

UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
BERKELEY, CALIFORNIA

COST OF WORK HORSES ON CALIFORNIA FARMS

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BULLETIN 401

APRIL, 1926

UNIVERSITY OF CALIFORNIA PRINTING OFFICE
BERKELEY, CALIFORNIA
1926



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R. L. ADAMS

California farmers continue to rely upon horses and mules as a source of motive power, although increasing use of tractors and trucks is tending to replace horse-power with mechanical power. The number of horses and mules, of all ages, on California farms and ranges, was reported by the 1920 Federal Census as 456,826 on January 1, 1920. By January 1, 1923, the total number was estimated at 401,000.*

A year later a drop of 16,000 was recorded, lowering the total to 385,000. On January 1, 1925, a further drop of 6000 was reported, thus further lowering the total number of horses and mules to 379,000.

STUDIES OF COSTS OF HORSE LABOR BY THE DIVISION OF FARM MANAGEMENT

Notwithstanding the gradual reduction in numbers of horses and mules, the annual cost of horse and mule power reaches a high figure. Considerable quantities of data have been collected by the Division of Farm Management, which appear to be worthy of recording for use by farm managers and agricultural economists who are concerned with plans of farm organization, details of farm administration, and costs of production studies.

The data were collected by trained investigators, who visited each of the selected farms, and there filled in specially prepared blanks upon which were recorded pertinent data as to numbers of work animals, values, rates of depreciation and mortality, methods of handling, cost items, and inventories of buildings and equipment used in connection with the work horses. Book records were seldom available so that much of the data had to be drawn from farmers' estimates. All items were carefully considered, detail by detail, both by the investigator and in making the office calculations. Only complete records taken from farmers with sufficient experience to render their judgment above reasonable doubt were retained. The survey method of collecting the records was used, and a sufficient number collected to safeguard the accuracy of the findings.

* This and the following figures of horse population are from The Coöperative Crop Reporting Service.

TYPES OF FARMING REPRESENTED BY RECORDS

These data are from the records of 187 California farms. One hundred forty records are from ranches primarily devoted to the production of field crops and dairying: The other 47 from farms specializing in deciduous fruit production. The farms from which the records were obtained are typical of the farming practices and equipment in the districts where they were taken. The dairy and field crops records were gathered in twenty counties. The majority were obtained: Nine from Del Norte and Humboldt counties; 15 from Marin and Sonoma counties; 20 from Alameda, Contra Costa, Santa Clara and San Benito counties; 35 from Sacramento and Yolo counties; 32 from San Joaquin, Fresno, Kings, and Kern counties; 24 from Los Angeles, Orange, San Bernardino, and San Diego counties. The 47 fruit farm records were taken: Ten in Santa Clara County, 8 from Santa Cruz County, 7 from Solano County, 9 from San Joaquin County, and 13 from Fresno County.

Collection of the records for the dairy and field crops ranches was completed by April 1, 1923; the records from the fruit farms were collected during July, 1923. All are based on the calendar year of 1922.

ITEMS CONSTITUTING COSTS OF HORSE LABOR

Annual cost of horse labor is a composite of a number of items. The most important are direct expenditures for feed and care, and indirect costs of depreciation and mortality and of interest upon the investment in horses. Incidental items include taxes, occasionally insurance and the cost of shelter and equipment.

The following table shows a commonly accepted basis for calculating horse labor costs:

TABLE OF ITEMS ENTERING INTO THE CALCULATIONS OF HORSE LABOR COSTS

Operating Costs of Horses:

Feed (hay, grain, pasture, etc.)

Bedding

Chores (feeding, grooming, cleaning, stables, supervising when on pasture, pumping water, etc.)

Shoeing

Veterinary services

Taxes

Insurance

<i>Overhead Costs of Horses:</i>	<i>Cost of Shelter Utilized by Horses:</i>
Interest on investment in horses	Interest on investment
Depreciation of horses	Depreciation
Mortality of horses	Upkeep
	Taxes
	Insurance

Cost of Equipment Used by Horses (harness, curry combs, brushes, barn forks, shovels, etc.):

Interest on investment
Depreciation
Repairs
Taxes
Insurance

The total of these items gives gross cost. Net cost is determined by deducting from the gross cost credits for outside work, for manure, and for value of colts raised to weaning age. The colt values are taken at the net value, found by deducting from the market value all costs of breeding, care, and rearing to weaning age.

Net cost—the figure sought—can be expressed in dollars per year, dollars and cents per work day, or cents per work hour.

METHOD OF FIGURING ITEMS OF COST

To obtain basic data, feeds were worked out in accordance with the kinds used, length of the feeding periods, and costs of feeds at current farm prices. If bought and hauled, farm prices consisted of the purchase price plus hauling cost. If farm-raised, the value was figured at market price less cost of preparing, delivering, and selling at a point where market price could be obtained.

Very little bedding was used, other than waste hay from the mangers. If straw or other bedding was used, a charge was figured in the same way as for the feed costs.

The cost of chores was found by multiplying the average time required per year by the "going" rate of wages. The going rate of wages included cash wages and the value of board, housing and other perquisites.

Shoeing, veterinary services, taxes, and insurance are totals of amounts actually expended.

The overhead costs of horses are here made up of interest at 6 per cent on the current investment or value of the horses studied; Depreciation, determined by dividing the value of the horses when at the peak of their usefulness by the estimated years of profitable life; and mortality figured in accordance with the operators' experience.

The charge for shelter is based on the quarters actually used by the horses. It is made up of interest at 6 per cent on the current investment, depreciation (found by dividing the initial cost of the structure by the number of years of probable life); upkeep (the average annual outlay for repairs, painting, and similar charges), taxes, and insurance.

The charge for equipment used by the horse department is figured similarly to that employed in determining the charge for shelter.

FINDINGS

Cost data were collected for 812 work horses on the 187 California farms studied. Six hundred sixty-five head were on 140 dairy and field crops farms, ranging in number per farm from 1 to 31 head and averaging 4.3 per farm. One hundred forty-seven were on 47 orchard and vineyard farms, ranging in numbers per farm from 1 to 12 head and averaging 3.1 per farm. The classification by numbers per farm is set forth in the following table:

TABLE 1
CLASSIFICATION SHOWING NUMBER OF WORK HORSES PER FARM

Number of horses per farm	Farms grouped according to number of horses	
	Dairy and field crops group	Orchard and vineyard group
1	6	2
2	35	25
3	19	5
4	36	10
5	14	1
6	7	1
7	2	...
8	7	1
9	1	1
10	2	...
11	2	...
12	5	1
16	2	...
26	1	...
31	1	...
	140	47

The majority of farms in both groups were equipped with two, three, or four horses each, with the data indicating a tendency toward either two or four horses.

Feed.

Various combinations of feeds were used. The majority of operators fed nothing but hay or hay and pasture. The findings are set forth in table 2.

TABLE 2
CLASSIFICATION OF FEEDING METHODS

Feeding method	Dairy and field crops group			Orchard and vineyard group			All farms		
	Per cent of farms in group	Per cent of horses in group	Number of hours of work per horse	Per cent of farms in group	Per cent of horses in group	Number of hours of work per horse	Per cent of farms	Per cent of horses	Number of hours of work per horse
Hay only.....	33	25	1574	25	16	1256	31	23	1535
Hay and pasture	31	31	1487	6	7	1767	25	27	1483
Hay and grain.....	21	22	2130	38	37	1237	25	25	1889
Hay, grain, and pasture.....	15	22	1639	30	40	1386	19	25	1467

Amounts fed varied with different operators and in different localities, the methods depending somewhat on available pasture, proportion of purchased feeds, current costs, and amount of heavy work required of the teams. The table gives an idea of feeding practice.

TABLE 3
AVERAGE AMOUNTS OF FEEDS USED PER HORSE PER YEAR

Kind and amount of feed	Dairy and field crops group	Orchard and vineyard group	All farms
Hay.....	6 tons	6 tons	6 tons
Hay.....	5.4 tons	6.8 tons	5.9 tons
Grain.....	903 lbs.	577 lbs.	780 lbs.
Hay.....	4.3 tons	4.3 tons	4.3 tons
Pasture.....	5.1 mos.	4.3 mos.	5 mos.
Hay.....	3.6 tons	5.9 tons	4.5 tons
Grain.....	631 lbs.	717 lbs.	666 lbs.
Pasture.....	6.1 mos.	3.8 mos.	5.2 mos.

All methods of feeding considered, horses used on orchard and vineyard farms were fed more hay, more grain, and less pasture than those on dairy and field crop farms, probably owing to less available pasturage. The weighted averages per head per year are:

	Dairy and field crop group	Orchard and vineyard group
Hay.....	5.0 tons	6.0 tons
Grain.....	274 lbs.	435 lbs.
Pasture.....	2.5 mos.	1.5 mos.

Cost of feed per head per year based on current prices for the period under study (1922) was found to be as follows:

	Dairy and field crops group	Orchard and vineyard group	All farms
Range in costs:			
High.....	\$295.00	\$220.00
Low.....	23.82	64.00
Average.....	89.80	118.61	\$95.75
Frequency (in percentages of total number of farms):			
Less than \$50.....	10%	7%
\$50 to \$75.....	22	4%	17
\$75 to \$100.....	30	39	33
\$100 to \$125.....	20	28	22
Over \$125.....	18	29	21

The average for all horses per head per year amounted to \$95.75.

Feed costs for the period were as follows:

	Dairy and field crops group	Orchard and vineyard group
Pasture, per horse per month:		
Range.....	\$.50- \$5.25	\$2.00- \$6.00
Average.....	2.50	4.00
Mostly.....	2.50	3.00
Hay, per ton:		
Range.....	\$8.50-\$28.00	\$12.00-\$25.00
Average.....	15.75	17.50
Mostly.....	15.00	18.00
Grain, per cwt.:		
Range.....	\$1.15- \$3.05	\$1.25- \$2.62
Average.....	1.75	2.00
Mostly.....	1.75	1.75

Costs of feeds vary within wide limits, being influenced by kinds and amounts of feeds grown in the locality, by demand, quality, and possible markets, and by costs of preparing for market, of transport and of selling.

The average cost of feeds per head per year was found to be:

TABLE 4
AVERAGE COST OF FEEDS PER HEAD PER YEAR

	Dairy and field crops group		Orchard and vineyard group	
	Amount	Cost	Amount	Cost
Pasture.....	2.5 mos.	\$6.25	1.5 mos.	\$6.00
Hay.....	5 tons	78.75	6 tons	105.00
Grain.....	274 lbs.	4.80	435 lbs.	7.61
Totals.....		\$89.80		\$118.61

Chores.

Time required for chores is variable. On the 187 farms, the time required per horse per day varied from only a few minutes to one hour.

Classified, the records showed:

TABLE 5
TIME SPENT IN CHORES PER HORSE PER DAY

	Dairy and field crops group		Orchard and vineyard group	
	Range in time, minutes.....	3-40	Average time, minutes.....	7½-60
Time	Per cent of farms in group	Per cent of horses in group	Per cent of farms in group	Per cent of horses in group
Less than 15 minutes.....	67	76	13	6
15 to 30 minutes.....	31	23	74	84
Over 30 minutes.....	2	1	13	10

The average time spent in chores for all farms averaged 15 minutes per horse per day.

The rate per hour for time spent in chores ranged from 18 cents to 46½ cents, with an average rate of 30.9 cents. The majority of operators paid from 25 to 30 cents per hour. An idea of the range in wages paid by the different operators can be gained from table 6.

TABLE 6
RATE OF WAGES PAID FOR CHORES

Rate per hour	Dairy and field crops group	Orchard and vineyard group	All farms
Cents	Percentage	Percentage	Percentage
18-25.....	10	28	15
26-30.....	42	24	37
31-35.....	31	7	24
36-46.5.....	17	41	24
Average rate.....	30.2c	32.9c	30.9c

The annual cost per horse for chores is determined by the amount of time spent in caring for the horses and the rate of wages. The average cost for the dairy and field crops group amounted \$22.50 per horse per year; for the orchard and vineyard group, \$43.55; and for all farms, \$27.80. The annual cost for the orchard and vineyard group is relatively high because of more chore work incident to keeping the horses regularly in barns and corrals and because of the somewhat higher wage rate, although the extra work is the major reason for the higher annual cost per horse per year.

The range in costs per horse per year for chores varied in the dairy and field crops farms from a minimum of \$3.75 to a maximum of \$97.33, the cost on the majority of farms being under \$25. The range for the orchard and vineyard farms was from \$15.46 to \$146, the cost on the majority of farms being between \$20 and \$50.

Taxes.

The amount of taxes paid was obtained from the county records or from the operators' tax statements. Valuations and tax rates varied in different counties and on different farms of the same county so that considerable range exists in the tax rate.

The range and averages paid per horse per year are here shown:

TABLE 7
TAXES PAID ON WORK HORSES PER HEAD PER YEAR

	Range	Average
Dairy and field crops group.....	0-\$3.69	\$1.42
Orchard and vineyard group.....	\$.80- 6.00	2.21
All farms.....	0- 6.00	1.62

Value of Horses.

The ranges in values placed upon workhorses are set forth in table 8.

TABLE 8
VALUES OF WORK HORSES PER HEAD—AVERAGE FOR YEAR

	Range	Average	Usual
Dairy and field crops group.....	\$38.33-\$233.33	\$111.94	\$100-\$150
Orchard and vineyard group.....	37.50- 200.00	102.79	100- 150
All farms.....	37.50- 233.33	107.33	100- 150

The average annual interest charge per head at 6 per cent amounts to :

Dairy and field crops farms.....	\$6.72
Orchard and vineyard farms.....	6.17
All farms.....	6.44

Mortality.

The death rate as a factor in estimating costs of horse labor was discounted by practically one-fourth of the 187 operators who supplied data, in the belief that mortality was not sufficiently important to include. This was particularly true of men having but one, two, or three head of work horses, and in the orchard and vineyard group.

TABLE 9
OPERATORS' ESTIMATES OF WORK HORSE MORTALITY

Rate of mortality per year, per cent	Classification of reports in dairy and field crops group	Classification of reports in orchard and vineyard group	Total—all farms
0	1	45	46
2	18		18
3	11	1	12
4	2		2
5	77		77
6	3		3
7	6		6
8	6		6
10	13		13
15	2	1	3
16	1		1
	140	47	187

Mortality is thus estimated by operators as ranging from 0 to 16%, with an average mortality of 6.6% for the dairy and field crops group and only a nominal rate for the orchard and vineyard group. The average amounted to 5.1% or at the rate of approximately one horse in twenty per year.

MEASURED IN MONEY, MORTALITY PER HEAD, AVERAGE

Dairy and field crops farms.....	\$7.39
Orchard and vineyard farms.....	Nominal
All farms.....	\$5.47

Depreciation.

The productive life of a work horse was variously estimated by operators. Table 10 contains the various estimates grouped according to type of farming and varying ideas of profitable life.

TABLE 10
DETAILS OF FINDINGS CONCERNING DEPRECIATION OF HORSES

Estimated useful life per horse	Dairy and field crop group	Orchard and vineyard group	All farms
20 years.....	5	6	11
16 years.....	17	24	41
14 years.....	20	5	25
12½ years.....	48	7	55
10 years.....	41	4	45
9 years.....	1	...	1
8 years.....	7	1	8
7 years.....	1	...	1
	140	47	187

According to these estimates the useful life of a horse generally lies between 10 and 16 years, with a general average depreciation taken from all records as follows:

	Average depreciation in percentage	Average depreciation in dollars
Dairy and field crop farms.....	8.48%	\$12.30
Orchard and vineyard farms.....	7.01%	13.13
Weighted average for all farms.....	8.14%	\$12.92

Cost of Shelter.

A charge for barn space occupied by horses, storage of hay for their use, and protection of harness is made up of interest on investment, depreciation, upkeep, taxes, and insurance. The cost per horse was as follows:

TABLE 11
ANNUAL CHARGE OF SHELTER PER ANIMAL

	Dairy and field crops farms	Orchard and vineyard farms
Range in charges:		
High.....	\$84.80	\$36.30
Low.....	.55	4.50
Average.....	11.27	17.25
Usual charge.....	\$5-\$15	\$20-\$30

The average shelter charge for all farms amounted to \$12.77 per animal per year.

Charge for Equipment.

The charge for use of equipment, such as harness, collars, halters, currycombs, brushes, barn brooms, shovels, pitch forks, and similar equipment is made up of interest upon investment, depreciation, upkeep, taxes, and insurance. The findings are set forth in the following table:

TABLE 12
ANNUAL CHARGE FOR USE OF EQUIPMENT PER ANIMAL

	Dairy and field crops group	Orchard and vineyard group
Range in charges:		
High.....	\$38.00	\$25.32
Low.....	1.14	1.17
Average.....	7.11	5.35
Usual charges.....	\$2.00-\$10.00	\$2.00-\$4.00

The average equipment charge for all farms amounted to \$6.66 per animal per year.

Miscellaneous.

Miscellaneous charges consisted of shoeing, veterinary services and medicines. The cost per animal per year was not large. Of the 140 dairy and field crop farms, 32 reported no outlay for miscellaneous items and, similarly, 10 of the 47 orchard and vineyard group had no such expenditure.

The range and average for the two groups amounted to:

TABLE 13
OUTLAY PER ANIMAL PER YEAR FOR MISCELLANEOUS EXPENDITURES

	Dairy and field crops group	Orchard and vineyard group
Range in charges:		
High.....	\$36.53	\$15.75
Low.....	0	0
Average.....	\$5.05	\$4.87
Most frequent charges.....	\$1.00-\$10.00	\$5.00-\$10.00

The average miscellaneous expenses incurred per animal per year amounted to \$5.01.

Credits.

Credits are made up of the net value of colts at weaning age and the value of manure produced. Few farm operators reported credits. Apparently the manure output is not fully appreciated. Of the 140 dairy and field crop farms, only 8 reported credits, these eight ranging from 75 cents to \$30, and averaging for the eight \$9.37 per horse. Only one of the 47 orchard and vineyard group report credit of \$50. Because of the possibility of an average being misleading, since the reports are inadequate, credits are ignored in the calculations of costs hereinafter set forth.

Total Net Cost of Work Horses per Head.

Bringing together the various items set forth above results in a figure indicating the average net cost for work horses per animal per year. The findings are as follows:

TABLE 14
TOTAL NET COST PER HEAD PER YEAR—AVERAGES

	Dairy and field crops group	Orchard and vineyard group
Number of horses.....	665	147
Operating costs:		
Feed.....	\$89.80	\$118.61
Chores.....	22.52	43.55
Taxes.....	1.42	2.21
Insurance.....	Nominal	Nominal
Miscellaneous (as shoeing, veterinary, etc.).....	5.05	4.87
Overhead charges:		
Interest on horse value.....	6.72	6.17
Depreciation per horse.....	12.30	13.13
Mortality per horse.....	7.39	Nominal
Shelter per horse.....	11.27	17.25
Equipment per horse.....	7.11	5.35
Gross cost per year.....	\$163.58	\$211.14
Credits.....	Nominal	Nominal

The cost per horse per year amounted to an average of \$163.58 for the animals in the dairy and field crops group, and an average of \$211.14 for the orchard and vineyard group.

Based on all horses included in this study the average net cost per horse per year amounted to \$172.19.

Hours of Work per Year.

A wide variation exists in the amount that horses are used by different operators. This is shown in the following table:

TABLE 15
HOURS OF USE PER HEAD PER YEAR

Classification by number of hours	Dairy and field crops group		Orchard and vineyard group	
	454-3382		468-2700	
	Number of farms	Percentage of group	Number of farms	Percentage of group
Less than 500.....	2	1%
500 to 1000.....	30	21	1	2%
1000 to 1500.....	40	28	6	13
1500 to 2000.....	22	16	12	25
2000 to 2500.....	33	24	24	51
2500 and over.....	13	10	4	9
	140	100	47	100

The average annual number of hours of use per horse was 1527 hours.

The number of hours as set forth above is only approximate. No accurate records were available to show the number of hours that these work horses were actually in use. Operators were, however, able to state with a fair degree of certainty the periods when the teams were employed. These data, therefore, though valuable for comparable purposes are not absolute criteria of actual productive use.

Cost per Hour for Horse Labor.

The cost per hour of use varies with each individual ranch, because methods of feeding, costs of feed, amount of chores, wages paid for chores, investment in horses, barns, and equipment are variable, and to these variations is also to be added the difference in amount of work done on different farms. The following table shows the variation in costs for farms in each group:

TABLE 16
SHOWING VARIATION IN COSTS PER HOUR FOR HORSE LABOR ON DIFFERENT FARMS
WHEN ALL FACTORS ARE TAKEN INTO ACCOUNT

	Dairy and field crops group	Orchard and vineyard group
Range for group.....	4.9–40.7c	7.2–32.3c
Average.....	10.06c	14.42c
Variation of costs:		
4.9 to 10c per horse hour.....	Frequency 44%	Frequency 13%
10 to 15c per horse hour.....	27	31
15 to 20c per horse hour	15	30
20 to 25c per horse hour.....	7	20
25c and over per horse hour.....	7	6

Average yearly cost for all horses amounted to 11.03 cents per hour for actual time worked.

The cost per hour is principally affected by the amount of productive and profitable work that an animal does during the year. Feed costs, chores and shoeing are reduced somewhat when horses are not working, but charges for taxes, interest, depreciation, mortality, shelter, and equipment are fixed annual charges. Savings when horses are idle are at best small in connection with necessary outlay for feed, chores, and miscellaneous items.

The importance of this point is shown in the following table, using data from table 14 of total net cost per head per year averaged for all horses.

TABLE 17

COST PER HOUR FOR HORSE LABOR BASED ON VARYING AMOUNT OF USE

Number of hours of work per year	Cost per hour for time worked (Based on average cost for all horses included in study)
	22.9 cents
750	22.9 cents
1250	13.7 cents
1750	9.8 cents
2250	7.7 cents

Relative Importance of Cost Items.

A study of the relative importance of the various elements of costs, which together constitute the annual cost per head for keeping work horses, serves to indicate the items deserving special attention in considering ways of economizing in horse labor. The findings for the 812 horses covered by this study are set forth in table 18.

TABLE 18

PERCENTAGE OF EACH FACTOR ENTERING INTO THE GROSS ANNUAL COST OF
KEEPING WORK HORSES—AVERAGE FOR 812 HORSES

	Dairy and field crops group	Orchard and vineyard group
Feed.....	55.1%	56.4%
Chores.....	13.8	20.6
Taxes and miscellaneous.....	3.9	3.3
Interest.....	4.1	2.9
Depreciation.....	7.5	6.2
Mortality.....	4.5
Shelter.....	6.8	8.1
Equipment.....	4.3	2.5
	100.0	100.0

The significance of the data presented above is that feed and chores together constitute from two-thirds to three-fourths of the total cost of keeping work horses. Fortunately, attention to proper and economical feeding and efficient use of labor is within control of each individual operator.

Items such as taxes, interest, shelter, and equipment are largely fixed. Study of the data shows, however, that material economies can be obtained by keeping contemplated investments in horses, shelter, and equipment at as low a level as is consistent with quality.

The depreciation and mortality factors are to some extent under the control of the operator, and lengthening the productive life of a work horse and reducing mortality will have its effect upon annual costs of horse labor.

UNIT FACTORS

Costs in dollars are of only passing interest since current figures are not likely to remain stationary. The price of feeds—the largest single item entering into these costs—is particularly prone to vary from year to year or during a single season, and in different localities. Unit factors, meaning basic items measured whenever possible in terms of time and quantity, provide a formula for future calculations which will apply as long as present procedure in handling horses is followed.

Unit factors for workhorses, drawn from the data collected from the two groups comprising these 187 farms, is summarized in the following table. Data are given in terms of money only when no other measure is available.

TABLE 19

UNIT FACTORS INVOLVED IN THE COST OF KEEPING WORK HORSES, PER ANIMAL
PER YEAR

Cost of	Dairy and field crops group	Orchard and vineyard group	All farms
Feed:			
Hay.....	5 tons	6 tons	5.4 tons
Grain.....	274 lbs.	435 lbs.	308 lbs.
Pasture.....	2.5 mos.	1.5 mos.	2 mos.
Chores.....	12 minutes	24 minutes	15 minutes
Taxes.....	\$1.42	\$2.21	\$1.62
Average value per head.....	\$111.94	\$102.79	\$107.33
Interest on investment in horse.....	\$6.72	\$6.17	\$6.44
Mortality.....	6.6%	Nominal	5.1%
Depreciation.....	8.55%	6.97%	8.15%
Shelter.....	\$11.27	\$17.25	\$12.77
Equipment.....	\$7.11	\$5.35	\$6.66
Miscellaneous.....	\$5.05	\$4.87	\$5.01
Credits.....	Nominal	Nominal	Nominal

EFFECT OF COST OF FEED

The average annual feed bill per horse amounted to \$95.75, the costs on individual farms ranging from \$23.82 to \$295. Low costs can be attributed to pasturing horses when idle or to special conditions making for cheap feed. The high costs are largely due to wastage of feed or to excessive prices paid for feed. Of the ranches studied in the dairy and field crops group, 23 reported annual feed costs amounting to over \$125 per horse so that the average feed cost of these was 7.8 cents per work hour against a group average figure of 5.6 cents per hour.

The importance of keeping down feed costs is shown by the following table. Here are presented the actual costs on five ranches which had the highest annual feed cost, in comparison with average costs of all ranches in the dairy and field crop groups—\$89.80.

TABLE 20
EFFECT OF FEED COSTS UPON COST PER HOUR OF WORK

Ranch No.	Number of hours worked	Actual			Under average feed cost			Saving per hour of work	
		Feed cost		Total cost per hour of work	Feed cost		Total cost per hour of work		
		Annual	Per hour		Annual	Per hour			
1	1799	\$295.00	16.4c	22.2c	\$92.09	5.1c	10.9c	11.3c	
2	1500	178.20	11.9	16.4	92.09	6.1	10.6	5.8	
3	2660	176.00	6.6	10.6	92.09	3.5	7.5	3.1	
4	2808	173.50	6.2	11.4	92.09	3.3	8.5	2.9	
5	832	168.00	20.2	25.3	92.09	11.1	16.2	9.1	

This table serves to illustrate another fact, namely, that the fewer hours per year that the horse works, the more important it is to keep down the feed cost. Farms Nos. 4 and 5 have approximately the same annual feed cost, yet farm No. 4, where the horses work an average of 2808 hours, would have made a saving of only 2.9 cents per hour had the feed bill been that of the average ranch, whereas on farm No. 5, where the horses worked only 832 hours, the saving would have been 9.1 cents per hour.

SUMMARY

A study of the cost of keeping 812 work horses on 187 California farms indicated that under the conditions existing at the time (for year 1922) the average cost per animal per year amounted to \$172.19.

The average cost of maintaining horses on orchard and vineyard farms was found to be higher than on dairy and field crop farms, being \$211.14 for the former group and \$163.58 for the latter group. Of the various items making up the cost of maintaining work horses, feed and chores are the two largest single costs. These amounted to \$112.32 (or 68.9%) for the dairy and field crop group, \$162.16 (or 77%) for the orchard and vineyard group.

The majority of operators fed hay only, at an average rate of 6 tons per head per year. When grain was fed the amount averaged 780 lbs., with a reduction of but one-tenth of a ton of hay. An average of five months of pasture replaced 1.7 tons of hay.

Prices for the period of study mostly ranged between \$15 to \$18 per ton of hay, \$2.50 to \$3 per horse-month for pasture, \$1.75 per 100 pounds for grain, 30.9 cents per hour for choring, \$1.62 for taxes, \$5.01 for shoeing, veterinary and similar miscellaneous minor items, \$12.77 for shelter and \$6.66 for use of equipment.

Credits (for colts and manure) were relatively small. The value of the manure is apparently not appreciated by horse owners.

Mortality averaged 5.1 per cent, depreciation 8.14 per cent.

The number of hours that horses are used per year is the greatest single factor affecting cost per hour. Yearly use was found to range from 454 to 3382 hours per horse, with a general average of 1527 hours.

The average cost per horse-hour for time actually worked amounted to 11.03 cents, or approximately \$1 per day for a 9-hour day.

ACKNOWLEDGMENT

In addition to the data collected by fieldmen in connection with a study of the cost of producing milk on California dairy farms,* 47 records, collected by Mr. W. L. Jackson, and constituting the orchard and vineyard group have been used. Mr. L. E. Haseltine gave substantial assistance in connection with compiling, summarizing, and analyzing the various records.

* Published in University of California Experiment Station Bulletin 372.

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