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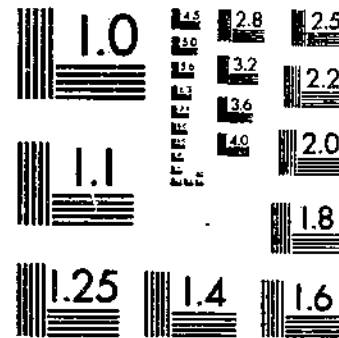
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TECHNICAL BULLETIN
USDA
ADAMS, R. L., TODD, F. E.
CALIFORNIA
COST OF PRODUCING EXTRACTED HONEY
GENERAL PURPOSE DATA

START



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



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UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

**COST OF PRODUCING EXTRACTED HONEY
IN CALIFORNIA¹**

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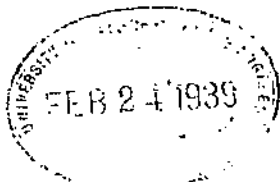
INTRODUCTION

This bulletin deals with the cost factors involved in the care of bees, production of honey and beeswax, and the preparation of honey for the wholesale market by the producer. It is the fourth in a series of studies of the economics of beekeeping in California. One of the previous studies³ discussed the agencies and practices concerned in

¹ Submitted for publication May 2, 1938.

² The field task of selecting apiaries and collecting data from beekeepers was done by Frank E. Todd, the junior author, with the assistance of E. L. Sechrist, formerly of the Pacific States Bee Culture Field Laboratory. The assembling and analyzing of the data was largely the work of the senior author, with the assistance of Nelda Foke. Credit is due to the cooperating beekeepers, county agricultural commissioners, and county inspectors of apiaries who gave generously of their time and information.

³ VOORHIES, EDWIN C., TODD, FRANK E., and GALBRAITH, J. K. HONEY MARKETING IN CALIFORNIA. Calif. Agr. Expt. Sta. Bull. 554, 31 pp., illus. 1933.



the movement of honey from producer to consumer. Another⁴ dealt with the distribution, extent of production, analysis of prices, purchasing power, and trade in apiary products. To aid in developing a marketing code for producers of queens and package bees, the cost findings based on the outputs of 64,032 queens and 59,029 pounds of package bees were published late in 1933.⁵

As pointed out in California Station Bulletin 555,⁴ prices of honey and beeswax alone give a one-sided view of economic conditions in the industry. If the prices received for honey and wax are high as compared with the cost, the beekeeper is prosperous; but if they are low as compared with the costs, he is not prosperous. The economic or financial aspects of honey production are concerned with (1) money required to equip and establish apiaries; (2) money required to maintain and operate apiaries and to harvest and market honey crops, including outlays for labor, supplies, use of equipment, replacements, and other necessary expenditures; (3) cost of production and financial returns; and (4) investments, costs, and financial returns as related to methods of increasing profits from the keeping of bees.

Thus, the economics of honey production deals primarily with money requirements, costs, and profits, as distinct from the technique of beekeeping, which concerns methods employed in the production of honey. Maximum success in beekeeping results from combining good technique with an adequate understanding of the economics of the industry. Much has been written on the technical aspects of beekeeping. Progressive beekeepers can therefore fully inform themselves, if they do not already know, as to what practices are most desirable. On the other hand, very little material has been compiled concerning the financial aspects of beekeeping. There is room for marked improvement in profits from beekeeping through a better understanding and utilization of sound economic principles, especially as applied to honey production.

METHOD OF STUDY

Between November 1933 and April 1934, 224 apiaries were visited in 33 California counties, and current data were collected as a basis for computing costs and making subsequent analyses. The data were recorded on forms containing about 450 questions, chosen to bring out the details of production and management. The records were taken by men familiar with beekeeping practices and experienced in the survey method of obtaining data.

Lists of all the registered beekeepers were obtained from the county agricultural commissioners. From these a random sample was taken, the drawing being limited, with a few exceptions, to beekeepers having more than 100 colonies. The selection provided representation from each of seven major honey-producing areas, each area containing counties with comparable conditions.

Costs as computed consisted of both direct or operating costs and indirect or overhead charges. The items under operating costs may be outlined as follows:

⁴ VOGLIETES, EDWIN C., TODD, FRANK E., and GALBRAITH, J. K. ECONOMIC ASPECTS OF THE BEE INDUSTRY. Calif. Agr. Expt. Sta. Bull. 555, 117 pp., illus. 1933.
⁵ ADAMS, R. L., and TODD, F. E. COST OF PRODUCING QUEEN AND PACKAGE BEES IN CALIFORNIA. Calif. Agr. Expt. Sta., Giannini Foundation Mimeographed Rept. 30. 8 pp. 1933.

(1) Supplies, including sections, cellophane, shipping cases and cans, sugar and honey for feed, paint, nails, lumber, gasoline, coal oil, queen and package-bee supplies, and minor miscellany.

(2) Labor (operator, family, and hired), whether actually paid or not, expended in maintenance and operation, including extraction, care, and delivery of honey.

(3) Current expenditures, including contracted labor, electric current, telephone, insurance, taxes, rental of buildings and bees, and miscellaneous items.

(4) Location rents, paid for in both cash and honey.

(5) Use of trucks and automobiles, based on the number of miles utilized in connection with honey production at an average cost per mile for total annual use, the cost being made up of interest, depreciation, gasoline, oil, repairs, tire replacements, and general upkeep.

(6) Apiary maintenance, including repairing of equipment and purchases of queens and package bees.

Overhead charges include the use of bees, buildings, and equipment. The charge for bees includes interest and depreciation. The value of bees for the purpose of charging interest was based on the beekeepers' statement of worth. Depreciation of bees was estimated from any reduction in colonies during the year, as determined from the first and second inventories. If no difference was shown, no charge for depreciation was figured. If the number of colonies was increased, the value was shown as a credit for bee appreciation. If package bees and queens were purchased, they were charged at actual cost as an expense necessary to maintain the apiary. Such purchases were deemed a normal outlay, and the full sum was therefore charged against the apiary.

The charge for use of buildings is made up of interest, depreciation, and upkeep. Depreciation was figured at the cooperators' estimate of the expected life of the building. Upkeep of buildings was determined from actual expenditures during the year, as the amount was deemed typical of the annual outlay for that purpose.

The charge for use of equipment is made up of interest and depreciation. Depreciation of equipment was figured at rates based on experience and estimated by beekeepers as the expected life of each item of equipment. Repairs of equipment were carried under maintenance expense.

Taxes and insurance could not be recorded separately for each type of equipment; hence these charges are lumped under current expense.

From the total gross cost as determined from the various items listed above, deductions were made for wax, queen and package bees sold, comb and chunk honey, receipts from rental of bees, equipment disposed of, premiums received at fairs, and appreciation of bees.

These figures were determined on an apiary basis, and from them the cost per colony was computed. The data on honey production were also assembled, so that the net cost per pound could be calculated. Comparison of data indicative of costs and of returns from the sale of honey provided a basis for determining profits.

Interest may be considered as either a profit or a cost. If figured as a cost, the total cost is increased. In these calculations interest was deemed a cost and calculated at a uniform rate of 6 percent. It was calculated on half the initial cost in order to allocate this charge over the entire life of the equipment, being assigned to the single year covered by this study.

With the wealth of data collected during this study, various economic analyses in addition to determinations of costs and profits were possible, and these additional analyses appear as a part of this report.

THE BEEKEEPING AREAS

The raw materials for honey production are not owned by the beekeeper, but are obtained from the vegetation existing within the bees' flying radius of the apiary. Beekeeping areas are found only where there are considerable acreages of good nectar-bearing plants. California honey is produced from seven principal nectar sources, which are found in different localities.

Beekeeping equipment and the general technique of honey production are fairly well standardized, but the timing of colony manipulations varies with the nectar source and the nature of the honey flow. Each honey-producing area, therefore, has its special management problems, and the honeys produced therein may command different prices. In some areas the beekeeper's income is derived largely from special apiarian products or services, such as the sale of queens and package bees or rents from fruit-pollination services. To present production costs for these varying conditions, apiaries operating under similar conditions have been grouped together. For convenience these groupings are presented as geographical areas⁶ (fig. 1), as follows:

Area	Counties
1—Imperial Valley	Imperial, Riverside (eastern portion).
2—Southern Orange Belt counties.	Los Angeles, San Bernardino, Orange, and Riverside (western portion).
3—Southern coast counties.	San Diego, Santa Barbara, Ventura, San Luis Obispo, Monterey, and Riverside (south-central portion).
4—San Joaquin Valley	Kern, Kings, Tulare, Fresno, Merced, Stanislaus, San Joaquin, and Contra Costa.
5—Sacramento Valley	Sacramento, Yolo, Sutter, Colusa, Butte, Tehama, Glenn, and Shasta.
6—San Francisco Bay and cut-over redwood area of coast ranges.	Napa, Alameda, Lake, and Sonoma.
7—Mountain counties	Modoc, Amador, Eldorado, Lassen, and Siskiyou.

A brief description of the main beekeeping features of these areas follows.

AREA 1—IMPERIAL VALLEY

Beekeeping in the Imperial Valley depends upon irrigated alfalfa for the source of its surplus honey. The area supports about 20,000 colonies and produces approximately 8 percent of the California honey crop. The honey is light amber in color and is used mostly for baking and manufacturing purposes, thus commanding lower prices than table honeys. It is sold largely in bulk to wholesalers. The yields per colony are fairly constant from year to year, and during the 5 years preceding 1933 averaged⁷ 80 pounds, which is slightly higher than the yields reported in the other areas.

Conditions in Imperial Valley permit nonmigratory beekeeping, a type of management in which bees remain on the same location throughout the year. From a cost standpoint this type of beekeeping has the advantages of minimum wear and tear on equipment, low transportation expenses, and permitting the operation of a large number of colonies per man. These features are found in Imperial

⁶ The areas used in this study are subdivisions of the honey belts described in California Agricultural Experiment Station Bulletin 555, as follows: Transmountain Belt, areas 1 and 7; South Coast and Chaparral Belt, areas 2 and 3; Sacramento-San Joaquin Belt, areas 4 and 5; the Bay and cut-over redwood area of the Coast Range Belt, area 6.

⁷ The averages used in this section are those reported by the cooperators in this study.

Valley beekeeping. In this area, where summer temperatures are high, colonies require protection from the sun. The expense of these sun shades, which are called ramadas, is not common to other areas.

AREA 2—SOUTHERN ORANGE BELT COUNTIES

Beekeeping in the southern Orange Belt counties depends upon orange groves and the native wild buckwheat and sages for its source of surplus honey. The honey crop for the 5 years preceding 1933 averaged about 70 pounds per colony annually, but because of the partial dependence on native nectar sources the annual yields are erratic. The area supports about 100,000 colonies of bees and produces 33 percent of the California honey crop. The honey is, for the most part, of the white table grades, commanding the higher market prices. Since the area has a large market close at hand, many of the beekeepers sell part of their crops direct to the consumer or the retail dealer.

In this area migratory beekeeping is necessary to obtain the largest possible crop of honey. This type of beekeeping, in which colonies are moved to different locations to take advantage of several honey flows during the year, requires considerable transportation expense, results in great wear and tear on equipment, and appears to limit the number of colonies operated per man. The lack of permanent locations has led to the establishment of central honey houses to which honey from the various bee yards is hauled for extracting. Because of the migratory nature of the industry in this area, competition for good locations is keen and has resulted in high rental fees. The main honey flows occur comparatively early in the season, frequently before the colonies have developed to their maximum honey-storing strength. That management skill is required to obtain good results is shown by the wide range in yields. Many producers also find it advantageous to move their colonies to higher or cooler sections for the fall and winter, because the mild southern California climate promotes winter activity of bees, which reduces colony vigor. The colonies are returned in January and February, to be developed for the April orange flow.

AREA 3—SOUTHERN COAST COUNTIES

The sources of surplus honey in the southern coast counties are the native sages and the wild buckwheats. The average production for the 5 years preceding 1933 is reported as 60 pounds per colony, but since the productivity is dependent on rainfall the yield is very erratic. The area supports about 50,000 colonies and produces about 13 percent of the California honey crop. In drought years the number of colonies is often greatly reduced by starvation, but these losses are quickly made up in wet years. Most of the colonies are in the hands of side-line producers, and the beekeeping is of the non-migratory type.

AREA 4—SAN JOAQUIN VALLEY

Cultivated crops, such as alfalfa, orange, cotton, and lima bean, form the backbone of beekeeping in the San Joaquin Valley. When there is adequate rainfall, there is also available a rich flora of native shrubs and weeds, particularly blue curl. This wide range of sources makes the area one of the most dependable honey-producing sections

of the State. The area supports about 80,000 colonies and produces about 25 percent of the California honey crop. During the 5-year period 1928-32 the average annual yield was about 66 pounds per colony, but during wet cycles this average is considerably higher. The honey in this area is of both the table and the manufacturing types, and is also used for export. Most of the crop enters the wholesale trade, although a number of producer bottlers sell direct to consumers.

The beekeeping is of the migratory type, with considerable investment in both portable and central extracting houses. The honey-producing season is one of the longest in the State, giving an opportunity to take advantage of several honey flows. In the northern part of this area many colonies are rented for fruit-pollination service, and there are a few producers of commercial queens and package bees.

AREA 5—SACRAMENTO VALLEY

Beekeepers in the Sacramento Valley derive their incomes from the sale of queens and package bees, rearing bees to fruit growers for pollination service, and the production of honey from the star-thistle plant and other minor sources. The area supports about 60,000 colonies, which produce about 16 percent of the California honey crop and most of the commercial queen and package bees. Star-thistle honey is of a table grade and therefore commands relatively high prices. The annual yields averaged 57 pounds per colony over the 5 years preceding 1933, but as star-thistle honey, coming from an introduced weed, is dependent on rainfall, the production varies considerably from year to year.

The package-bee production is based on the excellent bee-raising conditions during the spring period, when bees are in demand in other States, and the fact that the source of honey is star-thistle, which yields a summer nectar. Many annual wild flowers, deciduous fruit blossoms, and manzanita serve to stimulate early spring brood rearing, but there is available no spring source from which surplus honey can then be produced. Bees are shaken from the strong spring colonies, for sale in screen cages to beekeepers in other States where bee raising is more difficult but where there is a good source of surplus honey. Queen rearing is a companion enterprise. Shaking package bees tends to weaken colonies, serving to reduce the yield of star-thistle honey, but it is probable that in this area the income from honey production alone would be less than when combined with queen and package shipping.

The beekeeping is of the migratory type, with considerable investment in large central honey houses and transportation equipment. A dearth of nectar during May and June, typical of this area, causes colonies to decline in strength before the star-thistle flow. Many of the producers find it profitable to move their colonies to the mountains, where the nectar flows tend to maintain colony strength for the star-thistle flow in July and August.

AREA 6—SAN FRANCISCO BAY AND CUT-OVER REDWOOD

The San Francisco Bay and cut-over redwood area is the least developed beekeeping section of California. The sources of honey are eucalyptus and miscellaneous native vegetation. The production is

about 3 percent of the California honey crop and comes from mixed sources, but the honey is sold at fairly high prices to a good local market. The commercial producers find it necessary to migrate to other areas for summer pasturage. The area supports about 12,000 colonies, most of which are in the hands of fruit growers. The bee-

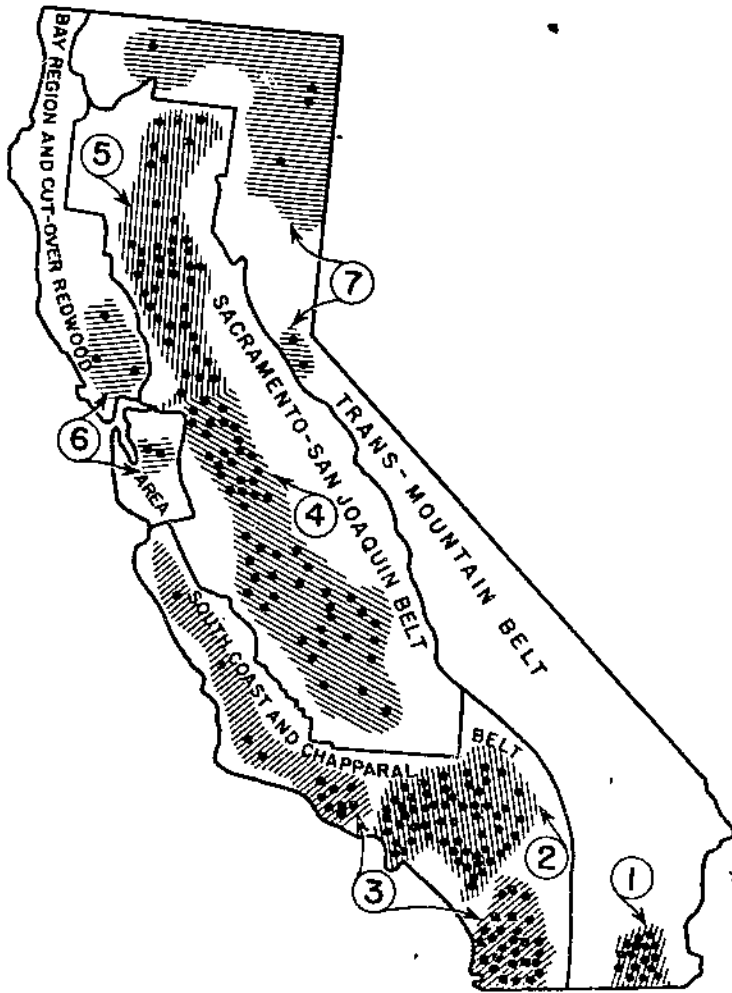


FIGURE 1.—Map of the honey-producing belts of California, showing the approximate locations of the cooperating apiaries and of the seven areas used in this study.

keeper's income is derived from the rental of pollination services as well as from honey production.

AREA 7—MOUNTAIN COUNTIES

Beekeeping in the counties of the Sierra Nevada-Cascade Range depends upon the alfalfa in the irrigated valleys and on a rich native vegetation. The area, producing 2 percent of the California honey crop, supports about 8,000 colonies, mostly in the hands of side-liners. Bears and buckeye poisoning are the chief drawbacks to commercial

production. The beekeeping is for the most part nonmigratory. The alfalfa honey is white and commands table-grade prices. That produced from the native vegetation is variable and enters into local consumption, where it commands good prices. The average production has been about 60 pounds per colony during the 5-year period 1928-32, but has been adversely affected by the dry-weather cycle. This area is used to advantage by beekeepers in the Sacramento-San Joaquin Valleys during their nectar-dearth periods in May and June.

DISTRIBUTION AND SIZE OF APIARIES STUDIED

The locations of the 224 apiaries from which data were collected are shown in figure 1. The usable records covered a total of 106,912 colonies producing 6,080,135 pounds of extracted honey. The total number of colonies in California in 1933 is estimated at 360,000, with a honey production of 12,960,000 pounds.^a The records thus comprise about 30 percent of the total number of colonies and approximately 50 percent of the estimated honey crop of California during the year 1933.

The distribution, by areas, of the number of apiaries, number of colonies, and honey production is indicated in table 1.

TABLE 1.—Distribution, by areas, of apiaries studied, number of colonies, and extracted honey produced

Area	Apiaries		Colonies		Honey production	
	Number	Percent	Number	Percent	Pounds	Percent
1. Imperial Valley.....	15	7.1	11,550	10.8	784,440	12.9
2. Southern Orange Belt counties.....	60	26.8	25,362	23.7	1,591,735	26.1
3. Southern coast counties.....	39	17.4	13,773	12.9	726,680	11.9
4. San Joaquin Valley.....	58	25.9	29,829	27.9	2,149,660	35.4
5. Sacramento Valley.....	40	17.9	24,556	23.0	745,740	12.3
6. San Francisco Bay and cut-over redwood.....	5	2.2	755	.7	35,500	.6
7. Mountain counties.....	6	2.7	1,087	1.0	46,480	.8
Total.....	224	100.0	106,912	100.0	6,080,135	100.0

The apiaries ranged in size from 62 to 5,000 colonies, the majority containing from 100 to 500 colonies (table 2).

TABLE 2.—Frequency distribution of apiaries classified on the basis of number of colonies per apiary

Grouping of colonies per apiary (number)	Apiaries in—						
	Area 1	Area 2	Area 3	Area 4	Area 5	Areas 6 and 7	All areas
	Number	Number	Number	Number	Number	Number	Number
Under 100.....	0	2	4	2	2	3	10
100-249.....	2	16	11	14	7	31	61
250-499.....	3	24	16	22	11	6	76
500-749.....	3	11	4	11	9	0	37
750-999.....	3	2	3	3	3	0	15
1,000-1,249.....	4	3	1	1	0	0	9
1,250-1,499.....	1	0	0	5	4	0	17
1,500-1,749.....	0	1	0	0	0	0	1
1,750-1,999.....	0	0	0	0	1	0	2
2,000-2,249.....	0	0	0	0	0	0	0
2,250-2,499.....	0	1	0	0	2	0	2
2,500-2,999.....	0	0	0	0	0	0	1
2,999-3,999.....	0	0	0	0	1	0	1
5,000.....	0	0	0	1	0	0	1
Average colonies per apiary.....	722	423	353	514	514	107	477

^a UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. Market News Service, Semimonthly Rept., Honey—No. 397, 8 pp. 1934. [Mimeographed.]

HONEY PRODUCTION

Of the total honey production 94.5 percent was produced for sale, while the remaining 5.5 percent was utilized, in order of importance, for bee feed, location rents, gifts, and home use (table 3).

TABLE 3.—Recorded production and disposition of extracted honey, by areas

Area	Reserved for bee feed		Paid for location rents		Home use		Gifts		Sold or held for sale		Total production
	Pounds	Per-cent	Pounds	Per-cent	Pounds	Per-cent	Pounds	Per-cent	Pounds	Per-cent	
1.....	4,140	0.5	12,000	1.5			0	0	768,300	98.0	784,440
2.....	45,330	2.8	29,758	1.8			1,000	0.1	1,624,847	95.8	1,691,735
3.....	11,050	1.5	12,212	1.7	1,140	0.2	3,871	.5	693,307	96.1	726,580
4.....	51,690	2.4	40,453	1.9	2,794	.1	0	0	2,654,923	95.0	2,149,600
5.....	96,220	12.9	23,000	3.1	400	.1	0	0	629,120	83.9	745,740
6.....			770	2.2			0	0	34,730	97.8	35,500
7.....	5,390	11.5	1,080	3.6	120	.2	0	0	39,320	84.0	46,480
All areas..	213,680	3.5	110,673	1.8	4,364	.1	4,871	.1	5,746,647	94.5	6,080,139

The production in 1933 was less than the average for the preceding 5 years (table 4), or 88 percent of that average. Since the cost per pound of producing honey is markedly influenced by the quantity produced, it is possible that costs for 1933 are somewhat higher than when production is normal.

TABLE 4.—Production of extracted honey in 1933 compared with preceding 5-year average (1928-32)

Area	Honey produced per colony ¹		Area	Honey produced per colony ¹		Area	Honey produced per colony ¹	
	5-year average	1933		5-year average	1933		5-year average	1933
1.....	80	68	4.....	66	72	7.....	60	43
2.....	70	63	5.....	57	30			
3.....	60	53	6.....	47	47	Average....	65	67

¹ Weighted averages.

The records show a wide variation in production per colony between areas as well as between apiaries in a given area. The majority of the apiaries in area 1 produced from 40 to 100 pounds, in area 2 from 20 to 80 pounds, in area 3 from less than 20 to 60 pounds, in area 4 from 40 to 120 pounds, in area 5 from less than 20 to 60 pounds, and in areas 6 and 7 from less than 20 to 80 pounds. Average yields in excess of 90 pounds per colony were obtained in 41 apiaries, but none of these were in area 5, 6, or 7. Data on production per colony per apiary, summarized and grouped from the various records, are shown in table 5.

TABLE 5.—Frequency distribution of apiaries classified according to the average production of honey per colony per apiary

Grouping of honey produced per colony (pounds)	Apiaries in—							Apiaries in grouping
	Area 1	Area 2	Area 3	Area 4	Area 5	Areas 6 and 7	All areas	
	Number	Number	Number	Number	Number	Number	Number	
Under 20.....	0	4	6	0	13	2	25	11.2
20-39.....	0	12	14	6	13	2	47	21.0
40-59.....	4	17	8	14	11	5	59	26.3
60-79.....	7	13	4	10	2	2	39	17.4
80-99.....	3	6	4	11	0	0	24	10.7
100-119.....	0	5	2	10	9	8	17	7.6
120-139.....	2	2	0	5	0	0	9	
140-159.....	0	1	0	1	0	0	2	
160-179.....	0	0	1	0	0	0	1	
180-200.....	0	0	0	1	0	0	1	5.8

INVESTMENTS

The principal investments in honey-producing equipment are shown in table 6. The essential buildings utilized in honey production are honey houses (permanent or portable) and storage houses. In the Imperial Valley ramadas are required. The number and value of buildings are shown in table 7.

TABLE 6.—Investment per colony

Area	Colo- nies	Build- ings	Extra hives, etc.	Honey equip- ment	Wax equip- ment	Tools	Other equip- ment	Total
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1.....	4.24	1.40	5.15	0.45	0.09	0.03	0.22	11.58
2.....	4.93	.87	* 6.24	.57	.06	.05	.25	12.99
3.....	5.24	.62	4.93	.70	.10	.04	.26	11.89
4.....	4.28	.65	3.56	.34	.07	.03	.24	9.17
5.....	4.56	.87	* 6.09	.36	.07	.05	.34	12.34
6.....	5.50	.62	* 6.41	.59	.16	.04	.21	13.53
7.....	5.51	1.46	* 8.28	.89	.06	.08	.73	18.01
Weighted average.....	4.51	.84	5.12	.47	.08	.04	.28	11.24
Proportion of total investment.....	Percent 29.8	Percent 7.4	Percent 45.1	Percent 4.1	Percent .7	Percent .4	Percent 2.5	Percent 100.00

* Includes ramadas, in which the average investment is 53 cents per colony.

† Apiaries in these areas were equipped with more supers and combs per colony than in other areas.

‡ Includes equipment for queens and package production.

TABLE 7.—Honey houses classified according to cost per structure

Grouping by cost per structure (dollars)	Perma- nent	Port- able	Stor- age	Grouping by cost per structure (dollars)	Perma- nent	Port- able	Stor- age
	Num- ber	Num- ber	Num- ber		Num- ber	Num- ber	Num- ber
Under 250.....	93	56	45	1,000-1,249.....	7	0	1
250-499.....	25	9	13	1,250-1,499.....	3	0	0
500-749.....	11	1	11	1,500 and over.....	4	0	0
750-999.....	7	1	1				

COSTS

OPERATING COSTS

Data on direct operating costs are shown in tables 8 to 16, inclusive. Cans and cases are the chief supply items except in area 5, where package-bee and queen supplies are more important. Prices of new cans varied slightly with the distance from Los Angeles and San Francisco. During the year of this study more than the usual number of used cans were purchased at about half the cost of new ones.

In area 2 considerable moving of bees was done on a contract basis. Where beekeepers were located near commercial wax plants, much of the wax rendering was done on a contract basis.

The nature of beekeeping makes it impractical to own the location where bees are kept. Location rents vary, owing to several factors. Suitable locations in highly cultivated areas, such as the Orange Belt, are scarce and higher rents are charged. In areas where migratory beekeeping prevails several locations per colony may be required; hence the costs are higher. Rents are higher in the southern part of the State than in the northern part.

TABLE 8.—Cost¹ of supplies for comb honey and extracted honey

Area	Sections, foundation, cellophane, and shipping packages for comb honey	Cans and cases for extracted honey	Sugar and honey for feed	Paint, nails, lumber, gasoline, and coal oil	Disease-control items	Queen and package-bee supplies	Miscellaneous	Total costs	Average cost	
									Per apiary	Per colony
1.....		\$4,420	\$322	\$359	\$73		\$58	\$5,242	\$328	\$0.46
2.....	\$142	7,419	1,003	1,304	70		184	10,242	171	.40
3.....	62	3,463	881	745	28		50	5,229	134	.38
4.....	144	9,963	2,413	1,015	12	\$775	53	14,075	243	.47
5.....	73	3,278	2,206	656	82	9,034	82	15,713	303	.64
6.....		21	18	80	2			127	25	.17
7.....	18	72	126	33	2			253	43	.23
All areas.....	439	28,636	6,733	4,508	269	9,869	427	50,881	227	.47

¹ Cents omitted except in last column.

TABLE 9.—Current expenses¹

Area	Contract work ²	Electricity	Telephone	Insurance	Taxes	Rental of—		Miscellaneous	Total costs	Average cost	
						Buildings	Bees			Per apiary	Per colony
1.....	\$15	\$23	\$5	\$128	\$794			\$51	\$1,026	\$64.12	\$0.09
2.....	1,975	141	44	439	1,309	\$349	\$600	541	5,398	89.96	.21
3.....	690	14	1	148	468	220	4	178	1,729	44.33	.12
4.....	786	244	108	248	1,051	397		313	3,147	54.25	.10
5.....	115	204	111	462	1,107	1,115		1,375	4,519	112.67	.18
6.....	55	0	0	7	7	3		0	72	14.40	.00
7.....	50	5	0	0	30			0	85	14.16	.08
All areas.....	3,692	631	269	1,462	4,766	2,084	604	2,408	15,976	71.32	.15

¹ Cents omitted except in last two columns.

² Work paid for on contract basis, such as moving hives, etc.

TABLE 10.—Location rents

Area	Total renting locations		Locations rented for payments in—			Rental costs ¹			Cost per colony	
			Cash only	Honey only	Cash and honey	In honey		In cash		Total
	Number	Percent	Number	Number	Number	Pounds	Dollars	Dollars	Dollars	Cents
1.....	16	100.0	2	9	5	12,000	467	1,239	1,706	14.8
2.....	87	95.0	15	5	37	29,558	1,032	4,101	5,193	20.8
3.....	31	80.0	7	12	12	12,212	640	702	1,242	9.0
4.....	87	98.6	1	31	25	40,453	1,975	1,214	3,189	10.7
5.....	38	95.0	1	20	17	23,000	1,175	531	1,706	7.0
6 and 7.....	10	91.0	0	8	2	2,450	122	17	139	7.6
All areas.....	209	93.3	26	85	98	110,573	5,311	7,864	13,175	12.8

¹ Cents omitted.

² Percent of total locations in the area indicated.

TABLE 11.—Costs of apiary maintenance

Area	Repair of equipment ¹	Package bees and queens				Total costs ¹	Average cost	
		Replacement on 100 colonies		Total costs ¹			Per apiary	Per colony
		Package bees	Queens	Package bees	Queens			
	Dollars	Pounds	Number	Dollars	Dollars	Dollars	Dollars	Cents
1.....	223		2.3		111	334	20.87	3
2.....	259	0.32	8.5	59	895	1,213	20.21	5
3.....	319		5.0		239	558	14.30	4
4.....	451	3.5	11.7	319	1,124	1,924	33.17	6
5.....	357	8.4	14.5	397	1,363	2,057	51.42	8
6 and 7.....	31	8.9	15.7	55	89	175	15.01	9
All areas.....	1,670	3.1	9.8	830	3,761	6,201	27.95	6

¹ Cents omitted.

TABLE 12.—Frequency distribution of apiaries according to labor input per colony

APIARIES

Grouping of labor per colony (hours)	Area 1	Area 2	Area 3	Area 4	Area 5	Areas 6 and 7	All areas
	Number	Number	Number	Number	Number	Number	Number
1-1.9.....	2	4		2	2	1	18
2-2.9.....	7	13	11	3	0	1	44
3-3.9.....	5	14	7	17	7	2	52
4-4.9.....	1	9	5	12	5	2	34
5-5.9.....	0	8	4	9	9	2	32
6-6.9.....	0	6	3	2	1	1	13
7-7.9.....	0	4	1	1	3	1	10
8-8.9.....	0	2	0	5	3	0	10
9 and over.....	1	0	1	7	1	1	11

LABOR

	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Average.....	3.2	4.3	3.8	4.7	3.9	5.2	4.2
Range.....	1.2-13.0	1.1-8.2	1.2-10.8	1.4-15.1	1.0-13.9	1.4-10.8	1.0-15.1

TABLE 13.—Frequency distribution of aptaries according to wages and value of unpaid labor, with summary of prevailing, average, and range in wages in each area

APIARIES REPORTING

Wage grouping per hour (cents)	Area 1			Area 2			Area 3			Area 4			Area 5			Areas 6 and 7			
	Opera- tor	Family	Hired	Opera- tor	Family	Hired	Opera- tor	Family	Hired	Opera- tor	Family	Hired	Opera- tor	Family	Hired	Opera- tor	Family	Hired	
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	
15-24.....	0	0	1	0	0	2	1	1	2	0	3	7	0	2	3	1	0	2	1
25-34.....	2	1	3	0	2	17	2	8	11	3	8	17	3	16	3	1	0	0	
35-44.....	5	3	5	7	4	15	6	2	7	14	10	12	11	4	3	1	0	0	
45-54.....	6	0	2	24	2	3	15	2	0	27	3	0	16	2	3	6	0	1	
55-64.....	1	0	0	19	1	3	9	0	1	11	0	0	5	0	0	3	0	0	
65 and over.....	0	0	0	8	0	0	6	0	0	1	1	0	5	0	1	0	0	0	

WAGES PER HOUR

	Cents 50-55	Cents 35-39	Cents 40-45	Cents 50-55	Cents 40-45	Cents 25-35	Cents 50-55	Cents 30-35	Cents 25-35	Cents 45-55	Cents 30-40	Cents 30-40	Cents 50-55	Cents 35-40	Cents 25-30	Cents 50-55	Cents 20-25	Cents (1)
Prevailing wages.....																		42
Average, all groups.....	48.3	35.0	38.4	56.8	40.5	38.1	52.2	34.7	32.3	49.5	39.0	26.5	50.9	39.1	27.8	51	21	18.6
Range.....	29.6	30.0	20.0	37.5	25.0	18.8	24.5	20.0	22.2	25.0	18.8	18.0	31.3	26.0	20.0	21.5	-----	62.5
	63.0	40.3	47.9	100.0	62.5	62.5	38.5	50.0	56.3	72.1	72.1	43.8	80.0	52.5	77.5	64.3	-----	

¹ Too few records to establish a base.

TABLE 14.—Hours and value of labor

Area	Operator			Family (other than operator)			Hired help			Total labor charge ¹	Average charge	
	Total time	Weighted average charge per hour	Total charge ¹	Total time	Weighted average charge per hour	Total charge ¹	Total time	Weighted average charge per hour	Total charge ¹		Per apiary ¹	Per colony
	Hours	Cents	Dollars	Hours	Cents	Dollars	Hours	Cents	Dollars	Dollars	Dollars	Dollars
1.....	19,436	45.2	9,033	5,972	35.0	2,090	10,768	38.4	4,134	15,857	991	1.37
2.....	73,492	55.8	41,753	4,800	40.5	1,820	32,041	38.1	12,199	55,773	920	2.20
3.....	30,018	52.2	15,805	9,379	34.7	3,250	8,907	32.6	2,269	24,823	524	1.77
4.....	74,459	49.5	36,881	22,153	39.0	8,640	43,517	26.5	11,563	57,085	984	1.91
5.....	62,256	50.9	31,706	7,046	39.1	2,765	37,247	27.8	10,527	44,969	112	1.88
6.....	3,202	51.6	1,621	704	21.0	148	50	32.0	16	1,637	327	2.17
7.....	5,480	51.0	2,790	704	21.0	148	112	46.4	52	3,000	500	2.78
All areas.....	274,874	52.1	143,198	49,761	37.6	18,703	130,732	31.1	40,781	202,664	904	1.90

¹ Cents omitted.

² Includes some monthly rates that do not show in average hourly rate.

TABLE 15.—Cost per mile for use of trucks and automobiles

Area	Apiaries reporting indicated number of trucks or automobiles				Apiaries reporting cost per mile of—								Cost per mile			Mileage								
					2-4.9 cents		5-7.9 cents		8-10.9 cents		11-13.9 cents		14-16.9 cents		17+ cents		No data		Range	Average all groups	Average largest group	Total	Range	Average per vehicle
	1	2	3	4	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	Cy.	Cy.	Cy.	Miles	Miles	Miles	Miles	Miles
1.....	11	4	0	0	3	8	4	0	0	0	0	0	0	0	0	0	3-10	8.3	5.9	75,800	1,500-11,000	3,989		
2.....	42	6	0	0	5	29	7	5	1	1	0	2-20	6.8	5.9	0	0	2-20	6.8	5.9	271,223	350-20,000	5,023		
3.....	24	2	1	0	1	13	7	2	2	3	3	0	3-19	7.0	6.0	0	0	3-19	7.0	6.0	112,029	500-31,000	3,614	
4.....	48	4	0	0	0	33	12	2	2	1	2	0	5-25	6.7	6.0	0	0	5-25	6.7	6.0	400,295	400-30,000	7,413	
5.....	25	8	1	1	2	19	7	2	2	1	1	0	2-19	6.8	6.6	0	0	2-19	6.8	6.6	261,441	200-21,000	5,447	
6 and 7.....	8	1	0	0	0	6	2	1	0	0	0	0	5-11	6.0	5.5	0	0	5-11	6.0	5.5	37,060	500-10,500	3,706	
All areas.....	156	25	2	1	11	108	39	12	6	6	6	2-25	6.8	5.9	0	0	2-25	6.8	5.9	1,157,843	200-31,000	6,300		

AUTOMOBILES

1.....	5	0	.....	3	1	0	0	1	.....	3-16	4.2	3.7	16,000	500-8,000	3,280
2.....	24	2	.....	16	7	2	1	0	.....	3-13	4.8	3.1	104,100	400-15,000	3,718
3.....	13	1	.....	6	3	2	2	1	.....	3-15	6.3	4.0	25,384	525-8,026	1,692
4.....	25	2	.....	15	6	1	2	0	.....	3-13	4.2	3.5	128,800	300-15,500	4,441
5.....	18	0	.....	9	8	0	1	0	.....	2-12	4.5	3.5	48,380	200-5,000	2,688
6 and 7.....	4	0	.....	1	3	0	0	0	.....	4-6	4.7	5.0	10,506	500-4,000	2,623
All areas.....	89	5	.....	60	31	6	6	2	.....	2-16	4.6	4.0	333,164	200-15,500	3,368

¹ A few records of costs were not available; hence the number of cases reporting costs does not equal the number of automobiles reported.

TABLE 16.—Total transportation mileage and cost

Area	Mileage			Average cost		
	Total	Average per apiary	Average per colony	Per apiary	Per colony	Per 100 pounds of honey
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1.....	91,800	5,738	7.9	339.13	0.47	0.68
2.....	375,320	6,255	14.8	390.45	.92	1.47
3.....	137,413	3,823	10.0	242.67	.69	1.30
4.....	529,095	9,122	17.7	854.14	1.08	1.50
5.....	306,821	7,745	12.6	498.45	.81	2.67
6 and 7.....	47,560	4,324	25.8	242.18	1.45	2.98
All areas.....	1,491,006	6,656	13.9	415.45	.87	1.53

OVERHEAD COSTS

Charges for the use of buildings, equipment, and bees are given in tables 17 to 20, inclusive. Designations and quantities of commonly used items, together with the first cost and depreciation data, are given in table 18, the data being a composite of all records. Hives, frames, and combs in use by colonies are included.

TABLE 17.—Charge for use of buildings

Area	Interest ¹	Depreciation ¹	Upkeep ¹	Total charge ¹	Average charge per colony	Average charge per 100 pounds of honey
1.....	\$483	\$838	\$223	\$1,544	\$0.134	\$0.107
2.....	664	968	200	1,832	.075	.119
3.....	253	819	118	890	.065	.123
4.....	533	969	258	1,830	.061	.085
5.....	640	843	185	1,668	.068	.224
6.....	14	11	31	56	.074	.158
7.....	44	29	0	73	.067	.159
All areas.....	2,681	4,197	1,075	7,953	.074	.131

¹ Cents omitted.

TABLE 18.—Cost and depreciation of equipment other than buildings

Item	Quantity	First cost	Annual charge for depreciation	
			Percent	Dollars
Production equipment:	<i>Number</i>	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>
Bottom boards, extra.....	11,662	4,763.42	7	333.44
Covers, extra, wood.....	11,368	4,835.67	7	338.71
Drawn combs, Langstroth.....	1,650,624	351,616.48	10	35,166.65
Drawn combs, shallow.....	63,310	8,443.00	10	844.30
Entrance screens.....	1,706	349.40	7	23.83
Excluders, wire.....	225	128.50	5	6.43
Excluders, wood-wire.....	9,439	5,423.00	5	271.15
Excluders, zinc.....	13,141	4,635.54	5	231.78
Frames, Langstroth, with foundation.....	34,880	4,334.25	7	309.40
Frames, Langstroth, nailed.....	73,120	3,662.63	7	256.39
Frames, Langstroth, knocked down.....	16,650	325.50	7	36.79
Frames, shallow, with foundation.....	4,400	49.00	7	2.80
Frames, shallow, nailed.....	110,668	184,495.91	4	19,370.84
Hives, complete, in use.....	5,722	13,401.25	4	533.95
Hives, extra.....	400	130.00	2.5	3.00
Moving clamps.....	10,971	5,924.15	7	414.69
Moving screens.....	1,590	324.00	5	16.20
Shade boards.....	1,752	701.00	7	49.07
Stands.....	20,394	12,329.70	5	616.49
Supers, 8-frame standard.....	180,828	107,153.75	5	5,367.77
Supers, 8-frame shallow.....	760	416.95	4	16.68

TABLE 18.—Cost and depreciation of equipment other than buildings—Continued

Item	Quantity	First cost		Annual charge for depreciation	
	Number	Dollars	Percent	Dollars	
Supers, 10-frame shallow	8, 145	4, 419.85	4	176.78	
Supers, 8-frame comb	5, 668	2, 971.95	4	118.88	
Supers, 10-frame comb	2, 200	1, 360.00	4	54.40	
Supers, others	4, 445	3, 007.50	5	150.38	
Trailers	63	3, 105.00	10	310.50	
Queen and package-bee equipment:					
Boxes ("nucs")	55	52.60	5	2.63	
Division boards	1, 150	150.00	5	7.50	
Hives, nucleus	7, 108	17, 077.25	4	683.09	
Incubators	2	250.00	7	17.50	
Introducing cages	1, 020	125.00	10	12.60	
Scales	240	3, 191.80	5	159.58	
Office equipment		1, 628.00	8	81.40	
Harvesting equipment:					
Bee escapes	485	74.75	5	3.64	
Bee escapes with boards	1, 442	458.70	0	27.52	
Capping baskets	4	8.00	8	.64	
Capping melters	47	904.80	7	63.04	
Capping presses	1	25.00	7	1.75	
Capping tanks	80	652.20	7	45.66	
Carts	7	82.00	3.3	2.73	
Comb trays	2	20.00	10	2.00	
Drift pans	1, 652	1, 105.75	7	77.40	
Engines	68	3, 904.80	7	266.82	
Extractors	205	23, 414.85	5	1, 170.73	
Honey hauling boxes	310	181.00	7	12.67	
Honey heaters	8	141.50	7	9.91	
Honey heaters	5	53.00	7	3.71	
Honey pumps	63	2, 167.50	6	108.38	
Honey pumps	88	437.00	10	43.70	
Honey strainers	805	18, 246.65	5	912.33	
Honey tanks	105	451.00	15	67.65	
Milk cans	56	2, 593.40	7	181.54	
Motors	2	40.00	7	2.80	
Pressure tanks	20	1, 077.50	7	75.43	
Steam boilers	220	1, 818.65	10	181.87	
Stoves	167	1, 716.25	7	120.14	
Uncapping boxes	104	187.00	5	9.40	
Uncapping knives, cold	104	107.77	10	10.78	
Uncapping knives, mechanical	10	1, 076.10	10	107.61	
Uncapping knives, complete with boiler	156	275.46	7	19.32	
Warehouse trucks	116	656.75	7	45.97	
Water tanks	150	1, 328.50	7	93.00	
Wax extractors (solar)	510	1, 911.75	7	133.82	
Wax-melting vats	14	19.50	10	1.95	
Wax pans	123	3, 278.09	5	163.95	
Wax presses	271	1, 319.00	0	79.14	
Wheelbarrows					
Tools and miscellaneous:					
Fire extinguishers	42	460.85	7	32.19	
Hive and box machinery	23	2, 073.50	5	103.68	
Tools, beach, hoes, etc.		2, 027.25	5	148.36	
Tools, vells, smokers		1, 318.95	100	1, 318.95	
Torches	101	561.70	10	56.17	
Miscellaneous ¹		1, 731.92	30	501.80	

¹ Includes a number of items usually reported but once, such as air pump, belting, binding, branding iron, chain hoist, coil for water back, comb-dipping outfit, special comb-honey equipment, feeders, frame marker, hauling tank, frame holder, motor cultivator (for cleaning around stands), paper, piping, planers, platform unloading tank, portable extracting equipment, screen box, screen working cage, sealing machine, section press, sign, square vat, steam coil, and wax container.

TABLE 19.—Charge for use of equipment other than buildings

Area	Interest ¹	Depreciation ¹	Total charge ¹	Average charge per colony	Average charge per 100 pounds of honey
1	\$3.054	17.653	\$9.707	\$0.84	\$1.24
2	5.457	20.412	25.869	1.02	1.63
3	2.493	8.963	11.446	.83	1.68
4	3.798	16.324	19.122	.64	.89
5	5.087	17.526	22.613	.92	3.03
6	168	767	935	1.24	2.63
7	328	942	1, 270	1.17	2.73
All areas	19, 385	71, 577	90, 962	.85	1.50

¹ Cents omitted.

TABLE 20.—Charge for use of bees.

Area	Interest	Appreciation	Total charge	Average charge per colony	Average charge per 100 pounds of honey
1	741,438	517	51,465	\$0.126	\$0.185
2	3,402	469	3,871	.155	.246
3	1,735	538	2,273	.165	.313
4	3,603	3,627	6,830	.228	.317
5	3,278	1,191	4,469	.182	.509
6	89	89	89	.118	.251
7	184	536	720	.062	1.549
Total	13,889	5,778	19,787	.134	.325

1 Cents omitted.

CREDITS

The nature and amount of credits varied with the different areas. In areas 1 and 2 sales of beeswax constituted the principal source of credit; in area 3 beeswax and appreciation of bees; in area 4 beeswax, followed by substantial returns from sales of queens and package bees, and some returns from rent of bees. In area 5 sales of queens and package bees resulted in outstandingly important credits (amounting to more than \$40,000, or about half the total credits for all apiaries studied), followed by substantial credits from sale of beeswax, appreciation of bees, and rent of bees. Beeswax, rents, and appreciation constituted the principal credits in area 6; and beeswax, appreciation of bees, and sales of comb and chunk honey in area 7. Amounts and values of credits are shown in table 21.

TABLE 21.—Credit items.

Area	Beeswax		Sale of queens		Sale of package bees		Comb and chunk honey		Rent of bees for pollination		Provision of hives		Appreciation of bees		Total credits	Average per colony
	Lb.	Dol.	No.	Dol.	Lb.	Dol.	Lb.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.		
1	14,414	2,326	0	0	0	0	0	0	0	0	0	0	689	3,015	0.26	
2	22,069	2,432	872	419	26	8	4,830	561	0	150	2,320	6,865	0	27	.27	
3	12,396	1,983	50	20	109	50	1,350	162	470	0	1,168	3,851	0	28	.28	
4	15,396	5,637	6,032	2,673	4,324	1,770	9,068	508	1,422	51	3,964	16,055	0	54	.54	
5	17,272	3,747	34,065	15,648	56,619	24,596	2,574	484	2,413	23	2,263	48,173	0	1.96	1.96	
6	738	123	23	18	30	13	0	0	360	0	176	690	0	91	.91	
7	11,890	1,122	11	35	37	0	0	2,414	166	0	0	210	623	0	.58	
All areas	103,998	18,479	46,067	18,896	61,093	26,439	20,236	2,204	4,665	233	10,487	76,804	0	.74	.74	

1 Cents omitted in all but last column.

2 Totals of only those apiaries showing an appreciation.

SUMMARY OF GROSS AND NET COSTS

The average costs of producing honey, as shown in table 22, are made up of the many varying costs of the individual producers, some having good and others poor production. They do not indicate the possibilities of beekeeping in a given area, but rather what actually was done during the year of this study.

TABLE 22.—Average cost per colony and net cost per pound of honey

Area	Overhead cost			Operating cost							Gross cost	Credits for byproducts	Net cost	
	Depreciation	Interest	Total	Maintenance	Supplies	Current expense	Location rents	Labor	Truck and automobile	Total			Per colony	Per pound of honey
1	\$0.75	\$0.35	\$1.10	\$0.03	\$0.45	\$0.09	\$0.145	\$1.37	\$0.47	\$2.55	\$1.60	\$0.26	\$1.40	\$0.050
2	.85	.30	1.25	.05	.40	.21	.205	2.20	.92	3.09	4.24	.27	4.97	.076
3	.70	.35	1.05	.04	.38	.12	.09	1.77	.69	2.09	4.15	.28	3.87	.073
4	.65	.28	.93	.06	.47	.10	.107	1.91	1.08	2.73	4.66	.51	4.12	.057
5	.80	.37	1.17	.04	.64	.18	.07	1.83	.81	3.61	4.78	1.06	2.62	.094
6	1.03	.40	1.43	.11	.17	.09	.06	2.17	2.06	4.85	6.08	.91	5.17	.110
7	1.36	.54	1.90	.08	.23	.09	.03	2.76	1.02	4.26	6.15	.64	5.57	.129
All areas	.76	.34	1.10	.08	.47	.15	.12	1.90	.87	3.57	4.67	.74	3.93	.069

Regional variations are indicated by these data. The average gross costs per colony in the nonmigratory areas (1 and 3) are noticeably lower than those in the migratory areas, most of the difference occurring in operating costs. The high gross costs shown for areas 6 and 7 may explain in part why commercial beekeeping has developed more slowly in these areas than in other parts of the State. The net cost per pound of honey is influenced by yields, which vary from year to year. The low yields in areas 3 and 5 result in comparatively high costs per pound.

The wide variation in the cost of producing extracted honey among the apiaries located in each area is a significant and thought-provoking finding. Only 42 percent of the apiaries were producing honey at or below the average cost of the group. Even at more normal prices only a portion of these would have made a profit or broken even.

The 58 percent producing at above the average costs were receiving little or nothing for their noncash items, and many of them were not even meeting cash expenses. The need for careful examination of costs and a correction of organization and method is indicated by the data in table 23, which shows the number and percentage of apiaries producing honey at various net costs.

TABLE 23.—Frequency distribution of apiaries according to net cost per pound of producing extracted honey

Area	Cost per pound				Cumulative percentage of total apiaries in indicated group	Area	Cost per pound					
	Class group	Average	Apiaries in indicated group				Class group	Average	Apiaries in indicated group			
1	Cents					5	Cents					
	Under 4	3.4	5	31.3			31.3	Under 4	2.9	3	7.5	7.5
	4-4.9	4.5	4	23.0			54.3	4-4.9	4.3	1	2.5	10.0
	5-5.9	6.7	2	12.6			66.9	5-5.9	5.2	3	7.5	17.5
	6-6.9	6.3	3	18.7			85.5	6-6.9	6.7	1	2.5	20.0
	7-7.9	7.3	2	12.5			100.0	7-7.9	7.6	3	7.5	27.5
	8-8.9	0	0	0			100.0	8-8.9	9.2	8	20.0	47.5
	10-14.9	0	0	0			100.0	10-14.9	12.0	9	15.0	62.5
	Over 15	0	0	0			100.0	Over 15	22.5	15	37.5	100.0
	Total or average ¹	5.0	16	100.0				Total or average ¹	6.3	40	100.0	
2	Under 4	3.5	3	5.0	5.0	6	Under 4	0	0	0		
	4-4.9	4.7	2	3.3	8.3		4-4.9	0	0	0		
	5-5.9	5.5	11	18.3	26.6		5-5.9	0	0	0		
	6-6.9	6.5	5	8.3	34.9		6-6.9	0	0	0		
	7-7.9	7.3	3	5.0	39.9		7-7.9	0	0	0		
	8-8.9	8.7	13	21.7	61.6		8-8.9	9.2	2	40.0	40.0	
	10-14.9	12.8	8	13.4	75.0		10-14.9	11.0	2	40.0	80.0	
	Over 15	21.0	15	25.0	100.0		Over 15	17.4	1	20.0	100.0	
	Total or average ¹	8.0	60	100.0			Total or average ¹	11.0	5	100.0		
	3	Under 4	2.3	2	5.1		5.1	7	Under 4	0	0	0
4-4.9		4.5	6	15.4	20.5	4-4.9	0		0	0		
5-5.9		5.3	3	7.7	28.2	5-5.9	0		0	0		
6-6.9		6.3	4	10.2	38.4	6-6.9	0		0	0		
7-7.9		0	0	0	38.4	7-7.9	7.2		1	16.7	55.1	
8-8.9		8.8	3	7.7	46.1	8-8.9	0		0	0		
10-14.9		12.0	12	30.8	76.9	10-14.9	13.8		4	66.6	83.3	
Over 15		24.9	9	23.1	100.0	Over 15	16.0		1	16.7	100.0	
Total or average ¹		7.3	30	100.0		Total or average ¹	13.0		6	100.0		
All areas		Under 4	3.1	5	8.6	8.6	All areas		Under 4	3.2	18	8.0	8.0
	4-4.9	4.4	10	17.3	25.9	4-4.9		4.9	23	16.3	24.3	
	5-5.9	5.4	9	15.5	41.4	5-5.9		5.4	28	12.5	36.8	
	6-6.9	6.5	12	20.7	62.1	6-6.9		6.4	25	11.2	48.0	
	7-7.9	7.4	7	12.1	74.2	7-7.9		7.4	16	7.1	49.1	
	8-8.9	8.9	9	15.5	89.7	8-8.9		8.0	35	15.0	64.7	
	10-14.9	12.2	5	8.6	98.3	10-14.9		12.3	37	16.5	81.2	
	Over 15	13.2	1	1.7	100.0	Over 15		22.1	42	18.8	100.0	
	Total or average ¹	5.7	58	100.0		Total or average ¹		7.0	224	100.0		

¹ This average is weighted according to the number of pounds at the various costs.

PRICES

Honey prices for 1933 were among the lowest on record. Since selling price is an important factor in determining profits, the number of producers making a profit during the period covered by this study was probably less than normal. When considering prices, however, the producer should not lose sight of the fact that, whereas prices are largely beyond his control, costs are largely within his control.

Prices of honey in case lots (two 60-pound cans plus wooden container) received by producers for the crop of 1933 are presented in tables 24 and 25, insofar as data were available.

TABLE 24.—Prices received for honey by producers

Area	Number of colonies	Records	Range in price per pound	Average price per pound	Range in price per pound of majority of sales
			Cents	Cents	Cents
1	18	18	2.51-5.0	3.7	3-4
2	37	37	3.3-7.0	4.9	4-4.5
3	31	31	3.0-8.0	4.4	4-6
4	53	53	3.0-10.0	4.5	3.5-5
5	38	38	2.0-10.9	4.4	4-5.5
All areas	176	176	2.0-10.0	4.5	3.0-5.5

1 Too few data were given for areas 6 and 7 to justify their inclusion.

TABLE 25.—Frequency distribution of apiaries according to wholesale price of honey

Price grouping (cents per pound)	Apiaries in					Total
	Area 1	Area 2	Area 3	Area 4	Area 5	
2.00-2.99	0	0	0	1	0	1
3.00-3.49	5	1	1	1	2	10
3.50-3.99	8	0	1	4	3	16
4.00-4.49	1	5	10	19	9	44
4.50-4.99	1	8	4	12	9	34
5.00-5.49	0	9	4	2	4	19
5.50-5.99	0	4	0	0	2	6
6.00-6.49	0	3	0	2	0	5
6.50-6.99	0	1	0	0	0	1

1 Too few data were given for areas 6 and 7 to justify their inclusion.

ANALYSIS OF FINDINGS

Various facts brought out by an analysis of the findings offer suggestions helpful in connection with the economic aspect of honey production.

AVERAGE GROSS EXPENSE OF PRODUCING HONEY PER COLONY.

Table 26 shows that the principal items of expense in order of importance are as follows: (1) Labor, (2) use of truck and automobiles, (3) depreciation of equipment, (4) supplies, (5) interest on value of equipment, (6) current expenses, (7) interest on value of bees, and (8) location rents.

The leading items of expense, labor and truck and automobile, show a wide variation between one apiary and another, indicating that these are reducible costs. The beekeeper seeking a reduction in his costs should study the organization of his business looking toward a more efficient use of these items.

UNIT COSTS PER 100 POUNDS OF HONEY

In area 5 the cost of producing queens and package bees for sale is involved in the cost of producing honey as presented. This also had an effect upon production. Since table 26 is concerned with the production of honey only, area 5 has been eliminated in the compilation. The average production for the remainder of the group was 64 pounds per colony, which is nearer normal for the State. When

the value of inputs minus credits was added to cash costs, which cannot be reported on a quantity basis, the cost of producing 100 pounds of honey was \$6.57. Table 27 shows details.

TABLE 26.—Distribution of expenses per colony

Item	Average cost per colony	Proportion of total expense
	Dollars	Percent
Operating:		
Supplies.....	0.47	10.1
Labor (operator, family, and hired).....	1.90	40.6
Current expenses.....	.15	3.2
Location rents.....	.12	2.6
Use of truck and automobile.....	.87	18.0
Maintenance.....	.00	1.3
Total operating costs.....	3.57	78.4
Overhead:		
Depreciation:		
Buildings.....	.04	.9
Permanent equipment.....	.07	14.3
Bees (full colony—honey flow).....	.05	1.1
Total depreciation.....	.76	16.3
Interest charge:		
Buildings.....	.03	.6
Permanent equipment.....	.18	3.9
Bees (full colony—honey flow).....	.13	2.8
Total interest charge.....	.34	7.3
Total overhead.....	1.10	23.6
Total expenses.....	4.67	100.0

TABLE 27.—Itemized cost of producing 100 pounds of extracted honey in 184 apiaries¹

Item	Quantity basis	Cost	Item	Quantity basis	Cost
Expense items:			Expense items—Continued.		
Operating costs:		<i>Dol.</i>	Depreciation charges:		<i>Dol.</i>
Labor.....	6.5 hours.....	2.95	Bees.....	1.56 colonies.....	0.08
Supplies.....		.60	Buildings.....		.06
Current expenses.....		.22	Equipment.....		1.01
Location rents.....		.22	Total depreciation charges.....		1.15
Truck expense.....	16.8 miles.....	1.14	Total expenditures.....		7.15
Automobile expense.....	5.3 miles.....	.24			
Maintenance costs.....		.07	Credit items:		
Total operating costs.....		5.50	Wax.....	1.63 pounds.....	0.26
Overhead costs:			Comb and chunk honey.....	.33 pound.....	.03
Interest charges:			Appreciation of bees.....		.15
Bees.....	1.56 colonies.....	.20	Miscellaneous.....		.14
Buildings.....		.04	Total credits.....		.58
Equipment.....		.26	Net cost per 100 pounds.....		6.57
Total interest charges.....		.50			

¹ Area 8 is excluded from this compilation, since the data for that area include queens and package-bee production costs.

CASH COSTS

Out of the average total gross costs per colony (\$4.67), only \$2.06, or 44.1 percent, was money out of pocket, or cash costs (table 28). Of the net cost per pound (6.9 cents), only 2.3 cents, or a third, was cash costs. The remainder of the costs was made up of unpaid labor,

depreciation, and interest. The per-colony gross costs in nonmigratory areas (1, 3, and 7) were very similar in amounts (\$1.53, \$1.49, and \$1.55, respectively) but lower than those in migratory areas. The cash costs in migratory areas were also very similar (\$2.27, \$2.21, \$2.22). The differences in cash costs between these groups are due to renting additional locations and increased transportation necessitated by migratory beekeeping.

The cash costs per colony probably represent the minimum cash outlay necessary to operate an apiary for each class of management. This low cash cost appears to explain why so many beekeepers stay in business when failing to make costs, and perhaps the willingness on the part of some to cut prices.

Many of the beekeepers considered only cash costs in determining the returns on their business. Not all the production costs in any business are actually paid out in cash. A few dollars left over after the sale of the crop does not always mean that the sale price has exceeded, or even equaled, the total cost of production. The beekeeper must have wages to pay his living costs and money to replace his worn-out equipment. Failing this, he must eventually go out of business.

The data confined solely to cash costs, exclusive of interest, depreciation, and unpaid labor, are shown in table 28.

TABLE 28.—Operating costs of producing honey

Area	Gross operating expenses				Net operating expenses			
	Total	Average per apiary	Average per colony	Average per pound of honey	Total	Average per apiary	Average per colony	Average per pound of honey
1.....	\$17,671.74	\$1,104.48	\$1.53	\$0.022	\$14,656.00	\$916.04	\$1.27	\$0.019
2.....	57,677.13	961.28	2.27	.036	50,782.34	846.37	2.00	.052
3.....	20,492.30	\$25.44	1.49	.028	18,641.37	426.70	1.21	.023
4.....	66,910.75	1,138.63	2.21	.031	49,984.44	861.81	1.68	.023
5.....	54,405.66	1,361.64	2.22	.073	6,292.43	157.31	.36	.026
6.....	1,902.47	\$80.49	2.62	.053	1,211.90	242.40	1.86	.034
7.....	1,684.78	280.90	1.55	.036	1,058.02	176.49	.97	.023
All areas.....	219,934.73	981.86	2.06	.036	140,828.68	627.80	1.32	.023

¹ Credits from sale of queens and package bees and rents for pollination distort this item.

THE YIELD FACTOR

In the analysis of costs, the yield was found to be of vital importance. Certain costs must be met regardless of the quantity of honey produced, whereas other costs are influenced by the quantity of honey produced. The greater the number of pounds by which the fixed costs can be divided, the less is the cost per pound.

The data on yields per colony as shown in table 29 clearly demonstrate the marked influence of yield upon net cost per pound. Low costs are associated with high yields and vice versa. Both gross and net costs per colony increase with yield but decrease per pound of honey produced.

Outlays for current expense, maintenance, interest, and depreciation are about the same regardless of yield. Cost of supplies, labor, and use of trucks and automobiles increase with production. Credits play an important part in determining net costs. The high credits for the low-yield groups in this study are due to the extensive sale of queens and package bees.

TABLE 29.—Relation of yield to cost of producing extracted honey

Yield per colony (pounds)	Apiaries		Average cost per colony			Average yield per colony	Average net cost per pound
			Gross cost	Credits	Net cost		
	Number	Dollars	Dollars	Dollars	Pounds	Cents	
Below 30.....	41	4.11	0.91	3.20	16	20.0	
30-59.....	90	5.08	.75	4.31	44	9.8	
60-89.....	52	5.19	.41	4.78	70	6.8	
90 and over.....	41	5.55	.20	5.47	112	4.9	

The 41 apiaries having yields over 90 pounds per colony represent 18.3 percent of the entire group. The average cost per pound of producing honey (4.9 cents) in this group was above the average selling price (4.5 cents). In this group are found apiaries making a profit from the year's operations, but apparently high yields alone did not result in profit. It was only when combined with low costs that high yields and profitable operations went hand in hand.

Tabulation of yields per colony by size of apiary indicated considerable variation (table 30). In the Sacramento and Imperial Valleys (areas 5 and 1) apiaries of less than 250 colonies recorded larger yields per colony than did the larger apiaries; in the southern coast counties (area 3) the largest average yields were from the apiaries of 750 to 1,249 colonies; and in the southern Orange Belt and the San Joaquin Valley (areas 2 and 4) they were from apiaries of 250 to 749 colonies. In the San Francisco Bay and mountain areas (6 and 7), all records were for apiaries of less than 250 colonies. From these wide variations in yields of apiaries within a given size grouping one concludes that mere size of apiary has had only a limited influence upon yields.

TABLE 30.—Relation of size of apiary to yields

Colonies in apiary (number)	Area 1			Area 2			Area 3		
	Apiaries	Production per colony		Apiaries	Production per colony		Apiaries	Production per colony	
		Range	Average		Range	Average		Range	Average
	Number	Pounds	Pounds	Number	Pounds	Pounds	Number	Pounds	Pounds
Under 250.....	2	90-129	109	18	6-107	49	15	8-100	40
250-749.....	6	54-129	78	35	6-150	96	19	6-197	48
750-1,249.....	7	52-90	65	5	20-100	59	5	22-104	60
1,250-1,749.....	1		71	1		66	0		
1,750-2,249.....	0			0			0		
2,250-2,750.....	0			1		52	0		

Colonies in apiary (number)	Area 4			Area 5			Areas 6 and 7		
	Apiaries	Production per colony		Apiaries	Production per colony		Apiaries	Production per colony	
		Range	Average		Range	Average		Range	Average
	Number	Pounds	Pounds	Number	Pounds	Pounds	Number	Pounds	Pounds
Under 250.....	16	49-143	88	9	13-76	44	11	4-75	45
250-749.....	3	33-189	68	21	4-66	27	0		
750-1,249.....	8	52-132	96	6	11-54	31	0		
1,250-1,749.....	0			1		23	0		
1,750-2,249.....	0			2	15-51	35	0		
2,250-2,750.....	0			1		34	0		

THE LABOR FACTOR

Labor constitutes the largest single item in the cost of producing honey, amounting, as shown in table 26, to 40.6 percent of the total gross cost for all records.

The labor was contributed by operators, families of operators, and hired help, the proportion contributed by each group varying in the different areas. The operator and his family contributed 70 percent of the labor (table 31). Owing to the scarcity of competent hired help for manipulating colonies, most of the hired help was used in the extraction of honey.

TABLE 31.—Distribution of specified kinds of labor

Area	Labor contributed by—			Area	Labor contributed by—		
	Operator	Family	Hired help		Operator	Family	Hired help
	Percent	Percent	Percent		Percent	Percent	Percent
1.....	54	17	29	5.....	85	7	28
2.....	67	4	29	6 and 7.....	91	7	2
3.....	69	18	13				
4.....	53	16	31	All areas.....	80	10	30

The operator and hired help furnished the labor for about half of all apiaries; the operators alone were next in number; operators and their families third; and operators, their families, and hired labor fourth (table 32).

TABLE 32.—Distribution of apiaries using specified kinds of labor

Area	Apiaries using labor of—				Area	Apiaries using labor of—			
	Operator only	Operator and family	Operator and hired help	Operator, family, and hired help		Operator only	Operator and family	Operator and hired help	Operator, family, and hired help
	Number	Number	Number	Number		Number	Number	Number	Number
1.....	2	3	10	1	5.....	10	4	21	5
2.....	16	4	35	5	6 and 7.....	6	1	3	1
3.....	10	9	18	4					
4.....	7	15	25	11	Total.....	51	36	110	27

On an average each apiary used about 2,000 hours of labor during the year, of which the operator contributed about 1,200 hours (table 33). This is about half the working hours in the year. Beekeeping does not require the full year unless the operations are sufficiently large to require a full winter of shop work. Other studies show that the peak of labor requirements comes during harvest.⁹ Beekeeping was the chief occupation of 142 cooperators; 46 others were engaged in farming, using bees as a side line, and 36 were in business or practicing some profession or trade.

⁹ SECHRIST, E. L., and KIPER, R. S. PRELIMINARY REPORT ON APIARY ORGANIZATION AND HONEY PRODUCTION IN THE INTERMOUNTAIN STATES IN 1928. U. S. Bur. Ent. and Biol. Agr. Econ. Rept., 18 pp. 1929. [mimeographed.]

WASHBURN, R. S., and MARVIN, G. E. ORGANIZATION AND MANAGEMENT OF APIARIES PRODUCING EXTRACTED HONEY IN THE WHITE CLOVER REGION. U. S. Dept. Agr. Tech. Bull. 461, 44 pp., illus. 1935.

TABLE 33.—Average hours and value of labor¹

Type of labor	Labor per apiary	Labor per colony	Average value per hour
	Hours	Hours	Cents
Operator.....	1,372	2.5	52.1
Hired help.....	920	1.3	31.1
Family.....	191	.4	37.6
All labor.....	2,013	4.2	44.2

¹ These data are based upon the average of 224 apiaries, operating an average of 477 colonies each.

By classifying the apiaries according to the number of colonies, the influence of yield on labor used per colony is demonstrated (table 34). A certain amount of labor is required in caring for an apiary throughout the year; additional labor is required for harvesting and handling the crop. The data indicate a slight and somewhat regular increase of labor with increase in yields for apiaries of similar size.

TABLE 34.—Average colonies per apiary, production and labor per colony, and labor per 100 pounds of honey, classified according to colonies per apiary and production per colony¹

Class grouping		Average colonies per apiary	Average production per colony	Average labor per colony	Average labor per 100 pounds of honey
Colonies per apiary (number)	Production per colony				
	Pounds	Number	Pounds	Hours	Hours
100-400.....	4-30	254	17	3.5	20.6
	31-60	243	46	4.5	9.8
	61-90	296	76	4.6	6.0
	91-187	263	109	4.9	4.5
	Average.....		264	56	4.4	7.8
401-800.....	4-30	(²)			
	31-60	600	45	3.7	8.2
	61-90	566	71	4.0	5.6
	91-187	614	125	5.5	4.4
	Average.....		590	70	4.3	5.6
801-1,200.....	4-30				
	31-60	1,111	55	3.2	5.8
	61-90				
	91-187	986	110	4.1	3.7
	Average.....		1,018	75	3.5	4.7
All groups.....	4-30	254	17	3.5	20.6
	31-60	478	47	4.0	8.5
	61-90	393	74	4.4	5.9
	91-187	512	114	4.9	4.3
	Average.....		425	62	4.1	6.6

¹ Package-bee and queen producers, apiaries with 100 or less colonies or over 1,200 colonies, and those falling in groups indicated by blanks are excluded.

² Blanks indicate too few records for significant calculation.

The influence of production on labor costs is shown more clearly when put upon a basis of labor used per 100 pounds of honey produced. The data indicate that five times as much labor is used to produce 100 pounds of honey where the per-colony yield is 17 pounds as where the yield is 114 pounds. Obviously profitable honey production requires adequate and dependable yields.

The labor used per colony tends to decrease as the number of colonies in the apiary increases. Although the average for all apiaries showed about 4 hours per colony, there was a wide range in amount of labor used. Wide variations were found in every grouping, and indicate a probable inefficient use of time.

The percentage of the labor supplied by the operator and his family and by other help is shown in table 35. The importance of hired labor in larger apiaries is clearly indicated.

TABLE 35.—Use of hired and family labor in apiaries of various sizes

Colonies per apiary (number)	Apiaries using no hired help	Apiaries using hired and family help	Division of labor	
			Operator	Family and hired help
	Number	Number	Percent	Percent
100 or less.....	9	8	83.7	16.3
101-400.....	32	91	74.6	25.2
401-800.....	6	46	61.9	38.1
801-1,200.....	0	24	53.7	46.3
1,200 or more.....	0	8	83.2	66.8
All areas.....	47	177	60.1	39.9

THE PRICE FACTOR

Table 36 gives a comparison of the prices obtained by honey producers with their costs of production, insofar as data were available. The figures are on a weighted basis, the comparisons taking into account quantities produced at differing costs or sold at differing prices.

TABLE 36.—Comparison of honey prices and costs of production by areas

Area ¹	Records reporting selling prices	Cost of production (per pound), all records ²		Average reported selling price ³	Average gain or loss in selling price over—	
		Operating only	Operating and overhead		Operating costs only	Operating and overhead
	Number	Cents	Cents	Cents	Cents	Cents
1.....	15	3.3	5.0	3.7	+0.4	-1.3
2.....	31	5.9	7.9	4.9	-1.0	-3.0
3.....	20	5.3	7.3	4.4	-.9	-2.9
4.....	41	4.4	5.7	4.5	+1.1	-1.2
5.....	20	5.2	9.4	4.4	-.8	-5.0
Average.....		4.9	6.9	4.5	-.4	-2.4

¹ Data for areas 6 and 7 too few to permit inclusion.

² Less credits.

³ Simple average.

Production required to meet expenses under conditions reported at the time of this study in all areas amounts to more than actual production (table 37).

At 1933 prices 87 pounds of honey were required to pay all production expenses. The high production alone did not insure profitable operation. Of those apiaries producing 90 pounds or more per colony, 56 percent had costs so high that no profit was realized.

TABLE 37.—Honey production per colony required to balance costs and selling prices compared with actual production

Area	Net cost per colony		Selling price of honey per pound		Production required to meet expenses		Actual production	
	Dollars	Cents	Pounds	Pounds	Dollars	Cents	Pounds	Pounds
1.....	3.39	3.7	92	68	6.....	5.20	116	47
2.....	4.96	4.9	101	63	7.....	5.58	124	43
3.....	3.83	4.4	87	53	All areas...	5.93	87	87
4.....	4.11	4.5	91	72				
5.....	2.63	4.4	64	30				

¹ Assumed price; actual data not sufficient to permit averaging.

The selling price of honey has been shown to range from 3 to 5.5 cents, with 4.5 cents the average (table 24). Comparison of costs and selling prices on the basis of average returns per pound shows the number and percentage of apiaries that showed a profit, those that showed neither profit nor loss, and those that operated at a loss (table 38). It was found that about 80 percent of these 175 apiaries operated at a loss. Area 1 shows the highest percentage of profitable apiaries, and area 5 the lowest. Profitable production was accomplished by some beekeepers in every area. Three factors appeared to operate in effecting profitable production, namely, efficient management, high yields, and high prices. The measure of efficient management is to be found in the cost of operating and overhead. When these costs were excessive, profits were out of the question, regardless of the yield. With efficient management, production became the important factor. The apiaries showing a profit combined high yields with low production costs.

It should be recalled that in 1933 prices were among the lowest on record and yields somewhat below average, both of which affect profits. Had the 1933 prices been higher than 4.5 cents, a larger group would have shown profit. Adjustment of management to prices was essential to profitable honey production.

It was found that few producers were keeping cost accounts. The picture presented indicates a rather serious situation in the industry. After a study of table 38 there can be no doubt that many California beekeepers would profit by keeping cost accounts and giving more careful attention to their costs, organization of business, and methods.

TABLE 38.—Apiaries showing a profit, about breaking even, and operating at a loss ¹

Area	Records	Apiaries showing a profit		Apiaries about breaking even		Apiaries operating at a loss	
		Number	Percent	Number	Percent	Number	Percent
1.....	16	3	18.8	3	18.8	10	62.4
2.....	37	6	13.5	3	8.1	29	78.4
3.....	31	3	9.6	1	3.2	27	87.2
4.....	53	6	9.4	7	13.2	41	77.4
5.....	38	2	5.3	2	5.3	34	89.4
All areas.....	175	16	10.3	16	9.1	141	80.6

¹ Some apiaries, including those in areas 6 and 7, omitted because of lack of data.

COMPARISON OF SELECTED LOW-COST AND HIGH-COST RECORDS

The data given in table 23 show marked differences in costs, and hence in profitableness. This raises the question as to what causes these differences. To answer this query a comparison was made of 12 low-cost records with 12 records having costs of from 14 to 18 cents, excluding the extremely high-cost apiaries. The findings, which are summarized in table 39, indicate that low costs result primarily from the following relative conditions: (1) Large number of colonies per apiary; (2) substantially large production per colony; (3) low investments in colonies, buildings, and other honey-producing equipment, resulting in low overhead; and (4) small outlay for labor, supplies, current expenses, location rents, use of truck and automobiles, maintenance of buildings and equipment, and purchase of bees and queens.

Yields of the low-cost records and savings in gross expenses were more than sufficient to offset the lower credits shown by the low-cost records.

TABLE 39.—Comparison of cost items in low-cost and high-cost apiaries

Items	Low-cost apiaries	High-cost apiaries
Average colonies.....number.....	733	423
Average production per colony.....pounds.....	91.8	33.8
Investment per colony:		
Colonies of bees.....dollars.....	4.32	5.19
Buildings.....do.....	.87	1.06
Other equipment.....do.....	5.94	9.26
Total investment.....do.....	11.13	15.51
Expense items per colony:		
Operating costs:		
Labor.....do.....	1.16	2.81
Supplies.....do.....	.52	.57
Current expenses.....do.....	.10	.17
Location rents.....do.....	.07	.10
Truck and automobile use.....do.....	.61	1.09
Maintenance.....do.....	.02	.13
Total operating costs per colony.....do.....	2.48	4.87
Total operating costs per pound of honey.....do.....	.03	.14
Overhead costs:		
Interest charges:		
Colonies of bees.....do.....	.13	.14
Buildings.....do.....	.02	.03
Equipment.....do.....	.18	.28
Total interest charges per colony.....do.....	.33	.45
Depreciation charges:		
Colonies of bees.....do.....		.06
Buildings.....do.....	.04	.04
Equipment.....do.....	.01	.95
Total depreciation charges.....do.....	.05	.07
Total overhead charges.....do.....	.38	1.42
Total per pound of honey.....do.....	.01	.04
Total cost per colony.....do.....	3.46	6.29
Total cost per pound of honey.....do.....	.037	.186
Credits per colony.....do.....	.61	.66
Net cost per colony.....do.....	2.85	5.33
Net cost per pound of honey.....do.....	.031	.160

MIGRATORY AND NONMIGRATORY COSTS

The survey indicates that beekeeping in California is 70 percent migratory. The typical migratory areas are the southern Orange Belt (area 2), Sacramento (area 5) and San Joaquin Valleys (area 4), and San Francisco Bay (area 6). The typical nonmigratory areas are Imperial Valley (area 1) and the southern coast counties (area 3).

Owing to differences in locality, direct comparison of migratory and nonmigratory costs is difficult, but certain facts stand out (table 40). Average yields per colony show an 11-pound advantage for migratory beekeeping, but this ranged from 5 pounds in some areas to 23 pounds in others. Average costs per pound showed a 0.3-cent advantage for the nonmigratory group. Where prices are below production costs, the disadvantage of migratory beekeeping is obvious. Where prices are above production costs, migratory beekeeping is advantageous.

TABLE 40.—Comparison of migratory and nonmigratory beekeeping in areas 1 to 4, inclusive

Item	Migratory	Nonmigratory
Aplaries.....number..	118	57
Colonies.....do.....	57,947	22,567
Yield per colony.....pounds..	68	57
Average weighted cost per pound.....dollars..	.067	.064
Labor:		
Time per colony.....hours..	4.5	3.6
Cost per colony.....dollars..	2.00	1.63
Use of trucks and automobiles per colony:		
Distance:		
Trucks.....miles..	12.8	5.2
Automobiles.....do.....	3.9	2.1
Cost:		
Trucks.....dollars..	.86	.35
Automobiles.....do.....	.18	.11
Total.....	1.04	.46
Supplies per colony.....do.....	.43	.43
Other expenses per colony.....do.....	1.43	1.28
Total gross cost per colony.....do.....	4.90	3.82
Total credits per colony.....do.....	.41	.25
Total net cost per colony.....do.....	4.49	3.57
Average colonies per apiary.....number..	500	395
Stores per colony.....pounds..	38	35

The increased expenses due to migratory beekeeping are to be found in the following items: Higher location rents; increase in labor requirements by 1 hour per colony at 35 cents; increase in use of truck and automobile by 9.4 miles per colony at a cost of 58 cents. It is important to note that the items which increase with migratory beekeeping are chiefly operating expenses—cash out of pocket.

To justify the added expense of migratory beekeeping the operator should show some clearly defined advantages. For example, he may derive additional income from pollination rents, or in moving for winter stores he may be able to extract additional honey. Moving to increase yields per colony should be considered also from the standpoint of costs and probable returns, for much of the gains already made for a crop may be lost by ill-advised migrations.

MEASURES FOR IMPROVEMENT

It is not within the province of this study to cover the details of management. The beekeeper may ask, however, what can be done to lower production costs. Points in contrast between a select group of high- and low-cost records can be located by referring to table 39. This table is set up on the basis of colony costs; that is, yields enter into the picture only as they influence certain operating costs. The table shows that high costs result from higher average investment per colony, the use of relatively more labor and transportation per colony, and lower yields. Management data obtained in connection with this survey permit the further analysis of these high- and low-cost records, the pertinent facts of which are briefly considered.

BALANCE OF INVESTMENT

The greater investment in equipment per colony places the high-cost group at a disadvantage in making a profit regardless of production. The number of super combs per colony owned by each group was practically identical. The relatively greater investment in buildings, extractors, tanks, and miscellaneous equipment by the high-cost group is due to lack of balance in investment. Such equipment is essential to the enterprise, but because of the greater number of colonies owned by the low-cost group the investment in buildings, extractors, etc., could be divided by almost twice as many colonies, and owing to the more nearly balanced investment apiaries in this group were in better position to make a profit. The importance of a balance between the number of colonies operated and the equipment investment should be considered by those endeavoring to lower their costs. Larger outfits have a further advantage in substantial discounts on the purchase of large volumes of supplies and equipment.

UTILIZATION OF LABOR

It is significant that the high-cost producers used one-third more labor per colony than did those in the low-cost group, while producing only one-third the honey crop (table 41). This is a management problem influenced by the organization of the enterprise. A few factors that may have influenced this result will be briefly pointed out.

TABLE 41.—Comparison of management items in selected high-cost and low-cost apiaries

Items	High-cost apiaries	Low-cost apiaries
Average colonies per apiary.....number..	423	733
Honey production per colony.....pounds..	33.8	81.8
Proportion of colonies lost by disease.....percent..	8.0	1.0
Requesting practices (annual) (colonies in apiary requested).....do.....	Under 50.0	Over 50.0
Use of power:		
Apiaries using hand power.....number..	10	4
Apiaries using mechanical power.....do.....	2	8
Labor input:		
Per colony.....hours..	4.1	3.1
Per 100 pounds of honey.....do.....	12.2	3.38
Distribution of labor:		
By operator.....percent..	58.0	43.2
By family and hired help.....do.....	42.0	56.8
Truck and automobile use:		
Per colony.....miles..	17.6	11.2
Per 100 pounds of honey.....do.....	40.4	12.2

The incidence of disease in the apiaries of the high-cost group was six times that in the low-cost group. This condition would necessitate a much greater expenditure of labor for inspection and disposal of the diseased colonies. It would also curtail the free interchange of equipment between colonies, which might affect yields as well as increase labor requirements. Much labor used in caring for colonies later found diseased would yield no profit.

More requeening was done annually by the low-cost than by the high-cost group. This would probably reduce the swarming problem and labor attendant thereto. The loss or failure of queens during critical periods of colony build-up would be lessened, resulting in better returns for the labor expended.

The difference in number of colonies per apiary between the two groups suggests that larger holdings may contribute to a better utilization of labor. The proper size of outfit for economical production is necessarily governed by the personal factor. In many cases, however, it appears that better organization may be possible with larger holdings. For example, the high-cost group was found to be using more hand-power equipment. With larger holdings and more honey to handle, an investment in power equipment might be justified, resulting in a more profitable utilization of labor. The low-cost group was using proportionately more hired and family labor. If the holdings are sufficiently large to warrant hiring help, a saving in unit labor costs will result, since the wages of hired labor are lower than those of management.

USE OF TRANSPORTATION

On a per-colony basis the high-cost producers ran up 6 more miles of transportation during the season than did the low-cost producers, while producing only a third the honey crop. Had their yields been equal, the transportation cost would still have been 48 cents greater for the high-cost group. At 1933 prices more than 10 pounds of honey per colony were required to pay this added cost. This placed them at a disadvantage in effecting profitable production, regardless of yield. This is a management problem of great importance and suggests one place where the high-cost producer may look for possible improvement.

A careful study of transportation might prove to be very valuable. For example, the high-cost producer's bee yards may be too widely scattered, or his migratory program faulty from an economic standpoint. Certain visits to the bee yard may be ill-timed or unnecessary, or he may not be following a clean-cut program throughout the year, performing definite manipulations at fairly definite times.

THE PRODUCTION PROBLEM

Although this study is not concerned with methods of honey production, it may not be amiss to call attention again to the devastating effects of low average yields on production costs (p. 22). Apparently, profitable honey production requires average yields considerably in excess of 70 pounds per colony. Beekeepers failing to make such yields can well afford to give careful study to their methods.

Certain factors, such as the influence of weather on nectar secretion and changes of agricultural crops or methods, are not under the beekeeper's control. He can, however, choose locations where honey

plants are abundant and consistent nectar secretion can be expected. He can supply his colonies with young queens and adequate feed. He can prevent swarming and supply the elements necessary, but lacking, to the proper building up of his colonies. He can control disease.

The timing of manipulations is important. For example, failure to manipulate colonies at the proper time may result in swarming losses, failure to add supers at the proper time may result in loss of production, failure to find disease in its early stages may result in its spread in the apiary, and failure to feed the bees at the proper time may result in starvation. Lack of information on prevailing conditions may result in untimely moves.

Equipment is also important. Part of the honey crop may be lost if sufficient super combs are not available. Honey and wax may be lost through inefficient capping equipment, and inadequate moving equipment may result in arrival at the honey flow too late.

COST ACCOUNTS

It is hoped that a study of this bulletin will awaken the interest of the beekeeper to the value of cost accounts and records, which he can use in locating weaknesses in his business. The methods used to analyze costs are given in some detail. With this as a guide, the producer can study and compare his own business with that of the low-cost group. Out of such a study he may locate unprofitable operations, misuse of time or equipment, or wasteful methods. For example, he may be traveling more than is economically advisable, or have too great an investment in equipment for the number of colonies he operates. He may be doing work that he can hire done more economically, or he may be trying to make a living with too small an outfit. By keeping records and studying his business, he should be able to locate points where changes in his methods or organization would make his business more profitable.

SUMMARY

A study has been made of the costs involved in the production of honey in California. The data were collected in the seven beekeeping areas of the State by the survey method, covering the operations of 224 beekeepers in 1933. This group operated 106,912 colonies, and produced 6,080,135 pounds of extracted honey, 20,236 pounds of chunk and comb honey, 103,696 pounds of beeswax, and, for sale, 61,093 pounds of package bees and 46,067 queens. The costs presented are probably above normal, and the number of producers making a profit is probably less than normal, owing to yields and prices that are below normal.

The average investment in 224 beekeeping enterprises totaled \$11.34 per colony. The distribution of the investment was 45 percent in hives and parts, 40 percent in bees, and 15 percent in buildings and miscellaneous equipment.

The gross cost per colony averaged \$4.67. Overhead charges averaged \$1.10 per colony, being made up of interest, 34 cents; and depreciation, 76 cents. Operating costs (76.4 percent) averaged \$3.57 per colony, consisting chiefly of labor, \$1.90; transportation, 87 cents;

and supplies, 47 cents. Credits for byproducts amounted to 74 cents per colony, making the net expense per colony \$3.93.

With an average honey production of 57 pounds per colony, the average net cost was 6.9 cents per pound. Excluding the records of package-bee and queen producers, the average production was about 64 pounds per colony, and the average net cost 6.6 cents per pound.

Four chief factors operated to affect the cost per pound—yield, labor, transportation, and investment. The greater the number of pounds of honey by which fixed expenses could be divided the less was the cost per pound. While the operating costs per colony rose with increased yields, the cost per pound of honey steadily declined.

Labor accounted for 40.6 percent of the gross cost per pound. The average labor input per colony was 4.2 hours, but the range was from 1.0 to 15.1 hours. Economy in labor is influenced by three factors, namely, size of apiary, use of hired labor, and production. The amount of labor per colony declined steadily as the size of the apiary increased, regardless of yield. Operators contributed 60 percent of all labor, but the percentage of labor contributed by the operator declined as the size of the apiary increased. Since wages of hired labor are less than those of management, the costs were proportionally reduced by the use of hired labor. Labor per colony increased with increased yields, but a steady decline in labor costs per pound accompanied increased yields, regardless of the size of the apiary.

Transportation accounted for 18.6 percent of the per-colony cost. Much of the transportation cost must be met regardless of yield, but efficiency in use of trucks and automobiles varies. A study of a select group of high- and low-cost producers showed the high-cost producers traveling 6 miles farther per colony while producing only a third the honey crop. Had their yields been equal, the transportation cost would still have been 48 cents greater for the high-cost group. The combination of higher mileage and less production operated to produce high costs.

Overhead costs are based upon the investment. Beekeeping requires, in addition to bees, an investment in buildings and miscellaneous equipment, much of which is in use only a portion of the year. The greater the number of colonies it is possible to operate efficiently with a given investment in such equipment, the less is the per-colony overhead. The lack of proper balance of investment due to small number of colonies increased the cost of production in many apiaries.

The study shows that 10.3 percent of the group made a profit, 9.1 percent broke even, while 80.6 percent operated at a loss. Profitable production was accomplished by some beekeepers in every area. Three factors appear to operate in effecting profitable production, namely, efficient management, high yields, and prices.

At 1933 prices 87 pounds of honey were required to pay average expenses of production. In 41 apiaries the yields were in excess of 90 pounds per colony, but 23 of these had costs so high that even with high yields no profit was made. The 10 percent of the apiaries showing a profit combined high yields with low production costs.

Of the total gross cost per colony (\$4.67), only \$2.06 was money out of pocket, or cash cost. Of a net cost per pound of 6.9 cents only 2.3 cents was cash cost. This represents the minimum cash outlay necessary to operate. However, the beekeeper must have wages

from bees or other sources to pay living expenses, and money to replace worn-out equipment, or he must eventually go out of business.

California beekeeping is 70 percent migratory. A study of selected apiaries in each class showed that, with 1933 production, the non-migratory beekeeper operated at lower costs per pound of honey. The migratory beekeepers obtained higher yields, but in doing so expended one-third more labor and more than twice as much transportation per colony. This resulted in an average cost 0.3 cent per pound higher than that in the nonmigratory group.

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END