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Certified Safe Farm: Identifying and Removing Hazards on the Farm

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Abstract. *This article describes the development of the Certified Safe Farm (CSF) on-farm safety review tools, characterizes the safety improvements among*

participating farms during the study period, and evaluates differences in background variables between low and high scoring farms. Average farm review scores on 185 study farms improved from 82 to 96 during the five-year study (0-100 scale, 85 required for CSF certification). A total of 1292 safety improvements were reported at an estimated cost of $650 per farm. A wide range of improvements were made, including adding 9 rollover protective structures (ROPS), 59 power take-off (PTO) master shields, and 207 slow-moving vehicle (SMV) emblems; improving lighting on 72 machines; placing 171 warning decals on machinery; shielding 77 moving parts; locking up 17 chemical storage areas, adding 83 lockout/tagout improvements; and making general housekeeping upgrades in 62 farm buildings. The local, trained farm reviewers and the CSF review process overall were well received by participating farmers. In addition to our earlier findings where higher farm review scores were associated with lower self-reported health outcome costs, we found that those with higher farm work hours, younger age, pork production in confinement, beef production, poultry production, and reported exposure to agrichemicals had higher farm review scores than those who did not have these characteristics. Overall, the farm review process functioned as expected, encouraging physical improvements in the farm environment, and contributing to the multi-faceted CSF intervention program.

Keywords. Agriculture, Farm machinery, Farm safety, Hazard abatement.

Agriculture had the highest occupational fatality rate in the U.S. in 2008 (29.4/100,000 workers), 8.2 times higher than the rate for all industries combined (3.6/100,000) (CFOI, 2009). The need for prevention is evident, but few interventions have been effective in reducing injuries in agriculture (DeRoo and Rautiainen, 2000; Rautiainen et al., 2008). The Certified Safe Farm (CSF) program was developed in response to the need for an intervention that can reduce agricultural injury and illness rates, is voluntary, and can be implemented widely in the farming community. CSF includes (1) periodic health screenings to detect health problems at an early stage and to refer farmers to appropriate care, (2) periodic on-farm safety reviews to identify and remove hazards on the farm, (3) education about safe working methods and personal protective equipment, and (4) incentives for improving safety and health on the farm. The CSF model has been tested in a series of studies in Iowa and Nebraska. Findings from these studies have been reported by Von Essen et al. (1997), Thu et al. (1999), Hodne et al. (1999), Jaspersen et al. (1999), Schneiders et al. (2001), Rautiainen et al. (2004), Choi et al. (2005), and Donham et al. (2007).

This article focuses on the on-farm safety review component of the CSF intervention model. We describe the development of the CSF on-farm safety review protocol. We report information on safety improvements prompted by participation in the CSF program, and we evaluate the association of farm safety scores and specific health outcomes.

Materials and Methods

Cohort

The cohort in this study has been described in previous reports (Donham et al., 2007). In 1998-1999, a total of 300 farmers out of 7611 eligible farmers (4%) from a nine-county area in northwest Iowa volunteered to participate in this intervention trial. The farms were pair matched on (1) crop, corn, and soybean acres; (2) number of cattle and hogs; and (3) previous injury experience. The pairs were randomly assigned into intervention and control groups. Additional recruiting in 2000 added 19 intervention farms and 39 control farms to replace participant dropouts. This article reports on the intervention group only. Farms in the control group did not receive on-farm safety reviews, which could have increased contamination of the control group. Another group of 25 dairy farms was recruited into the intervention group in northeast Iowa, and 5 dairy farms were later added to replace dropouts. A total of 185 intervention farms received at least one on-farm safety review. The majority of the farms ($n = 155$) were in northwest Iowa, while 30 dairy farms were located in northeast Iowa.

Intervention

The CSF intervention includes the four components described above. This article focuses on the on-farm safety review component, which is designed to detect injury and illness hazards on the farm and to encourage removal or reduction of those hazards. A customized checklist was developed for the CSF on-farm reviews. We collected and reviewed 38 existing checklists (contact the lead author for more information on these checklists). We compiled a list of all potential questions ($n > 200$) and selected the most appropriate questions ($n = 92$) to be considered for our checklist. An expert panel with expertise in agriculture, agricultural engineering, agricultural safety, agricultural health, rural sociology, anthropology, and veterinary medicine (Kelley Donham, LaMar Grafft, Kendall Thu, Charles Schwab, and Risto Rautiainen, chair) rated the selected questions based on six aspects (table 1):

1. Frequency of injury/illness. How frequently do farmers who are exposed to this hazard experience an injury/illness caused by this hazard?
2. Severity of injury/illness. How long is the disability that typically results from an injury/illness caused by this hazard?
3. Time to apply intervention. How many working hours are required for applying a typical intervention to remove or satisfactorily reduce this hazard?
4. Cost to apply intervention. What is the cost (in U.S. dollars) for parts and supplies for applying a typical intervention to remove this hazard?

5. Acceptability of intervention. What proportion of farmers will find this intervention acceptable on their farm?
6. Effect of intervention. What proportion of injuries is eliminated if this intervention is applied?

The expert panel removed questions with low ratings and added some questions for important hazards that seemed to be missing. The final checklist was arranged under 16 sections with a total of 113 questions addressing various types of machinery, structures, and the outdoor working environment. Trained farm reviewers walked through the farm and scored machinery, buildings, and environments using applicable checklist sections. Section scores were calculated as an average of all scored items. The overall farm review score was calculated by averaging the 16 section scores. The overall farm score had to be 85% or higher to enable certification. Only one section score was allowed to be below 75% in order to become certified.

Farm Reviewers

In the CSF model, on-farm reviews are conducted by persons from the farming community who are trained and certified by CSF training staff to conduct reviews.

Table 1. Rating scales used for evaluating and selecting CSF checklist questions. [a]

Point Value	Frequency of Injury or Illness (per farmer per year)	Severity of Injury or Illness (duration of disability)	Intervention		Acceptability of Intervention (per farmer within all farmers)	Effect of Intervention (% of injuries reduced by intervention)
			Time to Apply (hours)	Cost to Apply (dollars)		
1	1 in 1,000,000	0 days	100,000	1,000,000	None accept	0 - 9
2	1 in 100,000	1 - 6 days	10,000	100,000	1 in 100,000	10 - 19
3	1 in 10,000	7 - 29 days	1,000	10,000	1 in 10,000	20 - 29
4	1 in 1,000	30 - 89 days	100	1,000	1 in 1,000	30 - 39
5	1 in 100	90 - 359 days	10	100	1 in 100	40 - 49
6	1 in 10	1-19 years	1	10	1 in 10	50 - 59

7	1 in 1	20+ years, death	0	0	All accept	60 - 69
8						70 - 79
9						80 - 89
10						90 - 100

[a] **Panel rating system example:** Sample question: "Is the tractor PTO master shield in place and operational?" If a panel member rated this question as follows: frequency 2, severity 7, time 6, cost 5, acceptability 6, and effect 8, then the total score would be 2 **x** 7 **x** 6 **x** 5 **x** 6 **x** 8 = 20,160. The total scores of all five panel members were then averaged, giving the final score for this question. All questions were ranked based on their final scores. The least important (lowest ranking) questions were eliminated. The remaining questions were included in the checklist and given a weight factor (1 = least important, 4 = most important) based on their final score. **Point calculation example:** The tractor section had eight questions, such as: "Is the PTO master shield in place and operational? (weight factor 4)" If yes, it was scored 0 (safe); if slightly damaged, it was scored 1 (borderline); or if missing, it was scored 2 (unsafe). A guidebook was available for providing consistency in scoring. The safety scores (0-2) and the weight factors (1-4) were multiplied (automatically when the data were entered), giving a weighted safety level for each question. For instance, a missing PTO master shield resulted in a loss of 2 **x** 4 = 8 points out of 44 possible points in the tractor section, or 18% down from the perfect 100% safety level.

The initial training included a two-day program. The training included basic information on farm injury and illness hazards, specific classroom exercises on reviewing farms, and on-farm exercises where the trainees conducted independent reviews and the trainer observed any inconsistencies in scoring. The training ended with an exam, which the candidates had to pass to be authorized as CSF on-farm safety reviewers. Refresher information was provided periodically, and quality assurance visits were made by the training coordinator (LaMar Grafft). The reviewers scored the farm and provided suggestions and consultation for addressing hazards. They provided assurance that the farm had achieved the required safety score for becoming certified.

Certification Process

The CSF certification process proceeded as follows. After recruitment, the farmer received a general wellness and occupational health screening at an AgriSafe clinic. The specifically trained AgriSafe clinic nurse introduced the farm review process to the farmer (Donham and Venzke, 1997). The clinic gave each farm reviewer a list of farms to contact. The farm reviewer called the farmer and scheduled the review. The farm reviewer conducted the review scoring on a hardcopy checklist. The farm reviewer provided a copy of the completed checklist

to the clinic and another copy of the completed checklist to the University of Iowa (UI), where data were extracted and entered into a database. An automated program calculated scores and indicated pass/fail status. The UI study team printed summary pages and sent them to the farmer, indicating whether the farm passed and what corrections were recommended. UI kept electronic files for data analyses. The clinic kept a hard copy for identifying potential linkages between farm hazards and the farmer's health status. If the farm did not pass initially, but made corrections, the farm reviewer verified by phone or on site that the corrections were made. Corrections were reviewed again during the following annual farm review visit. The farmer and/or the reviewer provided information to the UI study team about improvements, both those that affected the farm review score and those that were not included in the checklist. UI CSF staff updated records and informed the farmer about becoming certified. The farm review and other CSF services were repeated annually.

Safety Improvements

Information on safety (and health-related) improvements was collected using two methods: reports from farm reviewers as described above, and a form that the participants were asked to fill out and return to the UI CSF study team annually. A list of improvements was compiled from these two sources. The monetary cost of each type of improvement was estimated by an expert panel with expertise in agriculture and agricultural engineering (Murray Madsen, LaMar Grafft, and Risto Rautiainen, chair), and the average from the panel members was used for calculating the cost of each improvement. The number of improvements and their estimated monetary costs were tabulated for the study population during the study period.

Data Collection

The CSF study used several data collection methods. The farm review score information was collected from the checklists annually as described above. Health outcome, demographic information, farm characteristics, and exposure data were collected using annual occupational history forms, annual clinic examinations, quarterly phone calls, and calendars for continued recording of injury and illness events. Data from these sources were linked using a unique farm identifier assigned to each farm.

Data Analysis

This study was designed as a randomized, controlled intervention trial, testing the effectiveness of the CSF intervention in reducing injuries, illnesses, and related costs. Power calculations were conducted to determine adequate sample sizes (Rautiainen et al., 2004). The intervention could not be blinded from subjects or the research team. This article analyzes data for the intervention group only

because control farms did not receive on-farm reviews. Our data include those subjects who completed at least one farm review (n = 155 farms from northwest Iowa + 30 dairy farms from northeast Iowa). Data on outcomes and covariates were obtained and linked from occupational history forms, clinic forms, and quarterly calls. The inter-rater reliability between four farm reviewers was assessed by comparing their mean farm review scores using ANOVA. All statistical analyses were performed using SAS (SAS, 2007).

Results

Cohort

A total of 185 farmers in Iowa completed at least one farm review. The mean number of completed annual farm reviews was 155 over the five-year period (1998-2002). Only three principal operators were female. The mean age of the principal operators was 49 years at the beginning of the study. Most participants (93%) were married. Participants had about 30 years of farm work experience, and they reported 38 farm work hours per week on the average. About half of the participants (52%) raised livestock. About 39% of the intervention farmers had off-farm jobs, averaging 12 hours per week.

Farm Review Scores

Table 2 shows the average annual farm review scores for 1998 through 2002; these data include dairy farms from eastern Iowa. The mean scores improved from 89.7% to 94.9% during this study period. During 2000, changes were made to the farm review process. Greater attention was given to lighting and marking features on farm equipment using ASAE Standard S279 as guidance (*ASAE Standards* , 2000; note: ASAE became ASABE in 2005). This resulted in more stringent scoring, which may have affected (lowered) the overall scores. Initially, the proportion of farms passing the farm review was 82%. The review checklists were sent out to the farmers before the review. This prompted many farmers to make improvements before the first review visit. Without these improvements, that passing rate would likely have been much lower. Over time, almost all farms made improvements. Ten farms dropped out after completing only one farm review; most of them did not pass. The passing rate increased to 96% in 2002.

Farm Reviewer Inter-Rater Reliability

Four farm reviewers conducted the farm reviews: three in northwest Iowa, and one in eastern Iowa. Three of them were male and one was female. All had some degree of farming experience, and all participated in the farm reviewer training. Their mean

Table 2. Summary of farm safety scores and passing rates.

Year	Count of Reviews	Mean Score (%)	Standard Deviation	Passing Rate (%)
1998	160	89.7	5.6	82
1999	152	92.8	3.3	94
2000	159	92.6	3.2	95
2001	153	93.6	4.0	92
2002	152	94.6	3.4	96

Table 3. Safety scores and inter-rater reliability between CSF reviewers.

	Rater 1	Rater 2	Rater 3	Rater 4	N/A	ANOVA (p-value)
Avg. No. of Farms	31	23	23	70	13	
Scores in 1998	92	85	91	90	91	0.0001
Scores in 1999	92	88	91	93	93	0.0004
Scores in 2000	91	93	92	93	95	0.17
Scores in 2001	92	96	93	94		0.02
Scores in 2002	94	96	94	95		0.29
Average score	92.2	91.6	92.2	93.0	93.0	

farm review scores are presented in table 3. In some cases where the farm dropped out, the reviewer's identity was not recorded. They are labeled "N/A". Table 3 shows that there were significant differences in the mean scores between raters during the early years, but consistency improved in later years. The farms were not randomly assigned to the reviewers, and it is possible that there were differences in the actual safety levels of the farms. The mean improvement (slope from linear regression analysis) was 1.13 points per year overall. The mean improvements (slopes) were significantly different between raters, ranging from 0.4 to 2.6 points per year (ANOVA, $p < 0.0001$).

Safety Improvements Made on Farms

Figure 1 presents a summary of all reported safety improvements. A total of 1292 improvements were reported during the five-year study period, and 95% of farms reported application of at least one improvement. The improvements included 207 slow-moving vehicle (SMV) emblems, 60 PTO master shields, 32 driveline shields, 77 machine guards/shields, 83 lockout/tagout items, 35 fire extinguishers,

139 lighting and marking items, 6 tractor rollover protective structures (ROPS), and 3 skid-steer loader operator protection enclosures. The total value of all improvements was about $70,000, or $650 per farm in five years. The labels in figure 1 show our estimated costs for each type of correction, including the cost of parts and supplies, and labor at $10 per hour.

One part of the CSF study was conducted in northeast Iowa (*n* = 25 dairy farms initially, plus 5 to replace dropouts). The local AgriSafe site (National Education Center for Agricultural Safety in Peosta, Iowa) raised $11,000 locally for safety improvements on participating CSF farms. The improvements made with this funding were in addition to the ones listed above and included respiratory and hearing protection for every farm, 188 SMV emblems, and 18 ten-pound-rating ABC-type fire extinguishers. In addition, 10 tractors from 7 farms were retrofitted with ROPS including seatbelts. These improvements are not included in the estimated $70,000 worth of improvements in the northwest Iowa CSF study, but they demonstrate that local funding sources can be used to enhance farm safety as part of the CSF program.

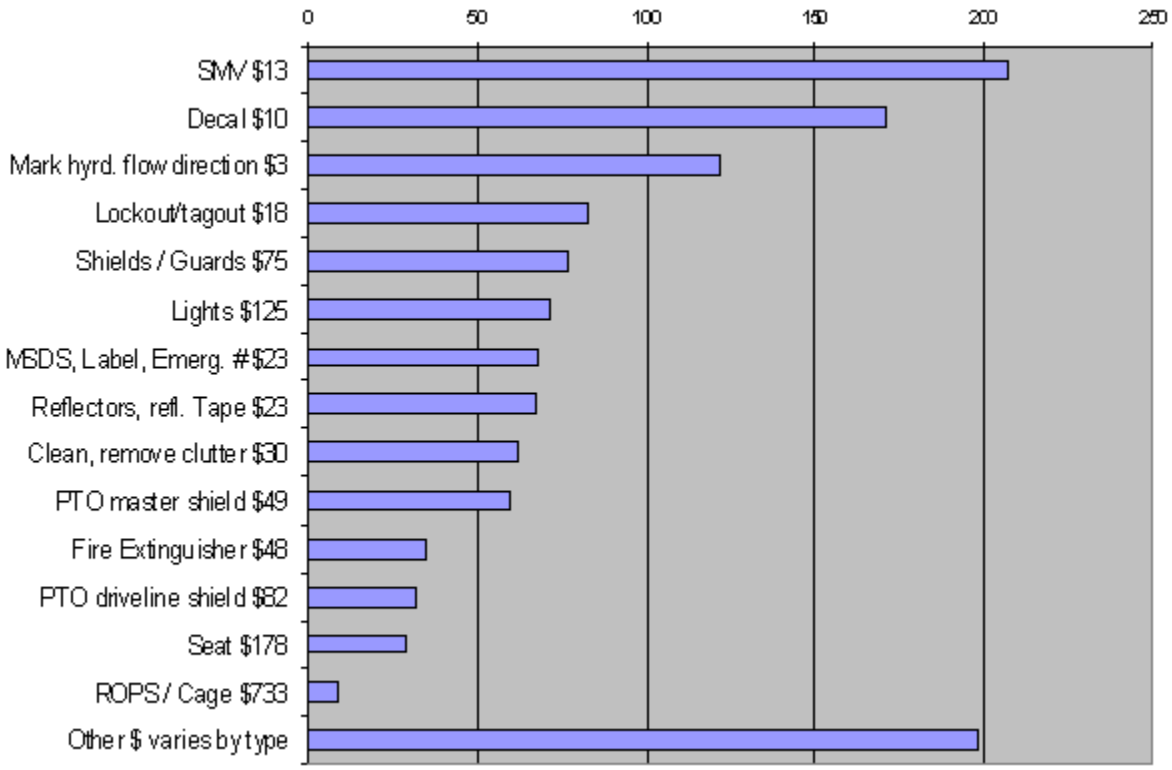

Figure 1. Number of improvements reported on CSF farms during 1998-2002 (labels include estimated cost of improvement in 2002 U.S. dollars).

Table 4. Characteristics associated with high farm review score (93 out of 100, or higher).

Variable	Rate Ratio	95% Confidence Limits	
		Lower	Upper
Over 20 farm work hours per week vs. up to 19 hours	1.42	1.04	1.95
Younger age (year of birth 1940 or later) vs. older	1.80	1.34	2.40
Beef production vs. no beef production	1.45	1.02	2.07
Hogs in confinement vs. no hog confinement	1.49	1.10	2.02
Poultry production vs. no poultry	1.38	1.00	1.90
Exposed to agrichemicals vs. not exposed	2.08	1.08	3.99
Made fewer than five improvements vs. made more	1.56	1.12	2.16

Finally, we examined the association of farm review score and personal, farm, and outcome characteristics. Univariable logistic regression analyses were conducted to examine the associations, and the results are presented in table 4. The characteristics associated with having a high (safe) farm safety sore were: working 20 or more hours weekly on the farm; being younger (year of birth 1940 or later); having beef production on the farm; having hog production in confinement buildings; having poultry production on the farm; reporting exposure to agrichemicals; and reporting fewer than five safety improvements during the follow-up period. We found no association between the farm review score and the frequencies of self-reported health outcomes (injury, hearing, back, respiratory, muscle/joint, skin, stress, and depression outcomes). However, we did find an association of farm review score and the costs for self-reported health outcomes; the results have been reported earlier by Donham et al. (2007).

Discussion

The CSF program aims to reduce injuries, illnesses, and related costs. The farm review process has an important role in the CSF program. Only those farms with acceptable farm review scores (at least 85% overall with not more than one section below 75%) become certified when they also complete the health screening and education components. CSF is designed to be a continuous program. During the study period, the farms received CSF on-farm review and occupational health screening services once each year. In future models, the frequency of these services could be adjusted to optimize program costs and benefits.

When designing the CSF program and the farm review process, we had few examples that could be used as a model. The Scandinavian agricultural occupational health service models had been developed, and they had similar components (health screenings, farm visits, and education). These programs were showing varying degrees of success. The Finnish model was initiated in the late

1970s and went through a research phase and a rapid expansion in the mid 1980s. The program reached a high participation rate (about 45,000 farmers, or over 30%) (Husman et al., 1990). The program has stayed at about the same participation rate for the past two decades. The Swedish model was initiated by farmers' groups in 1977. The Swedish organization established a network of up to 33 specialized agricultural health service centers. The program grew rapidly and reached a membership of about 40,000 farmers in the late 1980s (Hoglund, 1989). However, after government funding was eliminated the program became financially unsustainable and has been discontinued. The Norway model was developed later. In the Norway model, the central organization employs farm safety consultants and contracts with about 40 occupational health clinics across the country. The program has grown steadily in the past decade, reaching about 10% participation (8,500 members) (Landbrukets HMS tjeneste, 2007).

In North America, there were some programs that had similar components. The CSF program development was based on previous work at the University of Iowa's Institute for Rural and Environmental Health. The previous programs leading to the development of CSF, under the direction of Dr. Kelley Donham, included: in 1983, the Swine Confinement Workers Respiratory Disease Prevention Program (Donham et al., 1990; Gjerde et al., 1991); in 1987, the AgriSafe Network (Gay et al., 1990); in 1990, Iowa's Center for Agricultural Safety and Health (I-CASH); in 1991, Farm Safety Day Camp; in 1993, the Farm Safety Walk About (Hawk et al., 1991, 1994, 1995); and in 1995, the Tractor Risk Abatement and Control (TRAC) program (Lehtola et al., 1995).

A large number of farm safety checklists had been developed by state extension safety specialists, insurance companies, state Farm Bureau organizations, the National Safety Council, and others. We found 38 different checklists, which were not directly applicable but very helpful in developing our CSF checklist. Some similar programs were also underway about the same time the CSF program was implemented. In Pennsylvania, Mac Legault completed his doctoral dissertation, advised by Dr. Dennis Murphy, on developing and testing the Agricultural Safety and Health Best Management Practices Manual (Legault and Murphy, 2000). In Ohio, Dr. Tom Bean's group developed a hazard identification program utilizing handheld computer data entry. The Canadian Centre for Health and Safety in Agriculture, headed by Dr. James Dosman, also developed advanced hazard identification tools. These experts and several other agricultural safety specialists and organizations were consulted in the development of the CSF farm review tool and procedures.

The high initial passing rate (82%) among the northwest Iowa CSF study participants suggests that the safety level of the intervention farms was high at the beginning of the study. This is likely the result of self-selection into the study. Participants knew they could be randomly assigned to the intervention group, which involves a safety assessment. Those farmers who thought that their farm could not pass might have opted not to participate. When this study was

underway, a new group of farms (n = 100) was recruited in five new locations. The passing rate among those farms was only 33%. Recruiting of those farms was done primarily by word-of-mouth, and in many cases they were farms of friends and relatives of those who implemented the local CSF programs in northwest Iowa. This population may be more representative of Iowa farms in general. We anticipate that our first recruitment was fairly representative of those farms that would volunteer to participate if CSF became more broadly available in the future. A sample that represents all farms would be critical for a program that is designed to be mandatory. However, self-selected samples may be more appropriate for voluntary programs such as CSF, representing those who would participate voluntarily in such programs.

One challenge in this study was if the farm review can correctly identify farms that are "safe". Safety is obviously a relative term. Future safety performance can be estimated by observing known or anticipated hazards. Past performance can be measured more objectively by injury and illness outcomes, lost time, financial losses, and non-economic or intangible losses. In this CSF study (Rautiainen et al., 2004), we found that based on 318 injury case descriptions, the majority of injury situations were not directly addressed by the CSF checklist or other intervention measures. Most farm safety checklists, including CSF, emphasize machinery. However, a relatively small percentage of injuries were related to machinery. Most injuries were related to animals; falls from elevation; slips, trips, and falls on the same level; lifting; and being struck by or struck against objects. The great variability in injury sources remains a challenge for anyone attempting to develop a hazard identification tool that covers the majority of injury situations. The CSF checklist can only identify some hazards, and it is not likely that it can be designed to very accurately identify farms that are completely "safe". A human error component is involved in practically all injury situations. In our CSF injury study, 25% of farmers reported human error as the primary contributing factor to their injury. To some degree, human errors and injuries resulting from unsafe working methods can be prevented through educating farmers about safer working methods. In the CSF model, we intentionally separated the two functions: identifying physical hazards (farm review component), and educating farmers about safe working methods (education component).

Another challenge in this study was if farms will continue to improve their safety and not simply pass and stay at that level. We found supporting evidence. The farm review scores improved from year to year, despite the shift to more stringent review criteria in the middle of the study. The relatively high number and high value of corrections made by participants demonstrated that the participating farms were committed to improving safety on their farms on an ongoing basis.

Further, another challenge was if the on-farm review can be delivered consistently by different farm reviewers. We found evidence that raises some concern. The differences in farm review scores between the four reviewers were significant during early years in the study. As the farms were not assigned randomly, but

rather for travel distance and scheduling convenience reasons, there may be true underlying differences between the farms. Regardless, it is evident that the initial training of reviewers and continuing quality control should be more intensive to achieve high consistency among reviewers. Over time, the consistency of scores improved, and toward the end of the study there were no significant differences between reviewers.

One practical challenge in the farm review process was access to livestock confinement buildings. Hog farmers were particularly concerned about visitors due to bio-security reasons. In many cases, reviewers were not able to enter confinements and observe hazards but had to rely on asking operators about safety conditions. This is a concern because a great proportion of injuries and illnesses among livestock producers are related to their work in the livestock buildings. During this study, the animal confinements scored very high (99% initially) and this likely does not reflect the actual conditions in the livestock buildings. Other than a self-inspection completed by the farmer, there may not be good solutions for this problem.

One part of our study addressed differences between high and low scoring farms. We found earlier (Donham et al., 2007) that higher (safer) scores were associated with lower costs for the self-reported health outcomes in this study. This finding would indicate that the program can be feasible financially. In this study, we further examined the association of farm review scores and various demographic, exposure, and outcome characteristics. We were not able to find differences in the frequencies of health outcomes between high (93% and higher score) and low scoring farms, but we did observe differences related to farm work hours, age, production of hogs, beef and poultry, and exposures to agricultural chemicals. Part of the differences related to animal production in confinements may be due to the access issue discussed earlier. The differences in general seem to indicate that younger active farmers with modern animal production facilities tend to score higher in the CSF program.

After the 1998-2002 study period, the CSF farm review checklist was again revised. In the CSF northeast Iowa dairy study, we developed a new concept where the reviewer marks only unsafe items. We dropped the three-level system (safe, borderline, unsafe) and now have two levels (safe, unsafe). We also simplified the score calculation system. In the subsequent CSF research phase, which started in 2003, we applied the new concept to the entire checklist and printed the checklist in a booklet format. This new checklist is easier to fill out, and the data entry is quicker. One farm reviewer used a Tablet PC for entering data in the field, and this system appeared to work well. We have also tested handheld devices but found that the screen size was too small for our spreadsheet-type application, making it difficult to scroll and navigate through the review tool.

Strengths and Limitations of the Study

The strengths of this study include a consistent follow-up of a clearly defined farmer population over a multi-year time period. The study benefited from multiple data collection systems, making it possible to measure the association of farm review scores and health outcomes and costs. The study also benefited from previous program development expertise, trained staff, and the local agricultural occupational health service delivery infrastructure. The AgriSafe network of clinics, which provided the CSF services, is well recognized among farmers in the study area.

The study weaknesses include that the cohort was self-selected, and only about 6% of eligible farms participated. The study farms were larger than Iowa farms on the average. They were likely also safer than Iowa farms on the average; about 82% of the intervention farms passed the initial farm review, while in another CSF study group only 33% of the farms passed. While not representative of all Iowa farms, the study farms may be representative of those farms that would volunteer if the CSF (or similar) program was made available to the general farming population. Access to animal confinement buildings was an unanticipated challenge in this study. Our ability to score buildings accurately was limited due to bio-security concerns.

Conclusion

The CSF on-farm safety review process was carried out on 185 farms, and a total of 776 farm reviews were conducted during 1998-2002. The farms that became certified continued to make safety improvements, and their farm review scores improved year-to-year. The farm reviewers had significant differences in their scoring in the beginning of the study, indicating the need for more effective training and quality assurance. Over time, the consistency of scoring improved between farm reviewers. The local farm reviewers were well received by the farmers, and they were able to conduct reviews in a timely and cost-effective manner as a part-time job. Experiences from this study can be used for adjusting CSF farm review protocols, but overall the CSF farm-review process functioned as intended.

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