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AN ALTERNATIVE RATE STRUCTURE FOR ASSEMBLING AND HAULING BULK MILK IN VERMONT

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The considerable literature published in the past 10 years on farm-to-market milk routes, their organization and structure, and the charges for their services, suggests a widespread awareness of problems. In Vermont, we have attacked several of the complex issues regarding milk hauling. In this paper, we attempt an examination of one particular aspect of the rate structure: the equity of charges among producers on given routes for milk hauling. Later in this paper we describe a rate structure for assembly and hauling of bulk milk that we think will improve this aspect of equity.

The allocation of charges among producers is distinct from the question of equity between users of milk hauling services and suppliers of milk hauling services (although in the course of our study we have come to some conclusions in this area also). We feel the problem area on which this paper is focused is potentially of even greater importance.

We embarked upon this study with the intent of answering questions such as these: Are milk hauling charges paid by individual farmers reasonably closely related to the costs the hauler incurs on behalf of those same individual farmers? That is, is there a close relationship between (a) the costs which the hauling system incurs and which are identifiable as benefitting a particular patron or group of patrons, and (b) the charges which the system imposes upon the respective patrons who are the beneficiaries of those actions? Note the emphasis in the preceding sentence on the two governing words: "costs" on one hand and "charges" on the other.

Unless the society has specific reasons for injecting or tolerating a subsidy, we generally favor a close correspondence between "costs" and "charges." In general, in the assembly and hauling of raw milk, we believe that costs should be paid by those for whom the costs are incurred. Assuming that the total system covers its total costs (including a competitive level of profit), any other circumstance would mean that some patrons are paying more than their share while others are getting a partially-free ride. If such "inequity" occurs in only mild degree, it may do no worse than offend our sense of equity, but we were concerned that departures from the idealized alignment between costs and charges might be sufficiently gross as to affect resource allocation.

The opportunities to make judgments in this area are somewhat obscured by the high proportion of overhead and of unallocable costs that are inherent in any collection system for the assembly and transport of bulk milk from farms. Once the commitment is made to operate a milk pickup route, and to continue its operation, upward of 70 percent of its costs are either fixed or unallocable. Truck ownership costs (interest, depreciation, registration and certain other taxes, insurance) are mostly fixed; the wages of the driver-collector are fixed, except for possible overtime; and even some of the variable costs, such as fuel, maintenance, wash-up of tanks are either wholly or partially unallocable, since the functions related to the expenditure may serve the route's patrons in common rather than singly. The table accompanying this paper shows that approximately three-quarters of the total costs of milk collection and assembly are fixed costs, if labor is considered to be a fixed cost.

The high proportion of fixed and/or unallocable costs among the total, provides the basis for the first of our conclusions: The system is very forgiving of haphazard pricing structures. Within the framework of high fixed and unallocable costs, among the 167 producers on the 13 routes (20 runs) that we surveyed and analyzed, the charges paid by all but one producer were clearly adequate to cover the incremental costs incurred in picking up their respective milk outputs. As for the remaining costs—the fixed and/or unallocated—so long as the payment of each producer contributed toward that total and the total receipts equaled or exceeded the hauler's total expenses, what problem could be imagined?

Our observations in the course of the study, and our formulation of a set of requirements for an acceptable rate structure, did reveal a problem in this category. To judge performance of a milk hauling system, one of the criteria we established calls for the orthodox milk pickup system to provide service to each patron at a lower cost than the patron could secure equivalent service from any alternative source. Failing this requirement, any system of milk pickup is vulnerable to its most overcharged patrons being skimmed-off by competing haulers and/or receivers.

This vulnerability is already evident in Vermont. Aggressive milk receivers organize compact routes collecting from selected large producers. These large producers are able to accommodate tractor-trailer trucks on their well laid-out milk loading areas. The selected farms must be located on roads without restrictive load limits. Such well-positioned large producers frequently find tempting alternative offers dangled before

them, despite volume discounts which orthodox haulers apply to the base hauling rates per 100 pounds of milk.

To the extent that large producers accept alternative offers, the conventional hauling systems (those seeking to pick up all the milk along a route and delivering to receivers who are not so selective as the aforementioned "aggressive" receivers) are left with fewer (and generally smaller) shippers to meet an essentially-unchanged level of overhead costs. Thus, rates per 100 pounds must rise, or hauler returns suffer or both. The consequent escalation of rates or withdrawal of services will increase the economic pressure upon the farmers—principally smaller farmers and farmers in remote locations—who remain in the conventional system for assembly and hauling of milk.

To minimize total milk hauling system costs and minimize adverse economic pressures on small dairy farms, a new pricing formula based on better economic rationale is needed. If possible, the revised pricing formula should not be radically different from existing rate structures, but should relate charges to costs in an equitable pattern.

Existing rate structures in Vermont typically contain some or all of the following elements:

Stop charge. Ranging presently (on routes with such a charge) from $1 to about $4. Some routes have a minimum charge, rather than a stop charge per se.

Volume charge. This is the basic charge per 100 pounds, which typically is the largest element in the rate structure. When subject

to a volume discount, the usual volume charge will be lowered as per a schedule which establishes classes of monthly deliveries (by total weight), or states a discount (cents per 100 pounds) which is applicable to monthly deliveries of that size.

Location charge. Routes hauling milk long distances typically have higher rates than short but otherwise similar routes. Where the length of haul differs among patrons of the same route, a location differential may be built into the respective basic volume charges (or, less often, into the stop charge).

Fuel adjustment charge. Some hauling rates escalate with increases in fuel costs.

The variation in rate structure that we suggest alters the relation between the first two elements listed above—establishing and/or increasing the stop charge and generally decreasing the volume charge. Such a shift is not entirely novel, but we have developed a rationale for recommending it and a revised computational basis for establishing it. In addition, we would identify shippers located on spurs or otherwise requiring extra mileage for their service, and levy upon them a surcharge that is described on a later page.

We hold that in a simple situation—where all of a route's patrons are located in a compact pattern along a circular or linear route, and no location differential is appropriate—only two rate elements are warranted; a stop charge and a volume charge. Their computation should be as follows:

1. The target total return for the route should be established (we took the route's existing revenue to be the target).

2. The allocable time on the route should be established; that is, the total time allocable to serving individual producers. This will exclude time spent serving the producers en masse or in common; time, or fuel, or overhead, involved in hauling the milk of all (or even most) of them cannot be allocated and charged to individual producer(s).

3. Our survey of 167 farms on 20 milk collection runs established the allocable time as being 8 minutes per pickup stop (exclusive of pumping time), plus 0.3 minutes per 100 pounds of milk for pumping time (both into and out of the truck's bulk tank). No other time was assumed to be allocable. In summary, the following basic equation was selected as the most applicable for time allocation:

$$8 \cdot \text{Number of pickup stops} + .30 \cdot \text{Cwt. of milk picked up} = \text{Allocable minutes (round to whole minutes)}$$

4. Thereafter, the arithmetic is as follows:

a. $\dfrac{\text{Target revenue}}{\text{allocable minutes on route}}$ = Target revenue per allocable minute (round to hundredth of a cent)

b. $8 \cdot$ Targeted revenue per allocable minute = Recommended stop charge (round to nearest cent)

c. $.30 \cdot$ Targeted revenue per allocable minute = Volume charge per 100 lbs. (round to hundredth of a cent)

A slightly more complicated situation exists on routes where shippers, individually or in groups, are located on spurs or branches off of the basic direct linear or circular route; that is, on some routes, additional mileage may be driven for the exclusive benefit of a few shippers, or even a single shipper. In such situations, we suggest that

the extra mileage and the related time should be paid by the benefited shipper(s).

The mechanism that we propose to compensate for this is a supplemental stop charge. The costs of driving spur mileage are largely independent of changes in volume, after the hauler has made his commitment to a given size of truck. We feel that the extra charge that should be assessed for spur mileage should be:

a. The target rate per allocable minute for the time in transit, plus,

b. an additional allowance for the incremental costs of truck operation over the extra mileage. Fuel is the largest such cost. The extra truck repair, maintenance, and tire expense should also be recognized, but the cents-per-mile are small compared with costs for time and for fuel.

We calculated the extra time for off-route mileage at 3 minutes per mile, which follows from the net speed of 20 miles per hour which is representative for short runs for trucks on country roads. We also allowed the same 5-miles-per-gallon for fuel use that was representative for the other mileage in our study. To compensate for the additional "minor" cost items that have been noted, the results of the computation of costs for off-route spur mileage should be rounded upward. We rounded to the next 5-cent level. An equation expressing this is:

3 ·	Target rate of return per allocable minute	+	1/5 ·	Cost of fuel per gallon	=	Opportunity cost of driving off-route spur mileage, per mile (round upward to next 5 cents)

At 1980 cost levels for Vermont, we found this to work out at about $1.60 per off-route mile. In some situations, where two or more farms

are on the same spur or branch, it would be appropriate to share the charge between them, through appropriate supplemental stop charges.

For routes that include such spurs or branches, the computation has an additional initial step. Assume again that the target revenue is to duplicate the current revenue. From this target, subtract the revenue that will be realized through supplemental stop charges. Use the remainder as the basis for computing the target returns per allocable minute, through the same process of computation as has already been outlined.

In principle, these techniques make the large and small shipper equally attractive to the hauler because each will yield the hauler equal returns per minute of activity directly related to servicing each account. In practice, some further minor adjustment in rates, akin to volume discounting, may still be appropriate. This is because some costs are hard to quantify or to relate to measurable activities. For instance, how does one relate the time needed to handle public relations with individual milk shippers?

We have plotted the differences in hauling costs that would be assessed against 167 shippers on 13 routes (20 runs), under both (a) the existing rate structures, and (b) the proposed rate structures.

As expected, producers located on spurs off the direct route would be hurt; the 26 shippers so located would pay an average of $186 per month for shipping their milk, as compared with $138 at the time of our survey, an increase of 35 percent.

Among the on-route shippers, the 46 who would pay more under the proposal would incur average charges of $131 per month, as compared with $113 currently. This would be an average 16 percent increase.

(Deliveries from shippers in this category range from 7,905 to 247,605 pounds per month, with an average of 40,952 pounds.[1])

The remaining 95 shippers in the sample are on-route producers whose hauling costs would be reduced by the proposal. Their monthly hauling costs would be reduced to $153, from $175, an average decline of 13 percent. Such shippers have individual monthly deliveries of 9,075 to 180,390 pounds, with an average of about 63,651 pounds.

While alteration of current rate structures in the direction we describe would promote a closer congruence between costs and charges, the present discrepancies in Vermont are not so serious as to demand an immediate and complete overhaul. We recommend that our model be taken as a target, and that gradually, as rate revisions become necessary in response to inflation and route adjustments, the proposals could be used as the basis for a more equitable system conforming to the competitive model.

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[1]If the producer shipping 247,605 pounds monthly (located on a route with an atypical structure) were dropped, the shippers to pay increased charges would range from 7,905 to 108,120 pounds, with an average of 36,360 pounds.

Cost analyses, bulk-milk hauling vehicles, Vermont, 1979-1980.

Items	Type of vehicle		
	Single-rear axle trucks	Tandem-rear-axle trucks	Tractor trailer combinations
	- - - - - - - - D o l l a r s - - - - - - - -		
Average hourly costs			
Principal fixed costs[a]	2.58	3.16	4.17
Driver wages and related	5.25	5.25	5.75
Subtotal: Costs while standing still	7.83	8.41	9.92
Direct costs[b] at 10 miles per hour	2.49	3.20	2.83
Total costs at 10 miles per hour	10.30	11.60	12.75

[a]Based on 9, 9.5, and 13 hours of average daily use, respectively.

[b]The speed indicated here is an average over a duration of time, not road speeds while in motion.