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## Current Practices of Harvesting Hay on Highway Rights-of-Way

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### ABSTRACT

The harvesting of hay on highway rights-of-way has recently received attention by state highway departments. Several states have already implemented a harvesting program. However, concern has been expressed about traffic safety, lead poisoning, and other problems. The pros and cons of a harvesting program are examined, and current practices of the state highway departments are reviewed. The various aspects considered include legal problems, geographic condition, traffic safety, economic benefit, contamination of hay, and aesthetic and environmental concerns. Although the economics of a hay-harvesting program may not make such a program implementable in most states at the present time, changes in the local demand for hay and in labor and administrative costs for roadside mowing programs may make such programs feasible in the future.

ceiving the funding priority it once had. Many state highway departments are looking for ways to reduce their mowing programs by restricting the frequency of mowing as well as the total area mowed. In addition, growth retardants are being suggested to reduce mowing needs.

Recently a program designed to eliminate highway mowing with highway department resources and to allow private individuals and companies to harvest hay on highway rights-of-way has received attention by many states. The hay from the highway right-of-way is, in fact, a usable resource and should not be wasted. If the hay can be cut and used by private interests, it would benefit both the state and the harvester. Several states have already implemented such a program. South Dakota, for example, has been harvesting hay along its highways since 1940 (1). However, a lot of concern has been expressed about safety, lead poisoning, and other problems.

The purpose of this paper is to present the findings of a nationwide survey of current practices of state highway departments regarding highway hay harvesting. Various aspects considered include geographic condition, legal problems, economic benefits, traffic safety, contamination of the hay, and aesthetic and environmental concerns.

Mowing is one of the major tasks of roadside maintenance. Mowing is done to maintain adequate sight distance and drainage and to provide a safe and neat highway environment for the public. However, because of limited maintenance budgets, mowing is not re-

### TYPE AND SOURCES OF DATA

The Indiana Department of Highways obtained information from 11 states on the practice of harvesting roadside hay in 1976. An inquiry was made of the

remaining 39 states in April 1983. Thirty-five states responded with either the details of their haying program or the reasons why they do not allow such practices. Subsequently, telephone interviews were conducted with the highway maintenance engineers of the initial 11 states as well as with representatives of those states that did not respond to the inquiry. Current data are now available for all the states except Alaska.

**SUMMARY OF CURRENT PRACTICES**

The policies of state highway departments concerning the harvesting of hay along highways, as of summer 1983, are shown in Figure 1. Thirty-one states currently do not have such a program. Among these states, however, California has a few isolated areas where harvesting is allowed under permit. Washington allows owners of abutting property to harvest native grasses for hay on non-limited access highways. Eighteen states reported that a harvesting program has been in force for years. South Dakota, Missouri, Wyoming, and Iowa considered the program successful.

Summaries of the major reasons for not allowing harvesting of hay are given in Table 1. Geographic condition is the most common reason, followed by economic, safety, contamination, and legal aspects. In addition, aesthetic and environmental concerns were cited as reasons for not allowing hay harvesting.

Geographic Conditions

Certain topographic conditions of highway rights-of-way are required to make hay harvesting possible. The terrain must be flat enough to accommodate conventional harvesting equipment and an adequate stand of palatable grass must exist. For geographic reasons, none of the states in New England and the Middle Atlantic regions allow hay harvesting along highways. New Jersey, Massachusetts, and Rhode Island are highly urbanized and narrow rights-of-way

make it economically and technically infeasible to harvest hay. Maine does not have a haying program primarily because the major part of its Interstate system is located in wooded areas where grass is hard to mow. Pennsylvania has a hilly terrain that makes it difficult to carry out hay-mowing operations. In the mountain region, most states, except in Montana and Wyoming, do not provide a harvesting program.

On the other hand, most of the states in the West North Central and West South Central regions permit such practices. The climate, moisture, and flat terrain of these regions are conducive to harvesting hay.

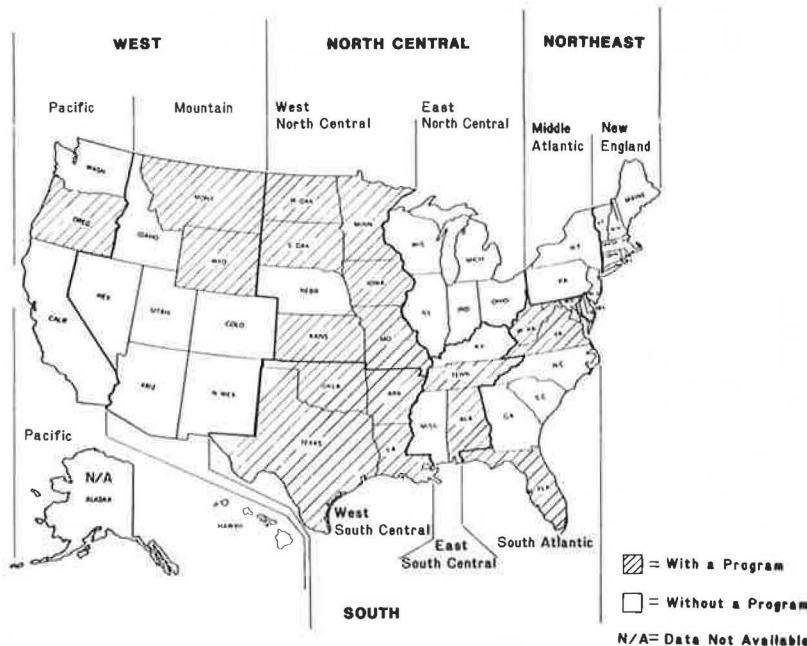
Legal Aspects

Most state laws on access control and federal highway regulations require that state highway departments maintain control of rights-of-way. A question has been raised about whether it is legal to allow private citizens to work on the highway right-of-way for any commercial purpose. Arizona statutes preclude the use of highway right-of-way for any commercial activity. Colorado prohibits the movement of nonofficial machinery within the right-of-way. As a result, the harvesting of hay cannot be legally permitted in these states.

However, this barrier was removed in Texas by a state statute (Art. 6673f Sec. 1) enacted in 1977, which stipulates that

A district engineer of the State Department of Highways and Public Transportation may grant permission to a person, at his request, to mow, bale, shred, or hoe the right-of-way of any designated portion of a highway that is in the state highway system and is within the district supervised by the engineer.

In Tennessee, a state statute enacted in 1978 provides that a local farmer may petition the de-



**FIGURE 1** Geographic distribution of states with hay-harvesting programs.

TABLE 1 Summary of Reasons for Not Allowing Hay Harvesting

State	Reason					
	Geographic Condition	Legal Problem	Economically Infeasible	Traffic Safety Concern	Contamination Concern	Other
Arizona	X	X	X			
California	X			X	X	
Colorado		X				
Connecticut	X		X			
Delaware	X					
Georgia	X			X	X	
Hawaii	X					
Idaho				X		
Illinois				X	X	Complaints about issuance of permit
Indiana			X		X	Union problem
Kentucky				X		
Maine	X			X		
Maryland	X			X		
Massachusetts	X		X		X	
Michigan			X			
Mississippi		X				
Nebraska			X			
Nevada	X					Wildlife concern
New Hampshire	X		X		X	
New Jersey	X					
New Mexico				X		
New York	X		X			
North Carolina		X		X	X	
Ohio			X	X		
Pennsylvania	X		X	X		
Rhode Island	X			X		
South Carolina				X	X	Aesthetic concern
Utah			X			
Vermont			X			
Washington			X			
Wisconsin				X		

partment of transportation for permission to cut and bale hay along the right-of-way of Interstate highways within the state for personal farming only. Several other states have also enacted similar regulations to administer such programs.

Under current practices, most states give adjacent property owners the first right to mow and bale hay on secondary roads where most of the right-of-way was obtained by easement. For the Interstate system, where the right-of-way is possessed in fee simple, the most popular approach for granting permits is on a first-come-first-served basis. In areas of high demand, bids are received.

Considerable legal precedent exists for permitting the harvesting of hay along highways. When the demand for access to cut hay on rights-of-way is sufficient, states need to review current practices or seek legislative relief.

#### Economic Benefits

The most direct benefit to a state from allowing harvesting of hay is the savings in highway mowing costs. Currently, mowing in many states is performed by state maintenance forces or contractors. Even though a number of states are reducing their mowing budget, there is still a significant amount of money expended on highway mowing each year. For instance, the Indiana Department of Highways spent \$1 million hiring private contractors to mow 44,000 acres of right-of-way in 1982. It took \$308,000 for the state of Washington to mow more than 7,000 miles of highways right-of-way in 1982. It may be possible to reduce these costs if a large portion of the highway system can be mowed free of charge.

Mowing costs have increased rapidly in the past few years. Figure 2 shows the trend of mowing costs per acre of highway right-of-way by contractor and

state forces in Indiana. The mowing cost per acre was \$24.80 by contractor in 1982 (2). (It should be noted that the actual mowing cost was \$22.64 in 1982. The \$24.80 figure includes a 10 percent addition for highway department inspection costs.) If the harvesting of hay is done along the 1,150 miles of Interstate highway in Indiana with a conservative estimate of 10 acres per mile, the state can save up to \$285,000 per year.

The other possible benefit to a state is compensation from the harvesters. In Missouri, haying is done on a share basis with the state receiving one-third of the hay harvested by farmers. If the hay is not needed by the state, the one-third share

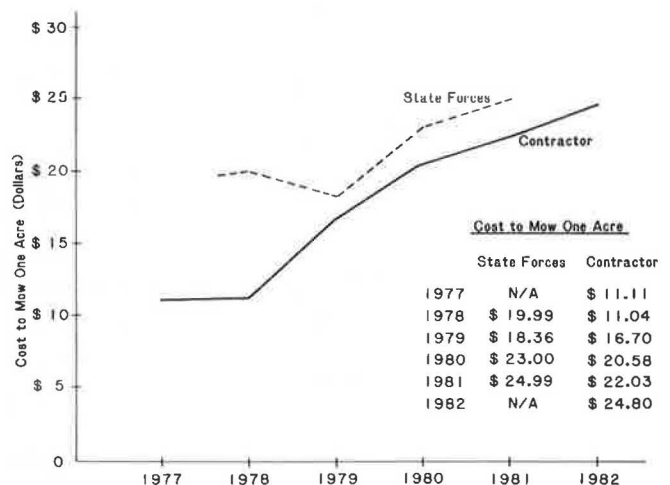


FIGURE 2 Cost comparison for mowing 1 acre by contract and by state forces in Indiana (2).

may be sold to the harvester at the established rate of \$30-\$40 per ton. It was estimated that the average yield of hay per acre of right-of-way is 2-4 tons. If 10,000 acres are to be hayed, the state government can expect about \$350,000 in compensation each year.

Obviously the economic benefits that state highway agencies can receive depend on the acreage available for haying. The Utah Department of Highways pointed out that the right-of-way area there is not sufficiently large to support a profitable hay-harvesting program. In Washington, it was estimated in 1976 that only 1,602 of the 110,350 acres of highway right-of-way may be suitable for the harvesting of hay. With such a small portion of highway right-of-way available for haying, the savings or compensation for the state would be limited.

Another factor that affects economic benefit is the demand for highway hay. If there are very few requests from harvesters for hay baling even though a good program is in place and a large amount of right-of-way is available, the savings in operation cost for the state would be very minor. As a matter of fact, this is exactly the case for some states including Oregon, Tennessee, West Virginia, and Florida. Efforts have been made by these states to encourage the private sector to use highway hay. However, little interest has been expressed by farmers and private citizens. It is worth noting that Nebraska had such a program several years ago. But because the bids received were extremely sparse, it was decided that it was not worthwhile to continue this program.

In addition to the possible economic benefits, there are extra costs incurred. These costs include administrative expenses, cost of establishing right-of-way in the field, traffic control, refertilization, performance bond, and so on. A group of states including Washington, Utah, Pennsylvania, and Ohio fear that the benefit of savings they might receive from such a program would not make up for the extra costs and that such a program would not be worth the effort, especially when very few requests are received to harvest the hay.

#### Traffic Safety

Many states expressed concern about traffic safety problems that may be associated with hay harvesting along the highways by private citizens. The appearance of an unexpected slow-moving machine on a major highway right-of-way would probably increase the risk of accident from the standpoint of both sight distance at interchanges and potential hazards related to the harvesting operation. Further, it is more difficult to regulate operations carried out by private interests than those of state maintenance forces. According to the survey, more than 10 states consider harvesting of hay along roadside dangerous and therefore prohibit it.

Although concern about traffic safety is high, the safety records associated with hay harvesting in several other states do not indicate any cause for alarm. South Dakota has had very few problems with traffic safety since the implementation of their program. Wyoming and Missouri have not encountered any major safety problem so far. A detailed examination of the bid specifications for these states leads to the conclusion that well-defined safety regulations are necessary to ensure safe operation.

First, liability insurance is required for the harvester in most of the states. Two hundred fifty thousand dollars for property damage and five hundred thousand dollars in personal liability are most

common. In addition, the harvester is required to file a bond to cover the cost of fertilizing the harvested area and guarantee restoration of the right-of-way in Arkansas and Iowa.

Next is the requirement of appropriate sign installation in working areas. The harvester is required to furnish and maintain advance warning signs that conform to either the federal or the state manual on uniform traffic control devices.

Most states do not allow mowing in the median and the interchange areas of Interstates to avoid unsafe operation. In West Virginia, Tennessee, and Illinois, mowing in the median and the interchange is allowed under special arrangement.

Several other regulations for safe operation include access control to the working area, working time constraint, parking of equipment, and so on. It is probable that traffic hazards can be reduced to a minimum when harvesters abide by the regulations.

#### Contamination of Hay

The hay on highway rights-of-way is subject to contamination by traveling vehicles. The lead and cadmium content as well as litter, debris, and other pollutants in the hay could create problems for cattle feeding and eventually result in a severe public health problem.

This concern is one of the major reasons cited by states for not permitting harvesting of hay along highways. Georgia Department of Transportation indicated that the lead content of grass grown near heavily traveled roads is high enough to be of concern. In Massachusetts, it was feared the amount of chloride in the hay resulting from snow and ice controlling operation could be unhealthy for animals. North Carolina expressed concern not only about lead poisoning but also about broken glass and large debris found in the hay; these would certainly be hazardous to animal life. South Carolina mentioned that a certain amount of the herbicides used for grass and weed control along the Interstate route could be harmful to cattle.

The experiences of those states where harvesting hay along highways is in practice, however, are not discouraging. No state has yet received claims about lead poisoning. Nor has any known disease of or harm to cattle fed on highway hay been reported. However, no claim does not necessarily mean no problem, and the lead content of the hay needs to be tested and analyzed.

In a study conducted in Oregon (3), a number of grass samples collected along various highway locations were tested to check their lead content. It was found that the lead concentration in roadside soil and grass decreases rapidly with distance from traffic or edge of pavement. The highest lead level, which occurred at the edge of shoulder, was less than 40 ppm and it decreased to 10 ppm when the distance from the edge of pavement reached 40 ft. The weighted average of lead concentration was 12-14 ppm. The safe level of lead content, as Buck (4) pointed out, is approximately 100-200 ppm. Consequently the lead content of roadside grass is well below the safety standard. To reduce the chance of any possible contamination hazard, the Oregon program mows the first 15 ft from the highway edge with highway department forces and allows the grass beyond 15 ft to be harvested for livestock forage.

Another study done in Illinois (5) reported a similar result of decreasing lead concentrations of plants with increasing distance from pavement edge. It was found that, within 65.6 ft (20 m) of heavily traveled roads, the lead content in and on various



plants was about 30 ppm. At a distance of 98.4 ft (30 m) and more from the pavement, the lead in and on crops was not significantly different from the field average of 8 ppm. On lesser traveled roads, the traffic produced no observable influence on crop lead concentrations.

A laboratory experiment conducted with randomly selected samples of forage from highway right-of-way in Indiana (6) indicated that the concentration of lead, nickel, cadmium, and zinc in the forage is below toxic levels. Table 2 gives the concentrations

TABLE 2 Concentration Levels (ppm) of Pb, Ni, Cd, and Zn in Forage Sampled at Different Locations (8)

Position Along Highway	Element (ppm)			
	Pb	Ni	Cd	Zn
25 ft beyond shoulder edge W of I-65 or S of I-70	22.86	2.01	0.37	24.62
Next to shoulder edge W of I-65 or S of I-70	17.48	3.10	0.42	33.34
Median closest to I-65 S or I-70 E	15.94	3.14	0.39	35.39
Next to shoulder edge E of I-65 or N of I-70	19.97	3.50	0.44	37.20
25 ft beyond shoulder edge E of I-65 or N of I-70	23.10	2.53	0.38	27.53
$\bar{x}$	17.83	2.75	0.39	30.81
$p^a$	NS	<.01	NS	.07

<sup>a</sup>Probability of a larger F-value due to chance.

of lead, nickel, cadmium, and zinc in forage sampled from different locations. In particular, the overall mean concentration level of lead obtained in this study was approximately 18 ppm, well below the concern level for livestock consuming roadside hay.

Some animal scientists do not regard debris as a problem (7). A preliminary check before mowing can be made to remove large debris, such as muffler or tire pieces, that has fallen from vehicles.

In most states, herbicides will not be sprayed on areas where hay is harvested. A careful coordination between the administration of the spraying program and hay harvesting would possibly reduce the level of contamination due to herbicides.

Although the public health problem may not be significant, the nutritional quality of the hay is generally not very high. Highway hay is mainly rye grass and fescue and some bluegrass and volunteer clover. These are not the best hay for livestock. In states such as Ohio and Virginia where hays are in abundant supply, the private sector would not be interested in cutting highway grass. A number of states reported that, because of the poor quality of highway hay, there have been very few requests to harvest hay along highways.

#### Aesthetic and Environmental Concerns

In general, the public views a mowed roadside as aesthetically pleasing and an unmowed roadside as less attractive. In regions where mowing has been reduced, complaints about unsightly appearance of the highways are often voiced. Harvesting of hay can help the state maintain a neat appearance of highways. However, some operators do a very poor job of mowing and leave the roadside in an unsightly condition. Furthermore, some states found it difficult to get private harvesters to remove their hay from the right-of-way within the specified time. Thus, adverse aesthetic impact could also be caused by such a program.

From the standpoints of ecology and environment,

mowing can potentially disrupt the native flora and fauna growing along a roadside. Unmowed roadside will provide good nesting cover for wild animals and birds. For this reason, reduction in mowing or even no mowing is advocated by some environmental groups. Consequently, a number of states, including Minnesota and South Dakota, have received complaints from environmental groups about hay harvesting. As a result, the Minnesota Highway Department discourages adjacent landowners from mowing roadsides controlled by easement until after July 31 to protect nesting wildlife.

#### OTHER CONSIDERATIONS

Not only can highway hay be used as forage for livestock, this hay can be applied as a mulch material for construction or maintenance purposes. In Florida, a hay-baling study in two of six districts is currently under way. The hay is being cut from the highways, baled, and delivered using the department's own equipment and forces. The purpose of that study is to determine if it is feasible to use the hay as mulch material for shoulder reworking projects.

There is a positive as well as a negative impact on drainage blockages and fire hazard along highways due to harvesting of hay. Well-mowed rights-of-way would reduce possible fire hazards caused by standing dry grass and facilitate the passage of drainage water. However, the time between mowing of hay and removal of hay would create an ideal situation for fire starts. Besides, failure to remove cut hay from drainage areas could result in even more severe blockages.

Some states do not allow harvesting of hay except in a severe drought season. The hay provided along the highways would be a valuable resource in time of demand. For example, in 1975 Wisconsin and Minnesota experienced a drought condition, and the state governments authorized the cropping of hay free of charge by adjacent farmers from state trunk highway rights-of-way on an emergency basis.

#### CONCLUSIONS

Traditionally, highway mowing is performed by state maintenance forces or contracted out to private contractors with the state paying the cost. Due to economic constraints, a number of states are tightening their budgets for highway mowing and reducing the frequency. There is a possibility that highway mowing may be partly replaced by private harvesting of hay. Under this program, the state would allow private interests to cut grass on highway rights-of-way and bale it for hay for little or no fee. A possible program may offer haying as an alternative to regular mowing contracts. This would require mowing to minimum standards with harvesting regulated to specific times or locations. This might result in lower bid prices per acre than standard mowing contracts with the difference made up by the value of the hay obtained. It might be more attractive to potential harvesters because there would be some revenue paid by the state for the mowing portion.

In this paper, a review has been made of the current practices of state highway departments. The pros and cons of various aspects of highway hay harvesting have been discussed. It can be concluded that the harvesting of hay on highway rights-of-way is feasible only under certain conditions. First, a suitable geographic condition must exist: the ter-

rain must be flat enough and the areas available for haying must be large enough for possible operation. Next, there must be appropriate legal authority for a highway department to allow such a practice. Most important, there must be sufficient demand for highway hay. Without the interest of farmers and private contractors in mowing the grass, any program would be in vain. The demand for highway hay would depend on its quality as well as on the price and availability of hay in the region. Experience reveals that traffic safety can be maintained with proper regulations and administration of the hay-harvesting program.

The concern about contamination of roadside vegetation by such pollutants as lead and cadmium is a serious one. However, the available information suggests that the level of contamination may not be significant enough to cause any public health problem, particularly if the harvesting is done some distance from the highway edge and along low-volume roads.

Although the economics of a hay-harvesting program may not make such a program implementable in most states at the present time, changes in local demand for hay and in labor and administrative costs of roadside mowing programs may cause the hay-harvesting program to be feasible in the future. The relative success of existing hay-harvesting programs in several states suggests that their potential cost-effectiveness for both state governments and private citizens should be subject to periodic review and consideration.

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