

Policy, Theory, and Research Lessons from an Evaluation of an Agricultural Crime Prevention Program

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Acknowledgments

This policy brief distills the findings and recommendations from an evaluation, funded by the U.S. Department of Justice's National Institute of Justice (Grant No. 2003-DD-BX-1017), of the Agricultural Crime, Technology, Information, and Operations Network (ACTION) Program. The complete results of that evaluation are described in the final report and a cost-benefit analysis policy brief:

Mears, Daniel P., Michelle L. Scott, and Avinash S. Bhati. 2007. *A Process and Impact Evaluation of the Agricultural Crime, Technology, Information, and Operations Network (ACTION) Program*. Washington, DC: The Urban Institute.

Chalfin, Aaron, John Roman, Daniel P. Mears, and Michelle L. Scott. 2007. *The Costs and Benefits of Agricultural Crime Prevention*. Washington, DC: The Urban Institute.

The final report formed the foundation for this brief. Points of view in the report, cost-benefit analysis brief, as well as this policy brief, are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice, the Urban Institute, its board of trustees, or its sponsors, or ACTION.

The authors thank our colleagues, especially Shelli Rossman, Nancy La Vigne, and Janine Zweig, and the staff at ACTION, especially Bill Yoshimoto and Mary Beth Hash, for their considerable support and assistance. Lou Barrett, Claudia Canales, Josh Rowlett, David Singleton, and Patrick Warner, all current or past members of the ACTION team, were extremely helpful throughout the study and uniformly accommodated our many requests for assistance. Ed Zedlewski and Maggie Heisler, with the National Institute of Justice, provided guidance and insights that greatly improved the project's design and execution, and Sandy Woerle helped guide us through the final stages of the project. Joe Donnermeyer offered many helpful ideas for improving the research design. We give special thanks to the many farmers who participated in the study, without whom there would not have been anything to report. John Roman and Aaron Chalfin were primarily responsible for the cost-benefit analysis discussions, which are detailed in the separate report (Chalfin et al. 2007). John Kempf, at Allied Insurance, provided many insights about ACTION and agricultural crime. Jesse Jannetta, who worked on this project while at the Urban Institute, conducted, analyzed, and summarized interviews for the transferability analyses and discussion. Elisa Ranck, formerly of the Urban Institute, assisted with the transferability analyses.

A Process and Impact Evaluation of the Agricultural Crime, Technology, Information, and Operations Network (ACTION) Program

Highlights of the Evaluation*

What the Study Did

Agricultural crime, including theft of farming-related commodities, supplies, and equipment, causes billions of dollars of losses each year to farmers, insurers, and consumers. Drawing on analyses of law enforcement, farm survey, site visit, and interview data, the Urban Institute and Florida State University evaluated the theory and impacts of a promising initiative in California—the Agricultural Crime, Technology, Information, and Operations Network (ACTION) project (www.agcrime.net)—aimed at addressing this problem. ACTION collects and analyzes agricultural crime data; encourages and enables information-sharing among law enforcement agencies and prosecutors within and across counties; educates the public and farmers about agricultural crime and how to combat it; marks equipment with owner applied numbers (OANs); and promotes aggressive law enforcement and prosecution.

What the Study Found

- *Program theory.* ACTION is guided by well-established criminological theories, including opportunity, situational crime prevention, and deterrence theories. The analyses suggest that these theories help predict agricultural crime and that efforts like ACTION can reduce crime.
- *Impacts.* ACTION's activities appear to have reduced victimization and to have increased agricultural crime arrests and prosecutions, recovery of stolen property (over \$6.3 million in 2004 and 2005), and farmers' investment in crime prevention.
- *Transferability.* The results of the study suggest that one or more of the activities that collectively comprise ACTION could easily be adopted in many other places, and that jurisdictions across the country are greatly in need of and interested in efforts like ACTION.

*Program and Policy Recommendations***

- *Continue ACTION's efforts and consider expansion.* In 2005, agricultural crime victimization resulted in an estimated \$101 million in losses across the nine ACTION counties examined in this study. However, only \$8 million of these losses were reported to law enforcement agencies. In addition, only 12 percent of agricultural crime victimization is reported. Considerable reductions in agricultural crime could be produced through increased reporting and crime prevention efforts.
- *Monitor and improve ACTION's operations.* ACTION's effectiveness ultimately depends on its ability to implement each of a set of diverse activities efficiently and with fidelity to program design. At the same time, the program operates with limited resources. For these reasons, it should continue to monitor program operations, taking corrective steps where necessary, and seek additional funding.
- *Test the feasibility of implementing ACTION in other places.* Because of the diverse activities that comprise ACTION, other jurisdictions in California and throughout the country may find it possible to adopt or modify the program to fit their unique circumstances and needs. Ultimately, however, research will be needed to assess the extent to which that holds true, especially in places where agricultural production differs. Future efforts should be guided by lessons gleaned from ACTION.

* Source: *A Process and Impact Evaluation of the Agricultural Crime, Technology, Information, and Operations Network (ACTION) Program*, a report by Daniel P. Mears (Florida State University), Michelle L. Scott (The Urban Institute), and Avinash S. Bhati (The Urban Institute), available from the Urban Institute (www.urban.org).

** The full set of policy recommendations are detailed in Section 10 of the report.

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The Research Study

Agricultural crime is a serious problem in the United States, with significant financial consequences for farmers, insurers, and consumers. Some sources estimate that it results in \$5 billion in economic losses annually (Swanson et al. 2002). Yet few prevention programs or polices have been developed, and fewer still have been evaluated. As a result, policymakers and practitioners lack critical information about how to deal with this costly problem. The Urban Institute (UI) and Florida State University (FSU) multi-disciplinary research team employed a multi-method approach to evaluate one promising initiative, the Agricultural Crime, Technology, Information, and Operations Network (ACTION) project, located along the southern coast and Central Valley of California and supported in part by the Bureau of Justice Assistance.

The goal of the research was to provide policymakers, practitioners, program developers, and funders with empirically-based information about whether ACTION works. The specific objectives were to assess the effectiveness of the ACTION project in reducing agricultural crime, examine cost-benefit analysis (CBA) issues related to evaluating the program, and identify whether programs like ACTION can be effectively adopted by other jurisdictions.

The study involved several strategies, including: collection of Agricultural Census and Census Bureau data; creation, administration, and analysis of data from two victimization surveys administered in 2004 and 2005, respectively, and developed with extensive assistance from farmers, program staff, and experts on rural crime; and interviews with ACTION staff, and law enforcement and agriculture officials in the intervention site and other states.

The impact evaluation entailed a diverse set of analyses, including examination of the causal logic of ACTION, the extent to which the level of program implementation influenced victimization outcomes, and other measures that could be used to provide a balanced assessment of impact. The results suggest that ACTION's activities have contributed to increased arrests, prosecutions, and recovery of property, as well as reduced victimization, and that many of the activities are needed in and can be adopted by other jurisdictions. Spatial mapping analyses indicated the need for more complete geographic information on agricultural crime incidents and highlighted the potential for such analyses to inform crime prevention efforts.

Cost-benefit analysis is an empirical technique used to systematically compare the economic efficiency of two or more policies or programs. In a separate, stand-alone report (Chalfin et al. 2007), the research team describe the CBA methodology as a means of evaluating the effectiveness of crime prevention programs, with a specific focus on ACTION. The report discusses the key steps in formulating a CBA design and the trade-offs implicit in those decisions, shows that ACTION may have increased farmers' investments in crime prevention, and then applies the principles of CBA to assess ACTION.

Finally, site visit and interview data were examined to identify lessons about how to improve ACTION and features of ACTION that could be feasibly adopted and sustained by other jurisdictions. The results suggest that ACTION could easily be adopted in many other places, but that successful implementation requires sustained attention to forging and maintaining collaborative relationships across a range of law enforcement and justice system agencies.

Background

Agricultural Crime

Agricultural crime occupies an unusual place in the range of offenses typically studied by criminologists or addressed by policymakers (Weisheit and Donnermeyer 2000; Barclay 2001; Donnermeyer and Barclay 2005). That place is reflected in part by the dearth of studies focusing on rural crime (Wells and Weisheit 2004), especially the victimization of farmers, and by the lack of classification schemes in official records. Compliance with Uniform Crime Report (UCR) classification does not, for example, require jurisdictions to quantify how many agricultural crimes have occurred. Indeed, few jurisdictions include separate codes for agricultural crime. Instead, they subsume such crimes under other headings, such as “burglary” or any of a range of generic “theft” categories. The explanation may lie in part with the fact that any number of “types” of theft could be identified (hotel, grocery store, gas station, etc.).

Regardless, agricultural crime—including theft of farming-related commodities, supplies, or equipment, or behaviors that otherwise influence farm production—occurs. And its impacts extend not only to farmers, who must replace what is stolen or have fewer products to sell, but also to consumers, who may have to pay higher costs for commodities, and to the insurance industry, which may have to pay for the replacement of equipment and supplies. Even if the latter two groups were unaffected, farmers as a group experience billions of dollars in theft annually, according to Swanson et al. (2002).

Agricultural crime is unique for an additional reason—apart from ACTION, there appear to be no systematic and comprehensive attempts in other places to prevent or reduce such crime. The study uncovered some efforts that have been or are being undertaken in different parts of the country, but none that rely on ACTION’s range of efforts to address agricultural crime or that have been evaluated or in existence for very long. Notably, there have been few published evaluations of agricultural crime prevention programs, due primarily to the fact that such programs are scarce (Barclay 2001).

ACTION

ACTION, the focus of this study, has undertaken a diverse set of measures collectively designed to reduce crime. These measures include:

- Developing a database for tracking agricultural crime and encouraging and enabling information-sharing within and across counties, as well as among prosecutors and law enforcement;
- Education of and outreach to the public and farmers about agricultural crime and what can be done to prevent it;
- Encouraging and facilitating the use of equipment- and crop-marking, especially the stamping of equipment with owner applied numbers (OANs);

- Encouraging and facilitating the use of surveillance equipment among farmers; and
- Active targeting and vertical prosecution of offenders.

Communication within and between law enforcement agencies, and between these agencies and prosecutors and ACTION, is a central feature of the program, one that cross-cuts the above areas.

The creation of distinct agricultural crime units in each participating county's sheriff's office and the assignment of prosecutors to specialize in agricultural crime cases has been central to the program's efforts. The premise of the program is that collectively the diverse set of efforts will reduce agricultural crime both through "target hardening," making it more difficult or less attractive for offenders to steal from farmers, and through punishments, facilitated by more proactive prosecution of offenders, that create a general deterrent effect.

ACTION has expanded considerably. At the time the study began, in 2003, there were eight participating counties from the San Joaquin Valley. Since then, five more have joined. The thirteen program counties include: Fresno, Kern, Kings, Madera, Merced, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Santa Cruz, Stanislaus, and Tulare. San Luis Obispo, the ninth participating county, joined ACTION in 2004, followed by Monterey in 2005, and San Benito, Santa Barbara, and Santa Cruz in 2006. The study focused only on nine of these counties—the original eight and San Luis Obispo.

The range of activities, coupled with both the expansion of the program over time to include more counties and the absence of baseline information on the prevalence of agricultural crime in these and other counties, renders any simple or direct assessment of impact difficult. This study thus relied on a diverse set of strategies to assess ACTION's likely impact.

Findings

Descriptive

The evaluation included the creation of two waves of survey data, one collected in 2004 and another in 2005 from different samples of farmers in nine counties, that would facilitate assessing the impacts of ACTION. The surveys provided an opportunity, however, to collect other data that could shed light not only on the victimization experiences of farmers but also on various other dimensions, such as the steps they take to protect their property, experiences with law enforcement, and factors that influence reporting, as well as other activities. Below, some of the key findings are summarized. Not all questions were asked in both years, and so some statistics are presented for only one of the years.

- In 2005, 50 percent of farmers reported *victimization*, compared with 62 percent in 2004 (see figure 1). Among victimized farmers, the average number of crimes experienced was 5.2 and 8.8 in each of these years, respectively.
- *Small equipment theft* and *vandalism* were the most prevalent types of victimization experience among farmers. In 2005, 47 percent of farmers reported experiencing small equipment theft and 33 percent reported vandalism; in 2004, and based on the 2004 survey, the ordering, in terms of prevalence, was reversed, with 30 percent of farmers reporting small equipment theft and 49 percent reporting vandalism.
- *Other types of victimization* were less common in 2005 and 2004, respectively: tractor theft (7 percent in 2005, 4 percent in 2004); large equipment theft (11 vs. 6 percent); livestock or poultry theft (4 vs. 2 percent); chemical or fuel theft (29 vs. 13 percent); fruit, vegetable, grain, feed, or seed theft (10 vs. 7 percent); burglary of farm buildings (20 vs. 11 percent). The higher prevalence of chemical or fuel theft in 2005 likely was due to dramatic increases in the price of fuel.
- Almost all (86 percent of) farmers in 2004 reported that they knew *friends or family who were victims* of agricultural crime.
- Theft of machinery, trash dumping, burglary of farm buildings, and vandalism were the *primary areas of concern* expressed by farmers in 2004.
- When asked how much *compensation* would be needed to offset the one-year costs of crime victimization, farmers in 2005 reported that on average they would need \$5,200.
- *Fear of crime* had diverse effects on farmers—62 percent of farmers in 2005 reported that they hired security if they went away, 59 percent said that they only made off-farm trips during the day, 46 percent worried generally about victimization, 32 percent rarely took vacations, 24 percent started carrying a concealed weapon, 24 percent took out extra insurance, and 7 percent considered leaving farming.
- Although *crime victimization was a concern* expressed by farmers in 2005, it was reportedly not as much of a concern as such factors as fuel costs, taxes, water availability, and the economy.

- The major *reasons why farmers said that they did not report victimization* was that they did not believe that law enforcement would take the crime seriously (54 percent of respondents in 2004) and that the crime simply was not serious enough (45 percent). Respondents in the 2005 survey also emphasized that they did not typically have enough proof that a crime occurred.
- When asked a series of questions about *law enforcement efforts*, the 2005 respondents were largely favorable in their views, but there was also room for improvement. For example, when asked if the local sheriff's department had been helpful in investigating crimes or marking equipment, most respondents reported that law enforcement efforts were either not at all helpful or only a little helpful. Respondents in the 2004 survey rated the quality of law enforcement protection as average.
- When asked what *activities law enforcement should prioritize*, farmers in the 2005 survey emphasized, in order of highest to lowest ranking, increased patrols of agricultural areas, greater responsiveness when called, being e-mailed about crime occurring in their (the farmers') area, assisting with equipment-marking, meeting with farmers about security measures, and encouraging farmers to share surveillance equipment.
- Most farmers in 2004 reported receiving *crime prevention information* from newspapers, television, or radio (69 percent), farm magazines (67 percent), friends, neighbors, and relatives (62 percent), the Farm Bureau (62 percent), local law enforcement (42 percent), and the county extension agent (18 percent).
- When asked *how they would prefer to receive crime prevention information*, farmers in the 2005 survey overwhelmingly favored postal mail (55 percent) followed by electronic mail (24 percent).
- Only 5 percent of farmers in 2005 reported *visiting the ACTION website*. Of those who visited it, the average number of visits was 3.3. Respondents found the website somewhat useful.
- Almost half (48 percent) of farmers in 2005 reported *using some type of markings* on their equipment, crops, and livestock. Twenty-six percent said they used surveillance equipment.
- Notwithstanding studies reporting that farmers typically take few crime prevention measures, the 2004 survey found that *farmers take a wide range of precautions*—on average, farmers used 43 percent of 30 possible prevention measures.
- The *percent of farms not reporting crimes to law enforcement* is considerable—across all counties, 88 percent of agricultural crime victimization experiences are not reported (see figure 2). The rate of non-reporting varies across counties and types of crime.
- Reflecting the underreporting of crime generally, the *dollar value of reported crime* substantially understates the true costs of agricultural crime victimization. In 2005, such victimization resulted in \$101 million in costs across the nine ACTION counties, only \$8 million of which was reported (see figure 3 and the Appendix).
- On a methodological note, although results from the two surveys points to a reduction in *overall victimization*—from 62 to 50 percent—that may be due to differences in the two

samples or to the design of the 2005 survey. For example, in the latter, and as shown in figure 1, respondents were asked to report both on 2004 and 2005 victimization, and the results from that survey indicate an increase, not a decrease, in overall victimization. The differences suggest the need for greater attention to developing consistent and valid measures of victimization in surveys of farmers.

The findings are relevant to informing ACTION's efforts. For example, only 5 percent of farmers in 2005 reported visiting the ACTION website, suggesting the potential need to better advertise the website. Similarly, over half of farmers indicated that they preferred receiving crime prevention information by mail, and one in four indicated that they preferred to receive such information via e-mail. The latter finding suggests that compiling lists of farmer e-mail addresses and sending out crime prevention tips to such lists might be a cost-effective way to reach a larger group of farmers in a manner in which many would prefer. The report and the conclusion of this policy brief detail more implications arising from the descriptive analyses.

Figure 1. Victimization of Farmers in 2004 and 2005

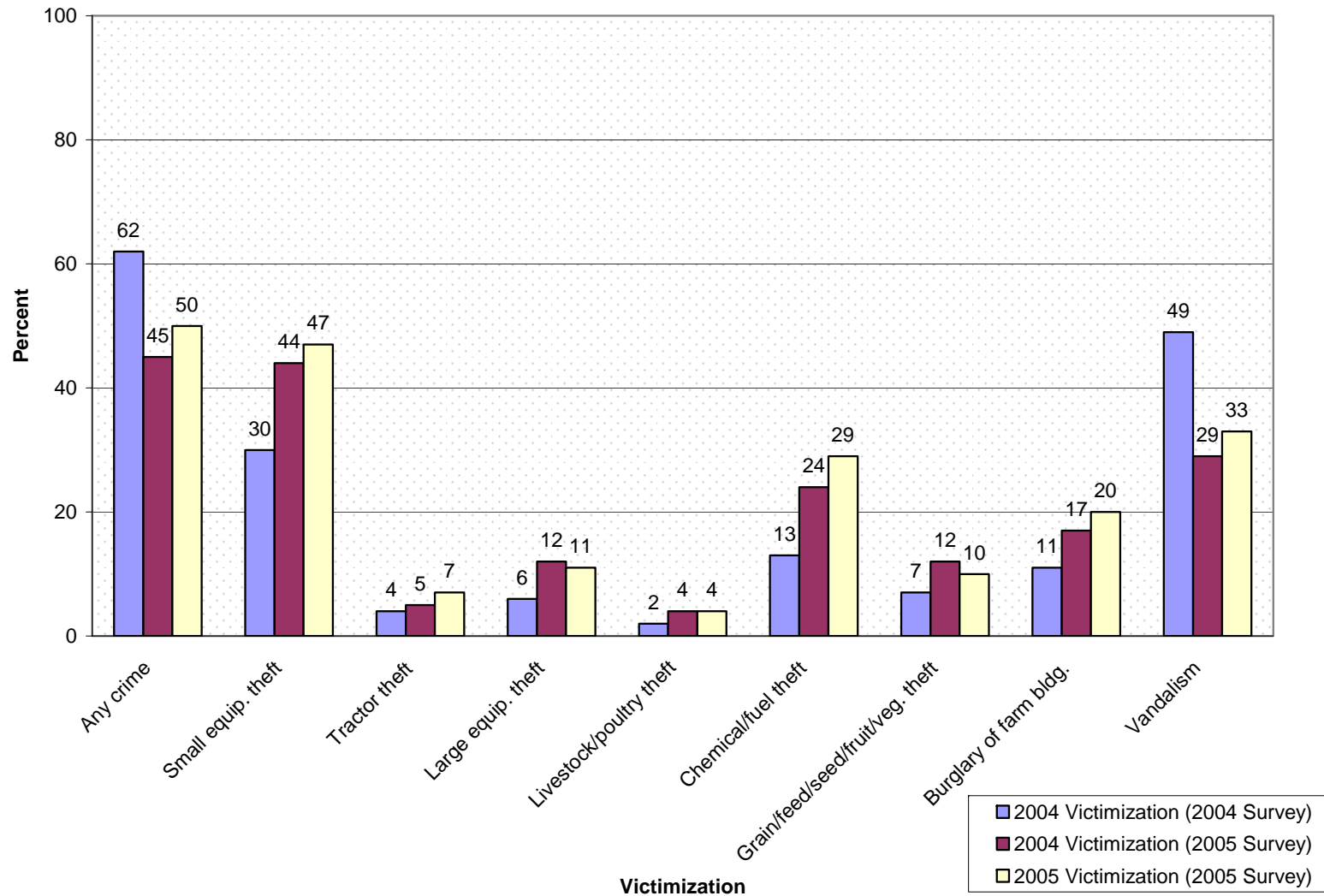
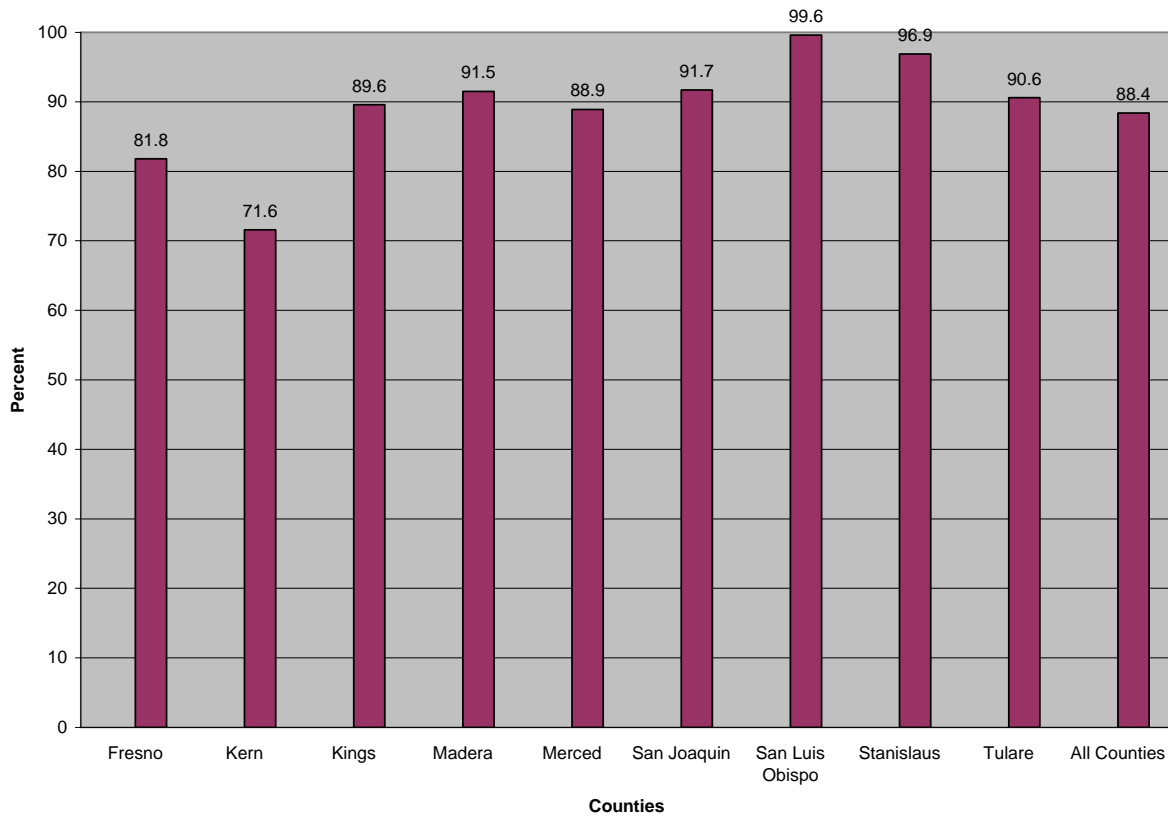
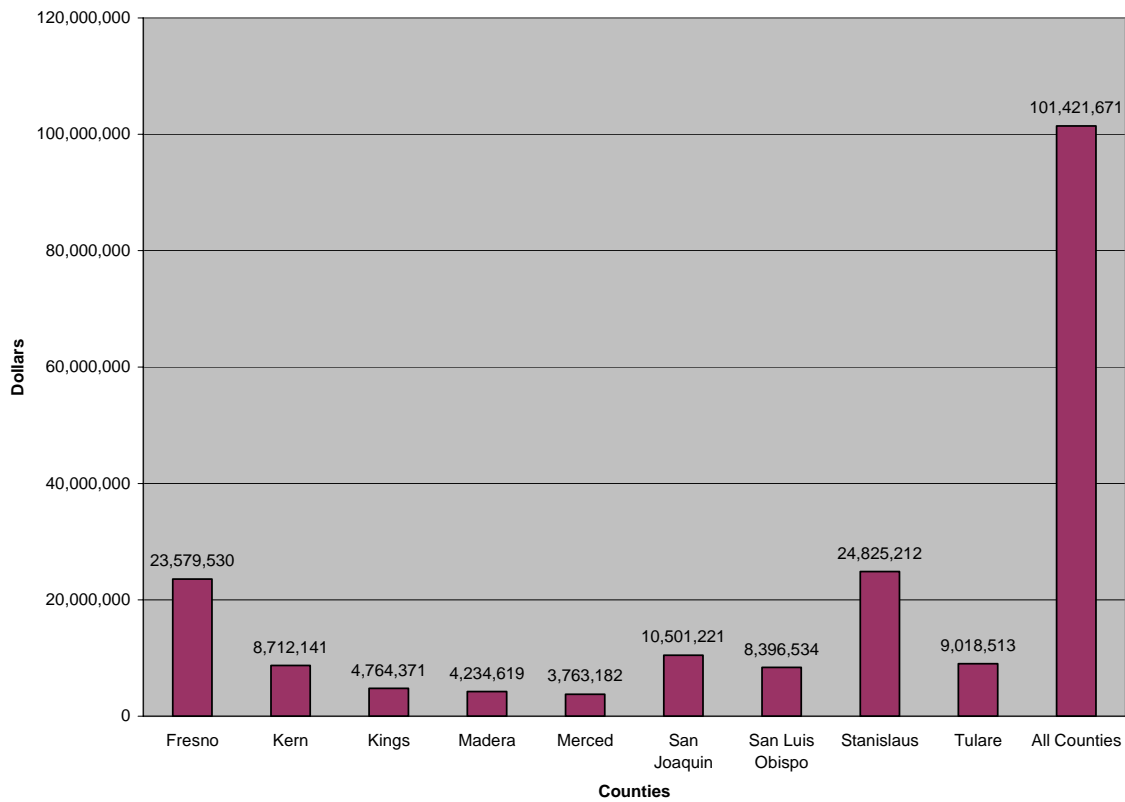


Figure 2. Estimated Percent of Farms Not Reporting Agricultural Crime Victimization Experiences to Law Enforcement, by County, 2005



Source: 2005 Survey. See Appendix for details on the derivation of these estimates. In some counties, the percentages in part reflect the fact that some counties do not consistently enter all reported crimes into the ACTION database.

Figure 3. Estimated Agricultural Crime Victimization Costs, by County, 2005



Source: 2005 Survey. See Appendix for details on the derivation of these estimates. Non-reporting of agricultural victimization costs paralleled that for victimization generally. The dollar amount of per-county victimization costs and the percent of per-county costs reported, in 2005, were as follows:

<i>County</i>	<i>Dollar Amount Reported</i>	<i>Percent Total Costs Not Reported</i>
Fresno	1,824,068	92.3
Kern	2,103,882	75.9
Kings	656,419	86.2
Madera	468,316	88.9
Merced	1,008,020	73.2
San Joaquin	686,301	93.5
San Luis Obispo	5,693	99.9
Stanislaus	525,411	97.9
Tulare	897,791	90.0
All Counties	8,175,901	91.9

Impact

A rigorous evaluation of the impact of the ACTION program ideally would involve reference to outcomes, especially agricultural crime, prior to and after implementation of ACTION, as well as to comparable counties in which ACTION was not present. Such a strategy was not feasible, however, for this study. The research team's investigations, as well as consultations with practitioners and experts, identified no counties that would be considered comparable in relevant respects (e.g., composition of the population, proximity to the coast, types of products raised or grown, extent of crime prevention efforts already in place, importance of agriculture to local economy). The problem associated with relying on counties that only superficially appear comparable is that spurious differences (positive or negative) between the intervention and comparison counties may be identified.

For these reasons, and after consultation with methodologists and experts on agricultural crime, the research team developed a “dosage” model approach to evaluating ACTION. This approach was premised on the assumption, borne out in site visits, interviews, and analyses, that ACTION was not equally implemented across counties. Indeed, San Luis Obispo, the ninth county, joined ACTION in 2004 soon after the study began, and essentially constituted a “zero dosage” comparison. Other counties had higher levels of implementation, but the levels varied considerably, creating a naturally-occurring experiment that enabled us to assess whether higher levels of dosage translated into lower levels of agricultural crime victimization.

As part of the assessment of the impact of ACTION, the research team investigated whether it is premised on a sound theoretical logic, since sound theory typically is a prerequisite for effective interventions (Rossi et al. 2004). If, for example, X is held to cause crime but it in fact does not, a program aimed at X is unlikely to reduce crime. The team thus examined whether empirical support for the program's logic exists. The evaluation examined this issue, identifying opportunity theory as the central theoretical perspective on which ACTION rests and then empirically investigating whether the perspective indeed helps predict agricultural crime.

The impact analyses relied on several sources of data, including official records from the ACTION database and two surveys of farms. The ACTION data include such information as crimes reported to the police, arrests, and the dollar value associated with victimization (where a value can be determined). It also includes information about farms that have used OANs to mark their equipment, whether and where surveillance deployment was used, and whether use of the equipment led to identifying suspects or arrests. The survey was developed with the assistance of farmers, the ACTION staff, and experts on rural and agricultural crime, as well as through a review of the literature. For the first survey, which was fielded in fall 2004, the response rate was 42.4 percent for a final sample of 823 respondents (farms). For the second survey, which was fielded in fall 2005, the response rate was 43.8 percent for a final sample of 818 respondents (farms). These response rates are comparable to what has been obtained in other studies of farmers, which typically obtain response rates of 30–40 percent (Cleland 1990; see also Peale 1990; Donnermeyer and Barclay 2005). The survey data were useful for collecting victimization data, information about steps respondents took to protect their property, and perceptions of and experiences with law enforcement in their area. Below, the results of the causal logic and impact evaluation analyses are summarized and discussed.

*Causal Logic*¹

ACTION consists of several inter-related activities, each of which entails its own logic. For example, the aggressive prosecution strategies are premised on the notion that they will produce a general deterrent effect. The increased communication within and across counties and different parts of the criminal justice system, especially the police and prosecutors, is assumed to create efficiencies and greater success in identifying, apprehending, and convicting offenders. Analysis of the database, apart from serving to document that agricultural crime exists, is believed to enable law enforcement to identify emerging “hot spots” and other locations where crime may be likely to occur and to target their efforts accordingly.

However, the perhaps central focus of ACTION consists of educating farmers about ways in which “target hardening” can be undertaken to prevent agricultural crime victimization, and of facilitating target-hardening efforts. The logic builds on situational crime prevention and place-based theories (Eck 2002), and, in particular, opportunity theory, which argues that crime is less likely when potential targets are less attractive (e.g., less portable and less valuable), offenders are less proximate to targets, and targets are less exposed (e.g., easier to see) and more guarded (Felson and Clarke 1995; Akers and Sellers 2004). Opportunity theory arguably is especially appropriate in farming communities, where opportunities for theft and offending are ubiquitous (Barclay and Donnermeyer 2002). Notably, however, applications of opportunity theory to such communities is almost non-existent, thus raising questions about whether the theory provides a sound, empirically-based foundation for a program aimed at reducing agricultural crime victimization. The research team thus investigated how exactly the theory might best be applied to farms and, using the data from the first year (2004) survey, empirically tested whether each of four opportunity theory factors (attractiveness, proximity, exposure, and guardianship) were associated with reduced victimization.

A first and general conclusion from the analyses was that it remains unclear how best to operationalize opportunity theory within the context of farming communities. For example, proximity typically is measured as the distance a residence or business is from high-crime areas. In rural communities, most farms typically reside far from cities or town centers, and it is unclear that residences of such areas systematically stray out into the country, though some accounts suggest that gangs and organized crime may do so (Swanson et al. 2002). Nonetheless, drawing on other studies (e.g., Barclay and Donnermeyer 2002), the study developed a series of measures that arguably represent each of the four opportunity theory factors.

Second, and more substantively, the results suggested some support, though in some cases the evidence was mixed, for the ability of opportunity theory to account for variation among farms in their level of victimization. Targets that are more attractive, such as those that are portable and relatively valuable (e.g., fruit and nuts), were more likely to be stolen than, say, livestock. The latter are quite valuable, but not easily portable. Proximity measures were not typically associated with victimization, although farms with more workers (a key source of potential offenders) experienced more theft. Similarly, exposure did not surface as a particularly salient factor. However, larger farms and those resting on flat terrain were somewhat more likely to experience relatively more theft and vandalism. Finally, farms that employed more

¹ This sub-section is a modified version of the authors’ discussion in Mears et al. (2007c).

guardianship steps (e.g., locking equipment, using guard dogs) typically experienced less victimization, though the effect was not consistent across all measures of guardianship. In some cases, the results were the opposite of what was expected—for example, farms that used surveillance equipment were associated with higher levels of victimization. Disentangling causal order issues is difficult with cross-sectional research designs, and, in this instance, not much easier with over-time data analysis strategies. Nonetheless, there is little logical reason to anticipate that surveillance indeed increases victimization. More likely is the possibility that farmers who experience greater levels of victimization invest in surveillance equipment to prevent future victimization.

Impact on Agricultural Crime Victimization

As noted at the outset, the results of the diverse evaluation methodologies suggest that ACTION may have (a) changed law enforcement behaviors (e.g., increasing communication within and between counties, sheriffs' offices, and District Attorneys), albeit more so in some counties than in others, (b) changed farmer behaviors (e.g., increasing the amount of crime prevention efforts taken), and, most importantly, (c) reduced agricultural crime victimization. Two distinct approaches were used to assess impact. The first, and less rigorous, suggested that dosage was positively associated with victimization but, after a certain threshold, negatively associated with it; additional analyses indicated that ACTION has improved the ability of law enforcement agencies to identify, arrest, and prosecute suspects. The second, and more rigorous, suggested that dosage was negatively associated with victimization.

The first approach involved cross-sectional analyses of the first year (2004) survey of farmers and the creation of dosage measures for each county. A main limitation of this approach was its cross-sectional nature, which, in an evaluation context, can render inferences about causal order questionable. If victimization is lower among farmers in higher-dose counties, perhaps that is because counties that are more aggressive generally in fighting crime and that therefore have lower crime rates are more likely to participate actively in ACTION. In fact, the analyses suggested that a different type of causal order problem arose—namely, counties experiencing higher rates of agricultural crime likely were more inclined to implement or participate in ACTION, creating the appearance, in cross-sectional analyses, of a positive relationship between the program and victimization. This issue was addressed in part by controlling statistically for property crime rates and various characteristics of farms. Nonetheless, a notable finding was that at higher dose thresholds, greater amounts of program implementation were associated with reduced levels of victimization.²

An additional finding of note from the cross-sectional analyses of the 2004 survey data was that farmers in higher-dose counties were more likely to undertake the types of activities promoted by ACTION; controlling for such activities largely eliminated the statistical significance of dose. These results suggest both that ACTION has changed farmers' behaviors and that doing so can influence the likelihood of victimization. The analyses—essentially a coupling of a process with an outcome evaluation—lend further support to the theoretical foundation on which ACTION rests.

² A more extensive discussion of these analyses can be found in Mears et al. (2007a).

The second approach relied on analysis of data obtained from a similar survey of farmers conducted in late 2005, one year after the first survey. Although the response rate of the first survey was comparable to that found in surveys of farming populations generally (see, e.g., Cleland 1990; Peale 1990; Ballweg 1991; Abaidoo 2002; Barham et al. 2004; Donnermeyer and Barclay 2005), the research team wanted to increase the response rate in the second survey and thus targeted a new sample of farms. A review and discussions with consultants suggested that if the same sample from the first survey were used, the response rate likely would be substantially lower. The second survey differed in another important way—it collected independent dosage measures, asking farmers such questions as whether law enforcement officers in their community regularly visited or were responsive when called. Such information was needed because the ACTION database provided an insufficient foundation for accurately quantifying the full range of activities associated with ACTION. Finally, the survey differed in asking about dosage and victimization over two time periods—the immediately preceding year (i.e., 2005) and the year prior to that (i.e., 2004). In short, the survey was designed to provide a more rigorous measurement of dosage and its effects on victimization.

Results from analyses of the second-year survey suggested that farmers in communities that more aggressively implemented ACTION activities in 2004 experienced less victimization in 2005, net of a variety of controls, such as size of farm and the type and level of security precautions taken by farmers, and, most importantly, prior victimization and property crime rates. Specifically, higher doses of ACTION contributed to less victimization in general and to less of several specific types of victimization, including chemical and fuel theft, small tool and equipment theft, and vandalism. In addition, the effect of dose was curvilinear for crime in general and for vandalism—namely, at higher levels of dose, there was still a crime-reducing effect, but the effect was less than at lower levels of dose. These findings are notable for drawing on better measures of dose, including a temporal dimension (i.e., one where dose precedes the outcome) that creates stronger grounds for making causal inferences, and for emerging despite the inclusion of a control for prior victimization and property crime rates.

The impact on vandalism, which can include dumping trash on farm property, bears emphasis. During site visits, the research team was repeatedly told that such crime can take a considerable toll on farmers. A similar point was made in comments farmers made on the surveys. When old cars, refrigerators, tires, and other refuse are left on farm property, farmers are legally required to remove it. Doing so takes time and can be costly, especially in cases involving chemicals. Thus, the possibility that ACTION may have helped reduce vandalism should be of particular salience to farmers.

Non-Victimization Impacts

A central feature of ACTION is its attempt to improve law enforcement success in identifying and arresting offenders and in facilitating their conviction. Such goals can reasonably be viewed as important outcomes in their own right, irrespective of whether they reduce crime. Indeed, the criminal justice system is grounded in no small part on an emphasis on accountability and retribution, not just deterring other crime. Notably, then, ACTION appears to have had an appreciable impact on identifying suspects and arrests. For example, over a two-year period (2003–2004), ACTION deployed surveillance equipment 69 times, and these efforts in turn

resulted in identification of 35 suspects and 15 arrests. Similarly, in 2004 and 2005, at least 522 defendants were convicted of agricultural crime-related charges among the participating counties (see table 1). This count is likely an underestimate since some county District Attorney offices do not always record all such convictions. Interviews with practitioners emphasized that without the evidence collected using the equipment, virtually none of the suspects would likely have been identified and no arrests would have occurred. Moreover, had arrests in fact occurred, there likely would have been insufficient evidence—absent the equipment—to obtain a conviction. Prosecutors with whom the research team talked consistently emphasized that such evidence had been extremely helpful in mounting successful prosecutions, many more than they reportedly have been able to obtain in the past. (Prior to ACTION, prosecutorial activity involving agricultural crime-related offenses was not systematically recorded; it thus is not possible to quantify exactly how many more convictions occur now as a result of ACTION.)

ACTION also has encouraged farmers to use OANs and directly stamped equipment at many farms. From 2003 through mid-year 2006, ACTION recorded 793 farms that had marked at least 52,298 pieces of equipment totaling at least \$360 million in value. Nonetheless, only 2.6 percent of all farms in the counties use OANs, leaving considerable room for expanded marking efforts (see table 2).

The study's investigations identified that farmers underreport 85 percent or more of victimization and that counties vary in their entry of information into the ACTION database. Such factors argue against drawing strong inferences about the spatial distribution or impacts of ACTION (e.g., potential displacement of agricultural crime from one area to another). However, spatial analyses suggest that agricultural crime clusters along major highways and roads, indicating that crime prevention efforts likely should target farms in such areas. Increased and more consistent reporting of crimes, as well as entry of such reports into a database, may enable spatial crime-mapping analyses to improve law enforcement and crime prevention efforts.

Finally, ACTION appears to have increased the recovery of stolen property, in part through promoting the use of OANs. Recoveries, like arrests and prosecutions of agricultural crime, typically have been minimal, largely reflecting the absence of identifying marks as well as the difficulty of identifying suspects. Thus, the counterfactual situation may reasonably be assumed to be one in which any amount of recoveries constitutes an impact of the program. Ultimately, however, that assessment rests on the accuracy of the assumption, one that cannot be tested based on existing records. Nonetheless, the amount of recoveries is notable—during 2004 and 2005 alone, ACTION recorded \$6.3 million in recovered stolen property (see table 3).

Table 1. Number of Defendants Convicted of Any Agricultural Crime-Related Charge by District Attorneys Participating in ACTION

	<u>2004</u>	<u>2005</u>	<u>Total</u>
Fresno	79	75	154
Kern	68	84	152
Kings	2	2	4
Madera	7	9	16
Merced	20	8	28
San Joaquin	51	21	72
San Luis Obispo	0	0	0
Stanislaus	0	2	2
Tulare	36	58	94
Total	263	259	522

Source: ACTION database.

Table 2. Number of Farmers Acquiring OANs for First Time

	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>Total</u>	<u>Percent</u>	<u>Amount of Equip. Stamped</u>	<u>Value (\$) of Equip. Stamped</u>
Fresno	47	45	33	17	142	2.26	8,407	53,514,142
Kern	14	14	22	21	71	3.31	5,326	40,207,756
Kings	27	16	18	9	70	6.07	4,717	36,848,370
Madera	14	13	6	1	34	1.98	2,162	11,958,317
Merced	21	18	6	2	47	1.59	3,091	17,895,786
San Joaquin	47	19	20	18	104	2.58	6,356	50,978,448
San Luis Obispo	0	0	15	3	18	0.78	1,136	8,955,867
Stanislaus	14	14	6	2	36	0.84	2,382	15,584,812
Tulare	52	67	83	69	271	4.72	18,721	123,747,507
Total	236	206	207	144	793	2.59	52,298	359,691,005

Source: ACTION records. For 2006, data are only through June. OAN figure include farms marked by ACTION as well as those that may not have been marked by ACTION staff but nonetheless registered with ACTION. Some farms were visited by ACTION more than once; here, however, only information on markings conducted on the first visit are provided. The percent of all farms is calculated based on data from the U.S. Department of Agriculture (2004). Reference: U.S. Department of Agriculture. 2004. *2002 Census of Agriculture*. Vol. 1. Washington, D.C.: U.S. Department of Agriculture, National Agricultural Statistics Service.

Table 3. Recovery of Stolen Property (\$)

	2004	2005	Total
Fresno	683,503	571,922	683,503
Kern	1,032,347	1,225,950	2,258,297
Kings	114,655	501,172	615,827
Madera	23,367	29,450	52,817
Merced	108,617	60,893	169,510
San Joaquin	496,336	397,441	893,777
Stanislaus	201,033	341,441	542,474
Tulare	417,770	631,292	1,049,062
Total	3,077,627	3,187,639	6,265,266

Source: ACTION database.

Cost-Benefit Analysis

Cost-benefit analysis is an empirical technique designed to measure the economic impact of government intervention into private markets. CBA contributes to policy formation by comparing the efficiency of two or more programs or policies using a common metric (dollars). CBA is routinely used in the evaluation of environmental and land use regulations, job training programs, healthcare policy, and welfare policy (Boardman et al. 2001). Unlike other research methods, such as regression analysis, CBA is able to directly estimate externalities from policies and programs that affect populations who are not direct participants in a policy or program (Gramlich 1981).

The application of CBA to the study of crime is not as straightforward as it is in other fields (e.g., health, welfare). Unlike labor or health care, crimes do not have a market price, and, as such, the costs of crime are more difficult to measure. Criminal justice policies may also affect the welfare of local communities in interdependent ways. The ripples in the community either from new crimes or from reductions in offending extend well beyond those few individuals directly affected. Determining the scope of an evaluation of the costs and benefits of crime control programs presents significant challenges that may be more limited in other policy areas with more discrete, easily measurable outcomes.

With this issue in mind and recognizing that cost-benefit analyses frequently are desired, the research team developed a report that outlines the steps involved in cost-benefit analysis of agricultural crime prevention efforts and the issues and concerns that should be addressed (Chalfin et al. 2007). The report introduces the CBA methodology as a means of evaluating the effectiveness of crime prevention programs, with a specific focus on ACTION. The report describes the steps necessary to conduct a CBA, emphasizing issues related to evaluating a property crime reduction program, and concludes with a CBA of ACTION. Special attention is given to considering the perspective of the analysis (determining whose costs and benefits should be counted), development of robust measures of hard-to-value benefits, selecting an appropriate time period for the evaluation, and strategies for dealing with specific CBA challenges. Cost-benefit analyses indicated that ACTION increased farmers' expenditures on crime prevention. The analyses and their implications are detailed in the CBA report.

Transferability

The results of this study suggest that ACTION could easily be adopted in many other places, and that jurisdictions across the country are in need of and interested in efforts like ACTION. However, successful implementation requires sustained attention to a range of issues, not least the forging and maintaining of collaborative relationships across law enforcement and justice system agencies. More generally, the study's analyses point to a set of barriers and facilitators to implementation for each of the five specific activities undertaken by ACTION, what may be viewed as components of the program, including use of OANs, the database and information-sharing, deployment of technology, education and outreach, and vertical prosecution. In addition, barriers and facilitators may vary depending on the phase of implementation, including start-up, sustainability (i.e., maintenance of the program's operations over time), and expansion.

Recommendations Emerging from the ACTION Evaluation

ACTION is a pilot initiative that consists of many components or activities, and it has expanded considerably, all during a period in which agricultural markets have fluctuated. Thus, generalizations about the impacts or whether it would be effective in other contexts must be made with considerable caution. Nonetheless, the study's findings suggest that programs modeled after ACTION may well contribute to reduced agricultural victimization and to more successful attempts to identify, arrest, and prosecute offenders. More than most types of offenses, agricultural crime remains largely unaddressed and yet is ubiquitous. Most farmers experience some type of theft annually, but do little to address it. Indeed, over 85 percent never report victimization experiences, generally because they do not believe law enforcement will take it seriously or that anything can be done (Barclay 2001; Barclay and Donnermeyer 2002). With these observations in mind, several sets of recommendations are provided below concerning ways to improve ACTION. The recommendations generally apply equally well to attempts to implement ACTION, or similar programs, in other places. General recommendations concerning the transferability of the program are also discussed.

Monitor Program Implementation

A critical step in improving any program is being able to document what the program currently is doing (Rossi et al. 2004). ACTION has undertaken such efforts through the development of a centralized database, one that collects information not only on outcomes (e.g., victimization) but also on program activities (e.g., OAN-marking efforts). Now, however, the program is well-positioned to build off this work to develop more systematic monitoring of its activities. In particular, the program, and similar initiatives, might consider developing annual reports that detail the type and level of each of the core sets of activities that collectively comprise the program. In some cases, queries would need to be developed that enable records to be more accessible for analysis. Drawing on the extensive information in the ACTION records and database system, annual reports might provide such information, by each activity area, as:

- *Database*—staff time expended on entering data; time spent responding to data and crime-mapping analysis requests; the number of such requests;
- *Education and outreach*—the number of presentations or trainings made to farmers, law enforcement personnel, and other groups about the program or agricultural crime prevention; the number of requests for such presentations; the type and number of materials (e.g., flyers, brochures) distributed to different groups; the number of visits to the ACTION website;
- *Equipment- and crop-marking*—the number of requests for such marking; the percentage of cases in which program staff directly assisted farmers in marking equipment; staff time expended on going to farms to mark equipment;
- *Surveillance equipment*—the number of requests for such equipment; the percentage of cases in which staff directly assisted farmers in deploying equipment; staff time expended on going to farms or to law enforcement agencies to assist with installing surveillance

equipment; the total amount of equipment and how many days of use each received;

- *Targeting and prosecution of agricultural crime offenders*—the number of agricultural crime arrests and prosecutions; the percentage of these cases involving marked equipment or information from surveillance equipment; the percentage of all arrests resulting in prosecution; the extent to which each county District Attorney adheres to the vertical prosecution approach (e.g., dedicating one prosecutor rather than assigning prosecutors on an as-needed basis to agricultural crime cases).

Communication is also an important emphasis of the program. Therefore, to the extent possible, the report should also provide some evidence concerning communication across counties and between law enforcement agencies and prosecutors. Quantifying such contact is difficult. However, annual one-page surveys could perhaps be administered to participating county prosecutors and law enforcement agencies about the frequency of their contact with each other and with their counterparts in other counties.

Certainly, other activities may merit systematic monitoring. But the ones identified here are among the more central ones undertaken by the program and thus should be given particular attention. Where possible, such information should be provided by county, given that the program is largely built on the activities of county personnel. Providing information in aggregate and for each county can aid in identifying whether corrective action is needed. To illustrate, if some counties make no or few requests for crime mapping analyses, it might suggest the need for improved program-county communications. Perhaps, for example, some counties are unaware of the full range of analyses that can be conducted and that might assist them in their investigations or crime prevention efforts. In addition, important changes to the program (e.g., increased or decreased funding, changes in personnel) should be discussed, as should the results of any studies that may have been undertaken concerning program operations or their impacts on farmers' behaviors or victimization. Ultimately, such reports can be used to monitor changes over time in the program. If coupled with descriptive accounts of the program and illustrations of its work and impacts, they also could be used to educate the public about the full range of activities that ACTION undertakes.

In addition to, and perhaps as part of, creating annual reports, the program might consider conducting focus groups or small-scale surveys of program staff, including county-level prosecutors and law enforcement staff, as well as of farmers. Such efforts could be used to obtain feedback on whether, for example, outreach efforts have been helpful and what could be done to improve them. In the surveys, for example, some farmers complained that law enforcement agencies are not responsive to their calls for assistance. Even if ACTION has improved law enforcement responsiveness, there is clearly room for improvement.

Monitor Program Intermediate Outcomes

ACTION's diverse efforts aim to create several changes—such as farmers increasing the number of protective measures they take to protect their property—that in turn ultimately are hoped to reduce agricultural crime victimization. Monitoring such changes is not simple, if only because it can require collection of new data. Nonetheless, such data may be more feasible and

affordable to collect than accurate measures of victimization. The information gleaned from analysis of intermediate outcomes can be used to document whether program activities are associated with these outcomes. Should such associations be found, they lend support to assertions about the program's effectiveness.

As importantly, however, changes in these outcomes can be used to determine if program activities need to be shifted. For example, if the percentage of surveillance deployments resulting in an arrest changes dramatically from one year to the next—from, say, 30 to 10 percent—there may have been a change in how deployments are conducted that needs to be reviewed, or it may be that no change occurred but that one is needed. Below are examples of intermediate outcome measures that ACTION or similar efforts might consider collecting. In some cases, measures similar or identical to those used for monitoring program activities are provided, reflecting the fact that some measures can be used to monitor activities as well as intermediate outcomes. For example, requests for data analysis (e.g., crime mapping) from law enforcement agencies clearly involves staff time and thus reflects program activity. At the same time, the program aims to improve law enforcement efforts by encouraging them to rely on analysis, and so the measure also indirectly reflects that intermediate outcome.

- *Database*—the number of times the database is accessed by law enforcement; the number of data analysis requests; the percentage of such requests resulting in identification or apprehension of suspects;
- *Education and outreach*—the extent to which presentations or trainings increased the knowledge or behavior of farmers, law enforcement, or other groups about ACTION or agricultural crime prevention (as measured through short surveys before and after trainings or through periodic surveys of participants);
- *Equipment- and crop-marking*—although no obvious intermediate outcome is associated with marking, information from farmers and law enforcement personnel about the experience might be informative, including data on whether they found ACTION's assistance helpful and whether the marking effort contributed to increased efforts more generally to take steps to protect farm property;
- *Surveillance equipment*—the percentage of deployments in which suspects were identified, arrested, and convicted;
- *Targeting and prosecution of agricultural crime offenders*—the number of agricultural crime arrests and prosecutions; the percentage of these cases involving marked equipment or information from surveillance equipment; the percentage of all arrests resulting in prosecution.

Monitor and Assess Program Impacts

The ultimate goal of the program is to reduce agricultural crime victimization by reducing opportunities for theft to occur and increasing specific and general deterrence through aggressive law enforcement and prosecution. Therefore, ACTION and similar efforts will want to monitor agricultural crime trends. Unfortunately, official records provide a questionable foundation for deriving accurate assessments of the type or amount of agricultural crime, as the present study

has shown. (Much the same is true of other non-agricultural crime.) Therefore, self-report surveys of farms likely remain the best alternative strategy for monitoring agricultural crime victimization. In addition, they can be used to measure other critical outcomes—such as victimization costs and quality of life—related to fear of crime and to actual victimization. In the likely event that administering such surveys is not possible on an annual basis, programs should endeavor to conduct them as frequently as possible and, in the interim, seek to measure appropriate intermediate outcomes.

It bears emphasis, however, that prosecutorial activity—and convictions, in particular—may merit particular monitoring, not only because doing so is possible but also because it stands as a critical outcome. Research on deterrence is far from definitive, though studies do indicate that punishment can produce a deterrent effect (Akers and Sellers 2004). Moreover, no studies have, to the research team’s knowledge, assessed the deterrent effect of sanctions involving agricultural crime. Nonetheless, a deterrent effect requires that punishment actually occur, and since agricultural crime typically goes unpunished, showing that punishment in fact happens is a critical step toward documenting an impact. In addition, convictions, not actual reductions in crime, typically are the gold standard by which prosecutors are evaluated and thus arguably serve as an end outcome in their own right.

Recoveries of stolen property should be monitored. Without comparable data from before the program began, it remains difficult to assess whether recoveries indeed have increased more than would have occurred in the absence of ACTION. Nonetheless, as with the interpretation of the arrest and conviction data, a reasonable supposition is that without the ACTION database and amount and quality of evidence collection, few recoveries typically would occur. Even without the ability to document an impact, monitoring of recoveries can help to identify any notable increases or decreases that might bear investigation.

Finally, the various costs of the program should be consistently collected and monitored annually. The costs should ideally be easily classified by activity to show which activities cost more than others. Such information in turn can be used to help inform efforts in other places and to ground cost-benefit analyses.

It should be emphasized that monitoring outcomes does not show that a program has an impact. For that, evaluations such as the present one, or ideally ones that involve some type of experimental design, are preferable. Nonetheless, it can contribute greatly to such efforts (Rossi et al. 2004).

Improve Program Design

Almost any program can benefit from small or large refinements to program design, especially when, as is the case with ACTION, it consists of many different activities. For this reason, it can be useful to obtain feedback semi-annually through staff, law enforcement, prosecutor, and farmer interviews, meetings, or short survey instruments, about the program—what is easy to implement, what have been challenges to implementation, what can be done to effectively address those challenges. Certain activities may be more useful in some years than others, and such monitoring can be used to identify such possibilities and adjust the program

accordingly.

The general causal logic on which ACTION rests is sound—drawing, as it does, on a large body of work on opportunity theory (and situational and place-based crime prevention more generally) and deterrence—but there may be other strategies that bear exploration. Although this study found little guidance in the extant literature, there are methods for uncovering potentially effective strategies. One possibility, for example, is to conduct interviews with convicted offenders about the advice they would give to farmers about how best to prevent theft. The answers may not always be honest. However, criminology has a long history of seeking insights from offenders (Nee 2003). Indeed, in many respects offenders are best situated to provide insights about effective theft reduction efforts. To illustrate, ACTION assumes that aggressive prosecution may create a general deterrent effect, but perhaps offenders report having no knowledge of District Attorney activities. That in turn would suggest the need to find ways to make the activities more widely known.

Similarly, focus groups might cost-effectively be conducted with farmers to learn from them their impressions about the program and its activities, as well as new activities that they would recommend. The groups could be used to help prioritize program efforts as well as to provide informal assessments about program performance.

The database is central to ACTION's efforts and constitutes a substantial improvement over the situation in most jurisdictions in the country, which collect no information on agricultural crime. There are, however, some changes that may be warranted. First, not all counties consistently enter crime reports. Ultimately, the issue appears to be one of resources, but unless that issue is resolved, the impact is that the utility of the database is undermined. Second, there are some minor but significant coding changes that may be warranted. For example, the "miscellaneous" category includes many offenses that likely should be disaggregated (e.g., chemical and fuel theft). And other data fields should be considered for inclusion, such as ones that capture law enforcement, District Attorney, and ACTION staff activities. Third, ACTION should consider eliminating the need for geocoding of crime incidents by requiring that all reporting officers take global positioning system (GPS) coordinates during investigations. The program would want to allow for easy and manageable uploading of these coordinates into the database. These steps would entail up-front costs but would eliminate the staff time required for geocoding and updating the online database, and it would eliminate any error introduced in the process of geocoding. Fourth, ACTION should consider attempting to increase ACTION's capacity to support new partner agencies by taking advantage of the increasing integration of geographic information systems (GIS) and records management systems in law enforcement agencies across the nation. For example, integrating the ACTION database with GIS would enable partner agencies to independently create maps relevant to their specific crime prevention efforts. Eventually, the program might want to consider allowing public users to access mapping capabilities through ACTION's website. This change would serve multiple purposes: reduce demand for staff time for mapping; provide another educational tool for the public and farmers; and increase the capabilities of ACTION as more partners join the network.

Finally, a range of more specific program design additions or emphases emerged from the descriptive analyses of the second-year (2005) survey. Below, we summarize some of the potential design and policy implications emerging from the analyses.

- *Effective policy interventions might focus on characteristics of farms that experience greater amounts of victimization.*
- *Small equipment and tool theft, as well as vandalism, were reported to be of particular concern among farmers and are highly prevalent, and so efforts specifically targeting both may be warranted.* Neither are likely candidates for prosecution, given that the severity of the offenses may not always be viewed as warranting action. Thus, targeted prevention measures may be more feasible and effective.
- *Crime prevention efforts might meet a more receptive audience among farmers if they focus on those crimes of most concern to farmers.* These include theft of machinery, trash dumping, burglary of farm buildings, and vandalism.
- *Many farmers believe that law enforcement will not take their calls about agricultural crime seriously, suggesting a need to improve how seriously law enforcement addresses agricultural crime and/or communicates their concern to farmers.*
- *Farmers' views on what they think should be prioritized might well reflect the types of crime prevention strategies that could be most effective in reducing victimization.* As such, consideration should be given to testing their ideas, which focused on increased patrols of agricultural areas, greater responsiveness of law enforcement when called, being e-mailed about crime occurring in their (the farmers') area, assisting with equipment-marking, meeting with farmers about security measures, and encouraging farmers to share surveillance equipment.
- *Since farmers receive crime prevention information from a diverse range of sources, effective communication with them about crime prevention may well require disseminating information through as many such sources as is possible.*
- *Given the low rates of crime reporting among farmers, considerable effort may be warranted in distributing, through diverse media, information to farmers about the importance of crime-reporting.*

Transferability

Any attempts to expand ACTION further or implement it in other places will require careful attention to a range of issues relating to the different activities that comprise ACTION, including equipment marking, database use and analysis and information-sharing, deployment of technology, education and outreach, and vertical prosecution. These issues are discussed in detail in the full report. In each instance, the central recommendation is that stakeholders first assess the feasibility of implementing each of these diverse activities. Will it be possible, for example, to dedicate, if only on a part-time basis, some law enforcement officers or prosecutors, to agricultural crime cases? Is there funding to support staff who could assist with equipment marking? Are there political divisions between counties that make cross-county collaborations and information-sharing unlikely? Answering such questions can help to ensure that time and resources are invested in those activities that can realistically be implemented and thus that are most likely to produce beneficial outcomes.

Attempts to implement programs like ACTION in other jurisdictions will want to pay

especially close attention to the challenges of starting a new program. As the report details, many substantial barriers exist, including the reluctance of law enforcement agencies and prosecutors to take agricultural crime seriously, the lack of communication within and among different justice system agencies and across counties, and, not least, the unwillingness of many farmers to contact law enforcement or to take proactive steps to prevent crime. These barriers are not insurmountable, especially if attention is given to developing and sustaining effective communication among these different groups. Indeed, creating such communication is likely to be the most important foundation for any effective, long-term strategy to reducing agricultural crime.

Because efforts similar to ACTION likely will target ecological areas—that is, entire communities or counties—documenting that particular activities contribute to crime reductions can be difficult, especially in the absence of comparable counties or experiments. Nonetheless, careful attention to collecting and analyzing agricultural crime data, as well as interviewing farmers and program staff, can facilitate formative evaluations in which lessons are learned on an ongoing basis about program operations and what can be done to improve them. Such efforts are especially important in the early stages of developing a program since they can contribute to important refinements to core program activities. For example, certain types of agricultural crime (e.g., fuel theft) may be more common than others (e.g., livestock theft), and so program activities might need to be adjusted to be better able to affect such crime.

Recommendations from Other Studies

The ACTION program emphasizes a range of activities to prevent and reduce agricultural crime. One or all of the activities may be useful as strategies that other jurisdictions can pursue in their crime-fighting efforts. To summarize, the activities include:

- *Developing a database* for tracking agricultural crime and encouraging and enabling information-sharing within and across counties and among prosecutors and law enforcement;
- *Education of and outreach to the public and farmers* about agricultural crime and what can be done to prevent it;
- *Encouraging and facilitating the use of equipment- and crop-marking*, especially the stamping of equipment with owner applied numbers (OANs);
- *Encouraging and facilitating the use of surveillance equipment* among farmers;
- *Active targeting and vertical prosecution of offenders*; and, cutting across these diverse efforts,
- *Building and maintaining effective communication* between law enforcement agencies and prosecutors and between counties.

Other reviews have identified overlapping strategies. For example, Swanson et al. (2002:640-641), in a review of research on environmental and agricultural crime, have emphasized a range of crime-specific guardianship measures that they recommend farmers pursue. The measures, by type of crime, include:

- *Farm equipment theft*
 - Place all equipment in secure buildings near main house and use locked gates.
 - If not housed, hide and disable the equipment.
 - Use equipment identification numbers.
- *Agrichemical theft*
 - Buy only the amount of agrichemicals needed.
 - Store in secure buildings.
 - Employ security personnel.
 - To reduce the market for stolen products, do not purchase stolen chemicals.
- *Livestock and tack theft*
 - Mark all livestock with identification numbers.
 - Take daily counts of livestock.
 - Vary daily routines.
 - Create cooperative supervision agreements with neighbors.
 - Mark tack and place in secure buildings.
 - Maintain photographic records of livestock and tack.

More recently, a report issued by the National Crime Prevention Programme (2004) and produced by the Australian Institute of Criminology, provided several sets of recommendations, one for farmers, one for local government and industry, and one for rural communities. Because they build off prior research and a review of the literature, are consonant with what ACTION has implemented, and parallel many of the insights gleaned from the ACTION evaluation, each set of recommendations is reproduced below.

- *Recommendations for farmers (National Crime Prevention Programme 2004:11)*
 - *Develop and maintain good relations with your neighbors.* A community that can work together is your best defense against crime. Let your neighbors know when you will be away from the farm and leave a contact telephone number and address—ask them to keep an eye out for strangers and strange vehicles entering your property and ask them to contact you if any problems arise.
 - *Install security lighting and closed circuit television if possible near your homestead and farm buildings if practical.* For example, security lighting and CCTV can help ensure the security of important and valuable property, such as your home, the sheds where you store vehicles and equipment, and fuel holding tanks.
 - *Electrify and alarm fences,* particularly those around the perimeter of the property and adjoining public roads (remember to check with your local government authority before installing electric fences or alarms).
 - *Maintain gates* and ensure they have sturdy locks and hinges.
 - *Report all suspicious activity and crime* to your local police or live stock squad.

- *Recommendations for local government and industry (National Crime Prevention Programme 2004:12)*
 - *Maintain good networks within the local farming and rural communities,* and encourage the community to commit to, or establish, Neighborhood Watch and Rural Watch programs.
 - *Explore training options for young people on farms and in local industry,* through government or community training programs—this could help reduce youth crime and unemployment, enhance community spirit and help young people develop self esteem and confidence.
 - *Organize community forums* to regularly discuss new security technology and other strategies to help prevent local farm and rural crime. This could include setting an agenda item on local council meetings.
 - *Provide local businesses and farmers with materials to engrave their farming equipment, tools and other household or farming items,* and provide free or subsidized “No Trespassing” signs.
 - *Encourage local business and farms to insure whatever personal and business property they can to lessen the impact of crime.* This may also encourage the reporting of crime to police.

- *Recommendations for local communities (National Crime Prevention Programme 2004:15)*
 - *Report all crime to the police.* This will help to build up a profile of local farm crime and help police to target resources to areas of greatest need.
 - *Encourage police to visit farmers and their farms* regularly to build up a sense of community and help reduce the feeling of isolation that some farmers may experience.
 - *Work in partnership with police to encourage the development of Neighborhood Watch and Rural Watch* in the town and outlying rural community.
 - *Work with the police to initiate a local newsletter* to provide regular information to the community on crime and crime prevention strategies, and to encourage discussion about these important issues.
 - *Help the police by volunteering* to provide regular training for local police on general farm and livestock issues.
 - *Invite police to visit saleyards and abattoirs regularly.* Police can use the visits as an opportunity to talk to a range of farmers, livestock agents and saleyard or abattoir officials about farm crime.

Conclusion

Few studies of agricultural crime exist, and the few that have been conducted in America are relatively dated (e.g., Farmer and Voth 1989; Cleland 1990; Deeds et al. 1992; Dunkelberger et al. 1992). A larger body of work exists, especially if one includes work conducted in Australia and the United Kingdom (Barclay 2001; National Community Crime Prevention Programme 2004). Considerably more research is needed, however, as Weisheit and Donnermeyer (2000) and others (e.g., Barclay 2001) have argued. The situation is improving slowly, especially with increased theory and research on rural versus urban crime differences (Wells and Weisheit 2004). These changes bode well for theory, research, and policy.

Theory

As this evaluation demonstrates, a large body of theory can inform agricultural crime prevention efforts, and, in particular, opportunity theory and deterrence theory. At the same time, these theories can be tested and refined through application to rural areas and specifically to agricultural crime. Indeed, opportunity theorists argue that the theory should be tested across a diverse set of contexts to establish its generalizability and to identify changes that may be needed to increase its explanatory power. In addition, despite a large literature on deterrence research, basic questions remain largely unanswered, ones that could advance the literature.

Opportunity theory has emerged as part of general set of theories or perspectives—for example, lifestyle and routine activities theory, environmental criminology, “hot spot” analysis, “defensible space,” “crime prevention through environmental design,” situational prevention, and problem-oriented policing—that have become prominent in recent decades and that emphasize the notion that crime results from characteristics of places as well as that of the people who frequent them (Clark and Felson 1993; Akers and Sellers 2004). In general, however, studies have focused on urban settings. Despite research findings that lend support to opportunity theory and other place-focused theories of crime, it remains unclear how well the theories account for crime in rural areas, where population density is markedly lower and where there is no necessary analogue to an “inner city.” Farms are notable in this regard because they tend to be more isolated, occupy large swaths of land, and cannot easily be guarded. For these and other reasons, such as the traditional reluctance of farmers to seek assistance from law enforcement, applying opportunity and place-based theories to agricultural crime may provide unique insights into the scope of these theories, their potential limits, and ways in which they may need to be modified to improve their ability to predict crime. As but one example, opportunity theory emphasizes the importance of exposure to victimization—all else equal, individuals, buildings, or places that are more visible to potential offenders should be more likely to be victimized. In a farm setting, however, exposure is seemingly ubiquitous. Perhaps, then, it is either not salient, or less so than other dimensions, such as guardianship.

Of course, other theories may also be helpful in predicting agricultural crime victimization and bear investigation. Social disorganization and collective efficacy theories (Sampson et al. 2002) may, for example, prove useful because they emphasize informal social controls, which can be particularly salient in rural areas (Weisheit and Donnermeyer 2000; Barnett and Mencken

2002). Efforts to conduct such studies have the benefit of potentially stimulating new insights about the scope of specific crime theories and important ways that they might be modified. For example, accounts of community-level social control processes often assume contexts in which social and geographic spaces are configured differently than in rural areas. It may well be that the type and extent of social ties and networks, and other social control mechanisms, vary in rural areas and in ways that affect agricultural crime. If so, such findings could prove useful in expanding and modifying theories of social control.

The study of agricultural crime also affords an opportunity to investigate several important questions relating to deterrence. Evaluations of prosecutor-focused interventions hold particular promise. The present study confirmed what other studies have found—agricultural crime typically has not been a priority for law enforcement or prosecutors, and thus convictions for agricultural crime are rare. If, therefore, a jurisdiction implements an aggressive prosecution strategy, and if a similar county exists that does not plan to implement such a strategy, opportunities arise for investigating the neglected question of whether certain thresholds must be met before general deterrent effects emerge. In short, how many convictions, or what percentage increase in or level of convictions, must occur to reduce crime through general deterrence? Similarly, if aggressive prosecution results in reduced crime, does that effect remain stable, increase, or decrease over time? If multiple sites were involved in such a study, additional questions could be pursued. To illustrate, for a given amount of prosecutorial activity, is there a larger reduction in agricultural crime to be had in counties where prior prosecution efforts have been minimal versus counties where some prosecution of agricultural crime has occurred?

Research

For researchers, especially those involved in evaluation efforts, we believe the results of this evaluation should be of interest. They reinforce the importance of linking process and outcome evaluations, taking a broad view of program effectiveness, and being creative in identifying and developing appropriate measures of effectiveness. Just as clearly, they reinforce that serious limitations attend to cross-sectional evaluations of ecological-level programs—such as community policing initiatives—not least because of the difficulty of randomly assigning some communities an intervention and the questionable utility of relying on statistical controls to approximate an experimental design. Too often, comparisons are made between an intervention site and a comparison site, where the latter cannot safely be assumed to be identical in all regards except the presence of the intervention and where statistical controls cannot produce true equivalence. At the same time, the baby should not be thrown out with the bathwater. Cross-sectional designs can, for example, help test the logic of a program, and the results can be juxtaposed against the findings from other studies, such as evaluations using longitudinal data that examine whether changes in implementation create changes in outcomes. In such cases, a cumulative body of findings from diverse methodological approaches may create a more compelling case in support of or against a program than any one approach by itself might allow.

The ACTION evaluation and recent research reviews point to a range of specific research questions and issues that bear investigation. There is, first, the need to develop operational definitions of crime categories that will allow more readily for appropriate comparisons across studies. Should, for example, tractor theft be separated from large equipment theft? Should

pesticides, hormones, and fertilizer be combined into one category?

Second, what is the full universe of individuals, farms, and companies that should be included in assessments of the prevalence of agricultural crime? For example, the evaluation of ACTION focused on farmers. But perhaps individuals and companies that contract with farmers—for example, in providing supplies, equipment, or storage—should be included in future surveys. The issue again is one of developing a standardized operational definition of agricultural crime.

Third, how should victimization be operationalized? Should it consist of frequencies? If so, how, then, should crop theft be measured? Should it consist of dollar estimates? If so, how, then, to establish accurate estimates?

Fourth, what is the prevalence or costs of each type of crime, and how does it vary among farmers, counties, regions, and states? How does it vary over time?

Fifth, what are the correlates of victimization, at the individual and ecological levels? Are market prices for supplies and commodities central determinants of theft? If so, how do such influences affect not only crime but also cost-benefit analyses of agricultural crime prevention programs?

Sixth, more generally, what new or promising agricultural crime prevention efforts exist? Which ones have the greatest potential to reduce crime? Which ones are most likely to be adopted by farmers, law enforcement agencies, prosecutors, or communities?

Finally, the ACTION evaluation indirectly highlights an important question that remains neglected in the criminological and evaluation literature. Specifically, to what extent do marginal general deterrent effects exist, especially among crimes that typically are rarely prosecuted? For example, does prosecuting a small handful of such crimes produce the same general deterrent effect as prosecuting many more? How many exactly are needed to produce a more-than-nominal effect? After certain threshold levels of prosecution are achieved, do increases in prosecution make any difference? By and large, the literature is largely silent on this issue (see, generally, Nagin 1998; Akers and Sellers 2004). A similar question applies to other activities undertaken by ACTION and, more generally, to any components of any program or policy. That is, at what point does a particular activity produce a substantively significant effect, and is that effect in any way modified by the baseline level of the activity or of the outcome it is designed to influence? Such questions are, we submit, fundamental to evaluating criminal justice policies (Goldstein 1987). We suggest, however, that the more important issue they highlight is the potential, as Blumstein (1996) and others (e.g., Rossi 1980) have argued, for evaluation research studies to prompt social scientists to investigate basic questions about social phenomena.

Policy

The lessons from the current evaluation and from a review of the literature are summarized in the recommendations section above. Here, however, several observations bear mention. First, agricultural crime is a serious and costly social problem that can harm not only farmers but also

society at large. Second, such crime continues to be largely neglected by law enforcement agencies and prosecutors. And, third, farmers often are reluctant to take steps to protect their property.

Juxtaposed against these observations is the fact that there are many policy options from which farmers, law enforcement agencies, prosecutors, and communities can choose in their attempts to reduce agricultural crime. Not least, as detailed in the recommendations section above, are a wide range of guardianship and target-hardening efforts (Eck 2002) that make agricultural crime less easy, and aggressive law enforcement and prosecution, guided by a general problem-solving orientation, one informed by research and analysis, to crime-fighting (Ratcliffe 2003; Peak and Glensor 2004). Education of farmers, law enforcement officers, and prosecutors also can be critical, leading to increased reporting of crime and more proactive, effective approaches to addressing it. Ultimately, however, effective agricultural crime prevention strategies must begin with assessing the need for crime prevention, the feasibility of the diverse strategies listed above, and the unique capacities in and context of specific communities.

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Appendix

Both the 2005 survey of farms and the ACTION database were used to generate estimates of the prevalence and costs of victimization at the county-level and to estimate non-reporting of victimization. The ACTION data used to create these estimates are described here, and the accompanying tables provide the steps taken to generate the estimates.

Each county's sheriff's agricultural crime unit uses the ACTION-designed and maintained web-based database to record agricultural crimes reported by farmers. Each county's District Attorney also provides data about cases brought to court and their status. This database is set up much like a traditional law enforcement records system; information about the incident, victims, suspects, and property is recorded electronically. However, the linking of District Attorney data constitutes a unique feature of this database; two sides of law enforcement are able to contribute to and look up related information. UI researchers were given read-only access to this database. Within the database, there are also a variety of standardized queries, which, when run, compile the data in various ways depending on the user's interest. There are reports highlighting District Attorney or court-related details, property details, and summary statistics. For this analysis, the "Crime Pattern" query was used to create records for all reported incidents in 2005.

One of the fields in the database records information about the type of property stolen and details of that property. Types of property include chemicals, commodities, farm equipment, livestock, tractor, and miscellaneous. The UI survey collected victimization data about thefts within these property types, as well as tools or small equipment, large equipment, and fuel. The database category of farm equipment included the equivalent of the survey's large equipment category. The database's miscellaneous category includes tool or small equipment, fuel, and other property categories. To create parallel categories between the database and survey data, the data from the latter source were manually recoded to categorize fuel thefts into "chemical" thefts and to recode the tool and small equipment thefts in a similar manner.

Another modification was required because incident information was stored in non-uniform ways across the counties. All thefts attributed to the same incident would be given the same case number. In the database, each property type might be stored on its own line so that there would be multiple records for the same case number. Similarly, there might be only one record for the same incident even though there were multiple types of property thefts; in this case, for our analyses only one type of property was recorded even though an entire list of stolen property is available in a free-text field. For simplicity's sake, when the miscellaneous category was recoded, only one record (and thus one property type) was recorded for each case number. The calculations are likely to produce substantial underestimates given the inconsistencies in recording multiple property items stolen during the same event.

After recoding, the dataset was manipulated so that there was only one record per case number. Where present, the multiple recordings of property type were retained and used in the analyses. Once transposed, the database dataset structure paralleled the structure of the survey dataset so that the number of incidents involving each type of property theft could be counted.

Appendix Table 1. Estimated Agricultural Crime Victimization, 2005

	No. of farmers reporting theft to law enf. ¹	No. of thefts reported to law enf. ²	No. of farmers reporting theft in survey ³	No. of thefts reported in survey ⁴	Pct. of respondents reporting theft ⁵	Est. farms experiencing theft ⁶	Pct. farms not reporting theft to law enf. ⁷
Fresno	N=587		N=67				
Chemicals	118	119	9	16	13.4	844	86.0
Commodities	41	42	2	13	3.0	187	78.1
Lrg. Equip	39	40	8	13	11.9	750	94.8
Livestock	27	27	1	3	1.5	94	71.2
Tools, Small Equip	360	390	21	47	31.3	1,969	81.7
Tractor	27	27	3	4	4.5	281	90.4
Any Crime	563	645	33	164	49.3	3,094	81.8
Kern	N=387		N=78				
Chemicals	74	76	22	39	28.2	606	87.8
Commodities	30	30	9	27	11.5	248	87.9
Lrg. Equip	14	15	15	19	19.2	413	96.6
Livestock	10	10	1	5	1.3	28	63.7
Tools, Small Equip	248	273	26	61	33.3	716	65.3
Tractor	15	15	7	9	9.0	193	92.2
Any Crime	383	419	49	259	62.8	1,349	71.6
Kings	N=71		N=98				
Chemicals	18	22	19	43	19.4	224	92.0
Commodities	9	9	3	6	3.1	35	74.5
Lrg. Equip	11	17	9	10	9.2	106	89.6
Livestock	8	8	2	4	2.0	24	66.0
Tools, Small Equip	25	32	37	86	37.8	436	94.3
Tractor	6	7	5	5	5.1	59	89.8
Any Crime	71	95	58	249	59.2	683	89.6
Madera	N=69		N=83				
Chemicals	27	30	15	23	18.1	311	91.3
Commodities	2	2	4	31	4.8	83	97.6
Lrg. Equip	8	8	3	3	3.6	62	87.1
Livestock	1	1	1	2	1.2	21	95.2
Tools, Small Equip	3	3	25	68	30.1	518	99.4
Tractor	33	39	2	7	2.4	41	20.4
Any Crime	67	83	38	192	45.8	787	91.5
Merced	N=181		N=81				
Chemicals	32	32	15	37	18.5	549	94.2
Commodities	12	12	3	5	3.7	110	89.1
Lrg. Equip	10	10	4	4	4.9	146	93.2
Livestock	33	33	5	7	6.2	183	82.0
Tools, Small Equip	90	91	32	50	39.5	1,171	92.3
Tractor	11	11	3	6	3.7	110	90.0
Any Crime	175	189	43	146	53.1	1,573	88.9

Appendix Table 1. Estimated Agricultural Crime Victimization, 2005 (cont.)

	No. of farmers reporting theft to law enf. ¹	No. of thefts reported to law enf. ²	No. of farmers reporting theft in survey ³	No. of thefts reported in survey ⁴	Pct. of respondents reporting theft ⁵	Est. farms experiencing theft ⁶	Pct. farms not reporting theft to law enf. ⁷
San Joaquin	N=167		N=94				
Chemicals	35	36	18	41	19.1	771	95.5
Commodities	10	10	5	69	5.3	214	95.3
Lrg. Equip	41	42	5	6	5.3	214	80.9
Livestock	4	4	1	1	1.1	43	90.7
Tools, Small Equip	77	87	25	58	26.6	1,071	92.8
Tractor	8	8	4	4	4.3	171	95.3
Any Crime	164	187	46	330	48.9	1,970	91.7
San Luis Obispo	N=2		N=102				
Chemicals	0	0	5	10	4.9	114	100.0
Commodities	0	0	3	7	2.9	68	100.0
Lrg. Equip	1	1	1	1	1.0	23	95.6
Livestock	0	0	2	41	2.0	46	100.0
Tools, Small Equip	1	1	18	33	17.6	410	99.8
Tractor	0	0	1	3	1.0	23	100.0
Any Crime	2	2	24	112	23.5	546	99.6
Stanislaus	N=86		N=110				
Chemicals	10	1	20	63	18.2	776	98.7
Commodities	6	6	5	18	4.5	194	96.9
Lrg. Equip	12	13	5	8	4.5	194	93.8
Livestock	8	17	4	46	3.6	155	94.8
Tools, Small Equip	42	66	44	90	40.0	1,707	97.5
Tractor	4	4	4	6	3.6	155	97.4
Any Crime	77	117	64	369	58.2	2,483	96.9
Tulare	N=302		N=97				
Chemicals	60	75	19	49	19.6	1,124	94.7
Commodities	29	29	11	32	11.3	651	95.5
Lrg. Equip	67	105	4	5	4.1	237	71.7
Livestock	18	19	2	4	2.1	118	84.8
Tools, Small Equip	132	273	39	64	40.2	2,307	94.3
Tractor	8	8	1	1	1.0	59	86.5
Any Crime	290	509	52	300	53.6	3,077	90.6
All Counties	N=1,852		N=811				
Chemicals	374	401	141	325	17.4	5,323	93.0
Commodities	139	141	45	208	5.5	1,699	91.8
Lrg. Equip	203	251	53	651	6.5	2,001	89.9
Livestock	109	119	19	113	2.3	717	84.8
Tools, Small Equip	1,008	1,252	267	582	32.9	10,080	90.0
Tractor	82	83	32	45	3.9	1,208	93.2
Any Crime	1,792	2,247	408	2,037	50.3	15,404	88.4

Notes

¹ Number of farmers reporting theft to law enforcement/county sheriff's agricultural crime unit in 2005. Calculated using data downloaded from the ACTION database. The column signifies the number of farmers, out of all farmers in the nine ACTION counties (including San Luis Obispo, which joined in 2004 and excluding counties that joined later), reporting thefts in 2005. The data were not assessed to determine if farmers reported more than one incident. Rather, each case number was considered a unique incident and farmer.

² Number of thefts reported to law enforcement. Within each reported case, multiple items were listed. The number of incidents farmers reported was multiplied by the number of farmers reporting a given number of incidents. For example, if 25 farmers reported experiencing 1 livestock theft incident and 11 farmers reported 2 livestock theft incidents, then the computation was: $(25*1)+(11*2) = 47$ incidents involving livestock theft. Given the inconsistencies in recording multiple property stolen during the same event, the total number of theft incidents reported to law enforcement are underestimated. The calculations here are based on the property-type field in the ACTION database. Vandalism and burglary, two categories included in the survey, are captured in a crime-type field and thus can not be calculated in the same manner as the other property-type calculations shown here.

³ Number of farmers reporting theft in the survey. This value is calculated using data from survey of farmers conducted in the 9-county region in December 2005.

⁴ Number of thefts reported in survey. This value is calculated by multiplying the number of incidents farmers reported (e.g., 0, 1, 2, 3) by the number of farmers reporting each given number of incidents. Note 2 above provides an illustration of the calculation involved.

⁵ Percent of respondents reporting theft. This value was calculated by dividing the number of farmers reporting theft in the survey by the number of survey respondents.

⁶ Estimated number of farms experiencing theft. This estimate is a projection based on generalizing the county-specific survey results to all farms in each county. Specifically, the number of farms in each county is multiplied by the proportion of survey respondents experiencing theft (see note 5). The number of farms in each county was identified using information from the U.S. Department of Agriculture's *2002 Census of Agriculture*: Fresno (6,281); Kern (2,147); Kings (1,154); Madera (1,720); Merced (2,964); San Joaquin (4,026); San Luis Obispo (2,322); Stanislaus (4,267); Tulare (5,739). Source: U.S. Department of Agriculture. 2004. *2002 Census of Agriculture*. Vol. 1. Washington, D.C.: U.S. Department of Agriculture, National Agricultural Statistics Service.

⁷ Percent of farms not reporting theft to law enforcement. This estimate of underreporting is calculated as follows: $[(\text{estimated number of farms experiencing theft, as per note 6}) - (\text{number of farmers reporting theft, as per note 1})] / (\text{estimated number of farms experiencing theft, as per note 6}) * 100$. The calculations show that underreporting of crime to law enforcement is common—across all counties, 85 percent or more any given crime is not reported.

Appendix Table 2. Estimated Dollar Value of Agricultural Crime Victimization Based on Survey Responses, 2005

	No. of farmers reporting theft to law enf. ¹	Value of thefts reported to law enf. (\$)²	No. of farmers reporting theft in survey³	Value of thefts reported in survey (\$)⁴	Number of farms in county⁵	Avg. loss per respondent (\$)⁶	Est. loss for whole county (\$)⁷	Est. loss not reported to law enf. (\$)⁸
Fresno	587	1,824,068	67	251,525	6,281	3,754	23,579,530	21,755,462
Kern	387	2,103,882	78	316,510	2,147	4,058	8,712,141	6,608,258
Kings	71	656,419	98	404,600	1,154	4,129	4,764,371	4,107,953
Madera	69	468,316	83	204,345	1,720	2,462	4,234,619	3,766,304
Merced	181	1,008,020	81	102,840	2,964	1,270	3,763,182	2,755,162
San Joaquin	167	686,301	94	245,185	4,026	2,608	10,501,221	9,814,920
San Luis Obispo	2	5,693	102	368,840	2,322	3,616	8,396,534	8,390,841
Stanislaus	86	525,411	110	639,975	4,267	5,818	24,825,212	24,299,802
Tulare	302	897,791	97	152,430	5,739	1,571	9,018,513	8,120,722
All Counties	1,852	8,175,901	811	2,686,250	30,620	3,312	101,421,671	93,245,770

Notes

¹ Number of farmers reporting theft to law enforcement/county sheriff’s agricultural crime unit in 2005. Calculated using data from the ACTION database. The column signifies the total number of farmers, out of all farmers in the nine ACTION counties (including San Luis Obispo, which joined in 2004 and excluding counties that joined later), reporting thefts in 2005. The data were not assessed to determine if farmers reported more than one incident. Rather, each case number was considered a unique incident and farmer.

² Value of thefts reported to law enforcement. This value is the sum of all reported loss, in dollars, from reported thefts.

³ Number of farmers in the survey reporting theft.

⁴ The dollar value of self-reported theft, as reported in the survey. The values are likely conservative estimates because not all farmers filled out the survey in its entirety.

⁵ Number of farms in each county, as identified in the U.S. Department of Agriculture’s *2002 Census of Agriculture*. Source: U.S. Department of Agriculture. 2004. *2002 Census of Agriculture*. Vol. 1. Washington, D.C.: U.S. Department of Agriculture, National Agricultural Statistics Service.

⁶ Average loss per respondent. The value of thefts reported in the survey is divided by the number of respondents reporting thefts.

⁷ Estimated loss for whole county. The average dollar loss per survey respondent is multiplied by the number of farms in each county.

⁸ Estimated loss not reported to law enforcement. The value of thefts reported to law enforcement (see note 2) is subtracted from the estimated loss per county (see note 7). This calculation shows that only 8 percent of losses, as calculated in dollars, are reported to law enforcement. The calculation is: $(101,421,671 - 8,175,901) / (101,421,671)$.