25.93	2.17	8.63	10.80	2.19	5.10	3.20	(−7.17)	4.66	9.23
Class II	95.67	10.62	7.12	24.56	.19	6.89	7.08	3.11	6.89	3.88	(−13.94)	(−3.17)	3.50
Class III	72.97	13.03	9.59	21.21	3.13	3.45	6.58	2.30	5.32	3.19	(−8.18)	(−1.53)	3.44
Southwest													
Class I	86.06	11.60	7.35	26.12	.78	9.80	10.58	5.04	4.94	3.84	(−14.52)	(−0.88)	4.25
Class II	76.67	14.60	7.53	22.87	.89	7.06	8.95	4.15	5.31	3.45	(−8.27)	2.24	7.07
Class III	58.63	12.87	7.95	17.82	2.12	4.08	6.20	3.48	4.09	2.63	(−4.95)	1.76	4.92
Class IV	51.45	14.90	8.80	16.38	3.74	1.26	5.00	2.94	3.69	2.49	(−1.48)	2.27	6.10

[1] See table 1, footnote 1, for explanation of size of operation. Costs shown here are for average size.

part-time employees, resulting in a cash cost higher than his income.

Operators in the Southwest moved bees to take advantage of honey flow or pollinating crop. Different sources of income from bees were reported in each class making it difficult to analyze the cost factors.

In the Southwest two beekeepers in class I shared honey and wax equipment, reducing their investment considerably. Operator K, with about 400 colonies, had a very high investment in power equipment, as he had a 1-ton and a 2-ton truck with hive loaders. Class III operators average the same quantity of power equipment.

Some operators in class II had very high investments in honey wax equipment. For example, operator M had three extractors and a power uncapper in addition to other expense equipment. His utility bill was five times that of other beekeepers in his class.

Yields of honey and income from pollination can make a great difference in profit or loss. Costs of operators O and P were very close but O received 116 pounds of honey per colony plus $8 per colony additional income from pollination, whereas P received only 50 pounds of honey per colony.

Operator Q had the highest earning ($26.82 per colony), of which $8.36 was from pollination and $18.46 from sales of queens and package bees. He had an average investment and used 2.6 hours of labor per colony.

Transportation cost of operator S exceeded his income by $0.35 per colony. He drove a 2½-ton truck 106,000 miles and another truck 70,000 miles at a cost of $15.90 per colony compared with an average of $3.84 per colony for his class. S moved colonies up to 400 miles from his home. Operator R, in the same class, kept his operation of pollination and honey production closer to home, therefore keeping his travel cost low.

In class IV total operating costs were relatively close for all operators. The difference in cost per colony was related to the number of colonies owned.

TABLE 7.—*Extremes within classes of cost and income*

Operator & number of colonies in class [1]	Per colony	
	Total costs	Management earnings
	Dol.	*Dol.*
Midwest		
Class I:		
A. 400 colonies	[2] 39.16	−8.03
B. 330 colonies	[3] 18.29	[3] −14.28
C. 490 colonies	21.59	[2] −.99
Class II:		
D. 550 colonies	[2] 31.94	[3] −21.37
E. 550 colonies	23.18	[2] −6.40
F. 600 colonies	[3] 17.04	−8.57
Class III:		
G. 1,180 colonies	[3] 17.98	[2] 2.89
H. 1,275 colonies	21.57	[3] −12.92
I. 1,350 colonies	[2] 25.51	−9.28
Southwest		
Class I:		
J. 350 colonies	[2] 30.59	−15.05
K. 390 colonies	[3] 21.56	[2] −9.55
L. 375 colonies	29.05	[3] −20.53
Class II:		
M. 900 colonies	[2] 28.10	−5.91
N. 550 colonies	[3] 18.95	−7.73
O. 600 colonies	25.30	[2] −.95
P. 800 colonies	22.82	[3] −16.23
Class III:		
Q. 1,400 colonies	14.23	[2] 12.59
R. 1,000 colonies	[3] 9.95	2.32
S. 1,000 colonies	[2] 29.66	−9.61
T. 1,000 colonies	25.42	[3] −17.67
Class IV:		
U. 3,000 colonies	[2] 20.91	.79
V. 5,500 colonies	[3] 12.62	.57
W. 5,000 colonies	16.66	[2] .96
X. 3,000 colonies	17.88	[3] −6.93

[1] See table 1, footnote 1, for explanation of class.
[2] High.
[3] Low.

CONCLUSIONS

Anderson [3] estimated an investment of $60 per colony for a 1,000 colony operation and Reed [4], $53.35 per colony for California. Our

[3] ANDERSON, E. D. AN APPRAISAL OF THE BEEKEEPING INDUSTRY. U.S. Dept. Agr., Agr. Res. Serv. ARS 42–150, 38 pp. 1969.

[4] REED, A. D. AN ECONOMIC ANALYSIS OF THE CALIFORNIA BEE INDUSTRY. Univ. Calif. Agr. Ext. MA–29, 8 pp. 1970.

study, however, shows a cost of $72.97 in the Midwest and $58.63 in the Southwest. Reed estimated total expenses per colony of $19.43 to $25.30, depending on type of operation, whereas we show an average cost of $17.82 per colony for a 1,000-colony operation. Anderson and Reed estimated the total income from $14.56 to $22.30 per colony. However, our sample test in the 1,000 to 3,000 group shows $12.87 per colony income. The Anderson and Reed reports were based on theoretical operations while ours is based on averages of those surveyed.

The study reported here showed that in 1968 the Midwest beekeepers received an average of 15.6 cents a pound for honey and the Southwest beekeepers, 13.3 cents. Based on this average price of honey, table 8 gives the amount of honey needed to cover various costs for each class in each area. In classes III and IV operating costs between honey producers and those pollinating crops were not significantly different. Therefore, pollination income could be substituted for honey income.

In class II in the Midwest, cash operating costs were low because little or no hired help was used, while in the Southwest, hired labor increased with increases in size. The total labor per colony for all beekeepers surveyed went down as the size of operation increased.

In the Midwest the class II beekeepers had a high investment in buildings and equipment. The increase for class II in the Southwest area was not as great. Apparently, the increase in the Midwest was the enlarging of the honey house and related equipment to save labor in handling the honey crop. In the Southwest, the extracting season is longer and, apparently, less demand for labor-saving equipment such as the automatic uncapper. Keeping 500 to 1,000 colonies is larger than a one-man operation and too small for efficient use of labor-saving equipment. For example, an automatic uncapper costs about $2,000. Therefore, a 500-colony operator would have a $4 per colony investment. This same uncapper would serve a 2,000-colony operation at only $1 per colony investment.

The comparison of high- versus low-cost operators and the high- versus low-income operators showed many factors that caused these differences. These factors were studied to help the beekeeper make better management decisions. Some suggestions on how the operators can reduce cost and increase net income are as follows:

TABLE 8.—*Pounds of honey required to cover specified expenses, by size of operation*

Size of operation and average number of colonies [1]	Cash operating expenses	Cash + depreciation & interest expenses	Total cost, including unpaid labor @ $2/hr.
	Lbs.	*Lbs.*	*Lbs.*
Midwest			
Class I, 372 colonies	61	111	166
Class II, 576 colonies	46	113	157
Class III, 1,560 colonies	64	114	136
Southwest			
Class I, 349 colonies	55	122	196
Class II, 695 colonies	56	118	171
Class III, 1,430 colonies	60	103	134
Class IV, 4,000 colonies	66	113	123

[1] See table 1, footnote 1, for explanation of classes.

- Using a 1-ton or smaller truck for inspection, locating new bee pastures, routine care, repair and maintainance of hives, painting, and, at least, minor repair of hives in apiaries.
- Arranging and managing apiaries to reduce time and travel of both vehicles and labor within the apiaries.
- Using the same honey house and equipment by two or more beekeepers, especially in classes I and II.
- Storing honey in drums instead of 5-gallon cans. If bulk pickup service is available, temporary storage of honey in tanks can be a saving to some beekeepers. Storing honey in larger containers reduces time and labor and equipment costs if managed properly and if the size of the bee enterprise justifies it.
- Arranging the equipment in the honey house to permit a good flow pattern to reduce labor.
- Using portable honey extracting plants where bee yards are located a long distance from the headquarters, especially if only a yard is located on that road as it may occur in mountain areas.
- Specializing in one phase of beekeeping such as pollination or honey production; thereby having less kinds of equipment and utilizing that equipment more.
- Planning each visit to the yard so that more things are done at each visit, thus reducing the number of trips made to the yard and reducing the times each colony is inspected.
- Using labor-saving equipment as automatic uncappers and hive loaders when their cost is less than labor cost.

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