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# BULK MILK HAULING MICROCOMPUTER SOFTWARE AVAILABLE FROM CORNELL UNIVERSITY

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# Bulk Milk Hauling Microcomputer Software Available from Cornell University

## INTRODUCTION

The era of double-digit inflation in the late 1970's was a particularly difficult time for the independent milk hauler. These frequently small entrepreneurs working on contract for proprietary and cooperative milk handlers are a vital part of the nation's $20 billion dairy sector. Rapid inflation affected this group in two important ways. First, many operators worked on the basis of historical equipment costs. When trucks need replacing there was frequently insufficient equity to purchase the sharply higher-priced vehicles. As a result numerous good operators had to leave the industry, creating problems for themselves and the dairymen they served.

Second, when rate increases were requested, in response to fuel or other input price increases, they were typically granted across-the-board to all haulers working for a cooperative or private handler. In an environment of widely divergent route conditions, such general rate increases were excessive in some cases while being inadequate in others. Over an entire milk-shed the result was an inefficient and inequitable system for haulers and farmers alike.

Both problems had the common base of inadequate cost information. With timely and appropriate cost data the replacement cost of a vehicle could be factored into the rate base. Moreover, costs could be computed on a route-by-route basis so that greater equity could be brought into the system. In response to the apparent need for better information a cost-computation program was developed at Cornell University for use on the TI-59 programmable calculator, then a state-of-the-art processor.[1] The program found wide acceptance by both handlers and haulers. The computed costs were as intended used as a common basis for negotiating actual rates.

The TI-59 version of the program was however cumbersome to operate and limited by the capacity and operating speed of the equipment. Additionally, both handlers and haulers shifted increased attention to route cost record keeping and developed expanded demands for cost information. At the same time

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[1] See W. Lesser and W. Wasserman, "Using the TI-59 Programmable Calculator to Estimate Operating Costs and Hauling Rates for Bulk Milk Assembly." Cornell University, Department of Agricultural Economics, A.E. Ext. 82-26, August 1982.

powerful, inexpensive microcomputers, most notably the IBM PC (and compatibles), gained widespread acceptance. Milk hauling analysis is an ideal application for microcomputers. This bulletin describes two application programs developed at Cornell University with financial support from the Agricultural Cooperative Service of the USDA.

## AVAILABLE PROGRAMS

### Milk Hauling Cost Analysis

Two programs were developed for the Agricultural Cooperative Service. The first is a translation and extension of the hauling cost program first available on the TI-59. The program performs several related computations:

1) Route-by-route costs for owned or leased equipment.

2) Hauler payments based on costs incurred.

3) Producer charges related to costs actually incurred in transporting milk from farm to plant. The costs, divided into assembly charges, transport charges, on-farm charges and general overhead time (waiting, washing, etc.) are charged on a cost-justified basis.[2]

4) Pool charges including zone payments for zones of 10-mile increments.

Key screens and sample output from the program are shown in Appendix 1.

### Truck Maintenance Records

Earlier experience with the cost analysis program indicated that truck maintenance cost data were scarce. This was particularly true of the smaller operator who in addition to driving is responsible for management and record keeping. With no suitable smaller-scale program available commercially, repair records were frequently sketchy or non-existent. Yet repair costs can make up to 40 percent of the variable mileage costs in a milk hauling system.

The truck maintenance records program is a simplified means of recording and aggregating individual expenditures. With a capacity of 99 trucks and 99 trailers or tanks the program contains two principal components:

1) A running tabulation of expenditures in each of 14 categories (12 for

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[2] For a conceptualization and description see D.R. Lee, et al., "A Cost-Based Rate System for Bulk Milk Assembly". Cornell University, Department of Agricultural Economics, A.E. Res. 85-9, April 1985.

trailers/tanks). Categories refer to major components like the suspension, brakes or electrical system.

2) Aggregations in monthly totals and year-to-date as well as life-to-date for each vehicle and for the fleet.

Data from this program are intended for general management use, including assisting in replacement decisions, as well as for inputting into the cost analysis program. To accommodate those double needs costs are characterized into three major areas, preventative maintenance, repairs, and tires. The major screens from the program along with sample output are shown in Appendix 2.

## SYSTEM REQUIREMENTS

Both programs are written in MS Advanced BASIC for the IBM PC/XT and compatibles. At least 48 k of memory (RAM) and one disk drive are required. Any form of the operation system (IBM DOS or MS DOS) is acceptable. The programs also function without alteration on some compatibles using MS DOS and MS Advanced BASIC. However compatibility is a relative matter and it should be recognized that the program does not function as supplied on all machines claiming IBM compatibility. A copy of the listing is provided with the program so that modifications to the program may be made as easily as possible.

## DISTRIBUTION ARRANGEMENTS

The programs are being distributed for ACS by Cornell University. The programs are not copyrighted and may be reproduced legally. Despite the lack of legal protection the programs should be considered the property of ACS.

Programs (with documentation) are sold individually for $30, or both programs may be ordered for $50. Prices include postage. Only prepaid orders are accepted. Please send requests specifying the brand of computer to be used to:

NRAES
Riley-Robb Hall
Cornell University
Ithaca, NY 14853

Checks and invoices may be made out to Cornell University. When ordering please specify the Hauling Cost Analysis or the Truck Maintenance Records Programs or both.

Should any errors in the programs become apparent no guarantee is offered that they can or will be corrected. However corrections/modifications of the program will be made available for $5 (prepaid). Registered owners will receive notice when any new material becomes available. Please address correspondence to the above address.

# APPENDIX 1

## Sample Screens from the Milk Hauling Cost Analysis Program

DAIRY HAULING ANALYSIS PROGRAM

OPTIONS

INDIVIDUAL ROUTES

1) ENTER HAULING AND ROUTE COSTS
2) CALCULATE HAULING COSTS
3) DELETE A TRUCK
4) LIST CURRENT TRUCKS

POOL CALCULATIONS

5) CALCULATE POOL PAYMENTS

OTHER OPTIONS

6) HELP
7) EXIT THE PROGRAM

YOUR SELECTION NUMBER? >

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TRUCK COSTS AND DATA

TRUCK DATA FOR TRUCK CASE1

| | | |
|---|---|---|
| 1) | AVERAGE DAILY ROUTE MILES | 139 |
| 2) | AVERAGE DAILY ASSEMBLY MILES | 52 |
| 3) | AVERAGE CWT DELIVERED PER DAY | 477 |
| 4) | AVERAGE OPERATING HOURS PER DAY | 9.6 |
| 5) | AVERAGE ASSEMBLY HOURS PER DAY | 5.8 |
| 6) | AVERAGE NUMBER OF FARM STOPS PER DAY | 14 |
| 7) | DRIVER'S NAME | DAVE |
| 8) | DESTINATION | CUBA |
| 9) | PEAK PLANT WAITING TIME IN HOURS | 2 |
| 10) | QUIT AND RETURN TO PREVIOUS MENU (TYPE <RETURN>) | ___ |
| 11) | MOVE ON TO FIXED COSTS (TYPE <RETURN>) | ___ |

CHANGE WHAT NUMBER?

TRUCK COSTS AND DATA

FIXED COSTS FOR TRUCK CASE1

| | | |
|---|---|---|
| 1) | TRUCK CHASSIS COST NEW (IF OWNED) | $ 65000 |
| 2) | TRUCK CHASSIS EXPECTED LIFE IN YEARS (IF OWNED) | 6 |
| 3) | TRUCK CHASSIS SALVAGE VALUE (IF OWNED) | $ 16000 |
| 4) | PER MONTH FEE ON TRUCK (IF LEASED) | $ 0 |
| 5) | TRAILER/TANK COST NEW (IF OWNED) | $ 20000 |
| 6) | TRAILER/TANK EXPECTED LIFE IN YEARS (IF OWNED) | 10 |
| 7) | TRAILER/TANK SALVAGE VALUE (IF OWNED) | $ 4000 |
| 8) | PER MONTH FEE ON TRAILER/TANK (IF LEASED) | $ 0 |
| 9) | ANNUAL INSURANCE | $ 2300 |
| 10) | ANNUAL REGISTRATION FEES | $ 435 |
| 11) | FEDERAL HIGHWAY USE TAXES ANNUAL | $ 0 |
| 12) | OTHER FIXED TAXES ANNUAL | $ 0 |
| 13) | ANNUAL INTEREST RATE | % 13 |
| 14) | MISCELLANIOUS FIXED COSTS ANNUAL | $ 2500 |
| 15) | MOVE BACK TO PREVIOUS SCREEN | ___ |
| 16) | MOVE ON TO VARIABLE COSTS | ___ |

CHANGE WHAT NUMBER?

---

TRUCK COSTS

WAGES FOR TRUCK CASE1

| | | |
|---|---|---|
| 1) | DRIVER 1 WAGES PER HOUR | $ 5.5 |
| 2) | DRIVER 1 AVERAGE HOURS PER DAY | 9.6 |
| 3) | DRIVER 2 WAGES PER HOUR | $ 0 |
| 4) | DRIVER 2 AVERAGE HOURS PER DAY | 0 |
| 5) | DRIVER 3 WAGES PER HOUR | $ 0 |
| 6) | DRIVER 3 AVERAGE HOURS PER DAY | 0 |
| 7) | AVERAGE FRINGE BENEFITS PER HOUR (IN $) | $ 2 |
| 8) | AVERAGE FRINGE BENEFITS PER HOUR AS A % OF WAGES | % 0 |
| 9) | MOVE BACK TO PREVIOUS SCREEN | ___ |
| 10) | FINISH ENTRY OF DATA | ___ |

CHANGE WHAT NUMBER?

HAULING POOL CALCULATIONS

OPTIONS:

1) CALCULATE PRODUCER PAYMENTS
2) CALCULATE HAULER PAYMENTS
3) CREATE A NEW COMPOSITE ROUTE
4) HELP
5) RETURN TO MAIN MENU

ENTER THE NUMBER OF YOUR CHOICE >

---

HAULER PAYMENTS
FOR ROUTE CASE1.COMP

| | | |
|---|---|---|
| STOP PAYMENT PER FARM STOP ..... | $ | 3.75 |
| MILEAGE PAYMENT PER MILE ..... | $ | 0.80 |
| VOLUME PAYMENT PER CWT ..... | $ | 0.06 |

TYPE (UPPER CASE) <PrtSc> TO PRINT THIS SCREEN
TYPE ANY OTHER CHARACTER TO CONTINUE

PRODUCER CHARGES

RESULTS:

STOP CHARGES ARE .....$ 7.42

VOLUME CHARGES PER CWT ARE .....$ 0.06

ZONE CHARGES PER CWT

| | | | |
|---|---|---|---|
| ZONE 1 CHARGE .....$ | 0.044 | ZONE 2 CHARGE .....$ | 0.074 |
| ZONE 3 CHARGE .....$ | 0.104 | ZONE 4 CHARGE .....$ | 0.133 |

TYPE ANY CHARACTER TO CONTINUE

## APPENDIX 2

Sample Screens from the Truck Maintenance Records Program

MAINTENANCE RECORDS

MAIN OPTIONS:

1) UPDATE MONTHLY COSTS
2) UPDATE TRUCK/CHASSIS MAINTENANCE RECORDS
3) UPDATE TRAILER/TANK MAINTENANCE RECORDS
4) HELP
5) EXIT THE PROGRAM

ENTER THE NUMBER OF YOUR CHOICE ->

---

MAINTENANCE RECORDS

TRAILER/TANK DATA ENTRY SECTION

OPTIONS:

1) UPDATE COSTS FOR A TRAILER/TANK
2) CREATE AND ENTER COSTS FOR A NEW TRAILER/TANK
3) CALCULATE FLEET COST FIGURES
4) DELETE A TRAILER/TANK RECORD
5) LIST THE NUMBERS OF CURRENT TRAILERS/TANKS
6) HELP
7) RETURN TO MAIN MENU

ENTER THE NUMBER OF YOUR CHOICE OR A ? FOR HELP ->

PAGE: 1

MONTHLY REPAIRS

MONTH: AUGUST

| | DATE | EQUIP NO. | TYPE | CODE | COST |
|---|---|---|---|---|---|
| 1 | 8/1 | FORD1 | 1 | 9 | 125 |
| 2 | 8/1 | FORD1 | 1 | 2 | 225 |
| 3 | 8/1 | MACK1 | A | 1 | 75 |
| 4 | 8/2 | MACK2 | A | 1 | 50 |
| 5 | 8/3 | MACK1 | A | 2 | 350 |
| 6 | 8/4 | MACK2 | A | 2 | 475 |
| 7 | 8/5 | FORD1 | A | 1 | 95 |
| 8 | 8/6 | GMC1 | A | 1 | 110 |
| 9 | 8/7 | WLK1 | B | 1 | 65 |
| 10 | 8/7 | WLK2 | B | 8 | 225 |
| 11 | 8/9 | GMC1 | A | 1 | 95 |
| 12 | 8/10 | BRN1 | B | 1 | 50 |
| 13 | 8/12 | MACK1 | A | 2 | 50 |
| 14 | | | | | 0 |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |

TYPES: A=TRUCKS, B=TRAILERS

TRUCK CODES

| | |
|---|---|
| 1 - PREV. MN. | 2 - TIRES |
| 3 - LABOR | 4 - MINOR ENG. |
| 5 - ELECTRICAL | 6 - BRAKES |
| 7 - SPRINGS | 8 - CAB |
| 9 - SUSPENSION | 10 - FUEL SYSTEM |
| 11 - COOLING SYS. | 12 - DRIVE TRAIN |
| 13 - MAJOR ENG. | 14 - MISC. |

TRAILER CODES

| | |
|---|---|
| 1 - PREV. MN. | 2 - TIRES |
| 3 - LABOR | 4 - ELECTRICAL |
| 5 - TANK MAJOR | 6 - TANK MINOR |
| 7 - DOLLY | 8 - SUSPENSION |
| 9 - FRAME MAJOR | 10 - FRAME MINOR |
| 11 - PUMP | 12 - MISC. |

1 2SAVE 3 4CALC 5 6ABORT 7 8CLEAR 9 0

---

MONTHLY TRUCK REPAIR TOTALS

| TRUCK # | MACK1 | MACK2 | FORD1 | GMC1 |
|---|---|---|---|---|
| P. M. $ | 75 | 50 | 95 | 205 |
| TIRES $ | 400 | 475 | 0 | 0 |
| LABOR $ | 0 | 0 | 0 | 0 |
| MIN ENG $ | 0 | 0 | 0 | 0 |
| ELEC. $ | 0 | 0 | 0 | 0 |
| BRAKES $ | 0 | 0 | 0 | 0 |
| SPRINGS $ | 0 | 0 | 0 | 0 |
| CAB $ | 0 | 0 | 0 | 0 |
| SUSPEN. $ | 0 | 0 | 0 | 0 |
| FUEL S. $ | 0 | 0 | 0 | 0 |
| COOL S. $ | 0 | 0 | 0 | 0 |
| DRIVE T. $ | 0 | 0 | 0 | 0 |
| MAJ ENG $ | 0 | 0 | 0 | 0 |
| MISC. $ | 0 | 0 | 0 | 0 |

TYPE <PrtSc> TO PRINT - ANY OTHER CHARACTER TO CONTINUE

1 2SAVE 3 4CALC 5 6ABORT 7 8CLEAR 9 0

```
                    MONTHLY MAINTENENCE RECORD              LAST CHANGED:
                         FOR TRUCK MACK1
                         ---------------
                        ODOMETER        0

PREV. MAIN. $          75               TIRES $              400
LABOR $                0                MINOR ENG. $         0
ELECTRICAL $           0                BRAKES $             0
SPRINGS $              0                CAB $                0
SUSPENSION $           0                FUEL SYS. $          0
COOLING SYS $          0                DRIVETRAIN $         0
MAJOR ENG. $           0                MISC. $              0

UPDATE TOTAL COSTS ___                  RETURN TO MAIN MENU ___
-------------------------------------------------------------

                          TOTALS
                    (LAST UPDATED:      )
                    -------------------------

PM LIFETIME        0                              $/MILE PM LIFETIME    0
MILES THIS MONTH   0          $ THIS MONTH    0   $/MILE THIS MONTH    0
MILES THIS YEAR    0          $ THIS YEAR     0   $/MILE THIS YEAR     0
MILES LIFETIME     0          $ LIFETIME      0   $/MILE LIFETIME      0
NONTIRE REPAIRS    0                              $/MILE NONTIRE REPS   0

                        TYPE <PrtSc> TO PRINT
```