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A COST ANALYSIS FOR OPERATION OF LIGHT TRUCKS

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In most mosquito control districts, vehicular costs are a substantial portion of the total budget. In order to maintain accurate records, a cost accounting system was set up in 1958 in this district and has been in operation to the present time. The basic document from which costs flow is a weekly vehicle report kept by each driver on each vehicle. All costs are entered on the form as they are incurred, and submitted at the end of each week to a clerk for entry into a ledger. Keeping up the vehicle report by each driver has become perfunctory and takes a negligible amount of time. The account clerk then prepares whatever statistical or cost summaries are required by management. In addition, the vehicle reports permit a

check to see that specified maintenance is being carried out. If mileage for any particular vehicle is substantially below the average, repair or tuneup can be performed promptly.

A trend has developed in industry and government in recent years for leasing items of equipment rather than purchasing such equipment. There are some advantages and restrictions to leasing which must be considered before a decision to lease vehicles is made. The vehicles must not be special purpose models but common, readily resalable types. If possible they should be returned to the lessor in the early fall before new models appear. The vehicles should be returned in excellent condition less normal wear and tear.

One advantage of leasing is that new vehicles can be specified each year. Maintenance costs are very low since most re-

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pairs come during the warranty period. Total operating costs are low and miles per gallon high. There is no storage problem in the off season and of course no insurance costs and no depreciation after the vehicles are returned. Since down time is at a minimum with new trucks, labor losses are correspondingly low. Pickup trucks are most readily leasable for longer periods (7-8 months) and at a cheaper rate than for shorter periods (4-5 months).

Even cheaper rates could be obtained for longer leasing periods but cost analyses made on this point indicate that 7 to 8 months is a breakoff period. After this time the advantages of short term leasing are gone and it would probably be more economical to purchase the trucks and take advantage of the tax free privileges of governmental agencies. The MMCD is located in a Metropolitan area with a population of 1,500,000 and in recent years the low bidders on District truck rentals have consistently been large car and truck dealers rather than the regular rental or leasing companies. The actual monthly rental costs per unit for the past six years are given in Table 1.

TABLE 1.—Monthly rental cost for each ½ ton pickup truck.

Year	Rental period	
	5 months	7 months
1959	\$120.00	\$..
1960	120.00	..
1961	120.50	..
1962	118.15	96.98
1963	108.40	89.90
1964	103.60	84.80

The MMCD purchased 26 Dodge four wheel drive (4 x 4) pickups and 6 International Harvester four wheel drive (4 x 4) Travelalls in 1958 and used them for 4 years before tradein. Thirteen Jeep four wheel drive (4 x 4) pickups were purchased in 1962 and are still in use. One Chevrolet Yeoman station wagon was purchased in 1958 and used 6 years. Most of the District's field vehicular needs

were met by the rental of standard one-half ton pickup trucks equipped with heavy duty springs, locking differential, and snow tires on the rear. The number so rented has ranged from 20 to 71 vehicles annually with new trucks being supplied each year.

The vehicular costs for this District for the past 6 years are summarized in Table 2. An important cost factor is the miles per gallon of gasoline obtained for the different vehicles. This averages 9.75 m.p.g. for 2 years for Jeep 4 x 4 pickups and 9.77 m.p.g. for 4 years for Dodge 4 x 4 pickups. Five-year averages for Ford and Chevrolet two wheel drive (2 x 4) pickups were 13.82 m.p.g. The Chevrolet station wagon consistently gave the highest mileage averaging 16.2 m.p.g. IH Travelalls averaged 12.63 m.p.g. for 4 years.

Total operating costs include gas, oil, lubrication filter, tire and general repairs, wash jobs and insurance but do not include rent or depreciation. Operating costs for Ford and Chevrolet one-half ton pickups averaged \$0.0268 per mile for 5 years with a low of \$0.0254 and a high of \$0.0289. Dodge 4 x 4 pickups averaged \$0.0389 the first year and rose to \$0.0750 the fourth year, due mainly to rapidly mounting repair costs. The IH Travelalls averaged \$0.0319 the first year and rose to \$0.0494 the fourth year. The Chevrolet station wagon averaged \$0.0354 per mile for 6 years. The Jeep 4 x 4 pickups averaged \$0.0362 in 1962 and \$0.0490 in 1963. Based on this experience, repair costs in the fourth year of operation of the Dodges rose substantially to where they doubled the operating costs per mile over the first year. These cost figures indicate that even when new, 4 x 4 pickups cost about one cent per mile more to drive than 2 x 4 pickups and up to 5 cents more per mile if the 4 x 4's are 4 years old and the 2 x 4's 1 year old.

In computing total costs, depreciation or rent must also be included. With leased pickups the rental figure is known exactly, and added to operating costs, brings the average cost per mile up to

TABLE 2.—Vehicle cost analysis (averages per unit).

No.	Type of vehicle	Year	Miles driven	Gas and oil cost	Lub. wash, tires-costs	Insur.	General repairs	Total oper. costs	Miles per gal.	Oper. cost per mile	Deprec. or rent	Total cost per mile
(6)	1958 I.H.C. Travelalls	1961	11,923	\$279.18	\$31.42	\$58.93	\$218.98	\$588.51	11.77	\$.0494	\$565.00	\$.0967
		1960	10,435	232.69	22.85	44.46	178.06	478.06	12.01	.0458	565.00	.10
		1959	7,295	164.88	14.83	54.19	105.09	338.99	11.83	.0465	269.50	.0834
		1958	7,820	167.64	9.37	37.92	34.37	249.30	12.47	.0319	332.50	.0744
(25)	1958 Dodge 4 x 4 Pickups	1961	8,022	230.34	21.11	39.18	310.61	601.24	9.28	.0750	428.44	.1283
		1960	8,216	221.14	21.38	43.78	177.61	463.91	9.60	.0565	428.44	.1086
		1959	7,255	183.36	16.87	44.00	141.67	385.90	10.22	.0532	199.50	.0807
		1958	5,111	132.31	7.59	25.64	33.17	198.71	10.30	.0389	250.60	.0879
(13)	1962 Jeep 4 x 4 Pickups	1963	9,540	242.80	20.00	44.71	160.37	467.88	9.73	.049	508.53	.1023
		1962	9,892	257.65	21.75	47.34	31.18	357.92	9.76	.0362	508.53	.0876
(1)	1958 Chev. Sta. Wgn.	1963	14,700	264.69	49.25	69.47	145.92	529.33	16.64	.0360	365.80	.0609
		1962	16,554	301.33	20.65	67.23	155.09	533.30	15.55	.0334	365.80	.0555
		1961	11,042	231.03	17.75	75.71	121.12	445.61	14.78	.0404	365.80	.0735
		1960	7,629	154.21	13.50	69.25	25.95	262.91	20.15	.0345	365.80	.0824
		1959	7,766	144.08	9.00	66.67	57.77	277.52	16.09	.0357	175.00	.0583
		1958	4,707	73.49	8.55	43.38	17.75	143.17	15.90	.0304	182.34	.0692
Rented Pickups												
(46)	Ford—7 Mos.	1963	8,134	161.98	11.69	23.86	25.19	222.72	12.69	.0274	611.33	.1094
(25)	Ford—5 Mos.	1963	5,896	106.51	9.34	17.63	16.27	149.75	14.15	.0254	563.69	.1210
(31)	Ford—7 Mos.	1962	8,849	189.34	17.27	24.87	13.40	244.88	11.56	.0277	675.21	.1049
(25)	Ford—5 Mos.	1962	5,593	109.72	10.32	24.61	12.88	157.53	12.91	.0282	586.81	.1331
(22)	Ford—5 Mos.	1961	5,316	100.66	8.73	10.31	17.16	136.86	13.77	.0258	545.54	.1284
(30)	Chevrolet—5 Mos.	1960	4,808	90.16	6.19	17.87	24.64	138.86	14.12	.0289	532.00	.1394
(21)	Chevrolet—5 Mos.	1959	5,888	105.47	9.42	20.15	20.31	155.35	14.24	.0264	565.52	.1224

\$0.12. Longer rental periods (7 months) result in lower rent, and bring the total cost per mile down to between \$0.10 and \$0.11. There are many ways to calculate depreciation but the figures presented herein are based on 20 percent depreciation per year. On this basis, the cost per mile, including depreciation or rent, ranges from 1 to 3.78 times operating costs per mile. Within reason, as miles driven increases, the cost per mile decreases.

Table 3 presents the total repair costs for all District-owned and leased vehicles from 1958 through 1963. All repairs were accomplished at commercial garages and the only billing concession received

TABLE 3.—Vehicular repair costs.

Year	Vehicles owned and rented	Repair cost
1958	32	\$ 840.05
1959	53	4,226.64
1960	62	8,174.68
1961	54	6,638.60
1962	70	1,667.47
1963	85	4,520.96

was that parts were discounted. It is obvious that this District could not equip and staff a garage for less money than these totals. Many large commercial garages remain open for 16 hours daily in this metropolitan area so repairs normally can be accomplished promptly.

LABORATORY REARING OF *URANOTAENIA ANHYDOR* DYAR (DIPTERA:CULICIDAE)

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In the United States the genus *Uranotaenia* consists of three species and one subspecies. Until the excellent ecological and taxonomical studies by Belkin and McDonald (1956), *U. anhydor* Dyar was considered to be a very rare species and was known from only small adult or larval collections in Nevada, Arizona, California, and Baja California. This species is reported in California from San Bernardino and San Diego Counties (Belkin and McDonald 1956) and from Inyo County (Loomis *et al.*, 1956).

The writer collected several hundred third and fourth instar larvae of *U. anhydor* approximately 6 miles east of Ban-

ner, California, in San Diego County, IV-10-63. The habitat was a small, open, slightly alkaline seep pool in a swampy area with *Scirpus olneyi* Gray, the principal vegetation in the area. These larvae were transported 360 miles to Fresno in small ice-cream cartons with little apparent mortality.

Approximately 90 adults were reared from a portion of the larval material and placed in a cage (9" x 9" x 11") containing raisins and a jar of pond water. The rearing room was held at approximately 70° F. and 70 percent relative humidity and supplied with 17 hours of normal white light, 2 hours of red light, and 5 hours of darkness. These conditions were maintained for 32 days during which time no autogenous development of eggs was observed.

¹In cooperation with the California State Department of Public Health, Bureau of Vector Control, Fresno, California.