

A COMPARISON OF STAKEHOLDER CHOICES OF FARM SAFETY TRAINING TOPICS FOR UTAH YOUTH

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Abstract

The purpose of this study was to compare the beliefs of farmers, practicing and pre-service agricultural education teachers, and secondary students concerning the content for farm safety instruction for Utah youth. The stakeholder groups believed youth should receive farm safety education in various topics within the machinery and facilities, rural-based hazards, and livestock categories of instruction. Within the livestock category, the stakeholders agreed or strongly agreed youth should receive instruction in working with and around horses, dairy and beef cattle. The machinery and facilities safety topics they strongly agreed or agreed should be taught were tractor, machinery, electrical, pto, augers and elevators, ATVs, grain bins and silos, and facilities safety. Topics they believed should be taught within the rural-based category were pesticides, fencing, stacking hay, and irrigation and canal safety. Stakeholder groups differed in the levels of belief concerning the need to teach youth farm safety. Other than for farm safety topics within the machinery and facilities category, pre-service and practicing secondary agriculture teachers placed the greatest importance on the need for teaching farm safety topics to youth. Secondary students with farm or non-farm backgrounds consistently indicated the lowest priority for teaching farm safety topics to youth.

Introduction/Theoretical Framework

An estimated 27,000 children under the age of 20 years who live on farms and ranches are injured in farm accidents each year. This figure does not include children who visit or work on non-family farms. The total injury toll has been estimated at greater than 100,000 annually (National Farm Medicine Center, 1996). Considering that secondary agricultural education programs have over 800,000 students (The Council, 2000) enrolled per year, what specific agricultural and farm safety topics should agricultural educators teach in order to lower the number of farm injuries experienced by youth? Many of the recommendations from earlier research completed in the profession have applicability in farm settings. For example, recommendations by Lawver and Frazee (1995),

Swan (1993), and Miller (1995) have informed the teaching practices of teachers in agricultural mechanics laboratories about student attitudes concerning safety and the effects of exposure to magnetic fields. However, there remains a limited amount of knowledge concerning what stakeholders, other than researchers or teacher educators, desire in farm safety instruction for youth.

In order to determine the content of farm safety instructional programming, one must be aware of the context of the involvement of youth in agriculture as well as the nature and magnitude of their injuries. First of all, children make up a significant portion of the work force in agriculture. Children of any age may be employed by their parent in any occupation on a farm owned or operated by their parent in accordance with Child

Labor Bulletin No. 102 (Swanson, Sachs, Dahlgren, & Tinguely, 1987). Second, economic conditions on the farm and ranch encourage the use of children as laborers to "make ends meet." Health providers have documented children working more than 60 hours per week, with some working 80 or more hours (Pollack, McDonnell, Galilee, Schmidt, Oregon, & Landrigan, 1990). Economic conditions often place youth in hazardous situations that often lead to serious injuries and sometimes to death.

Findings from a study of fatal farm-related injuries to children 9 years of age and under in Wisconsin and Illinois from 1979 to 1985 indicated that average annual death rates in the study population were 3.2 per 100,000 workers in Wisconsin and 1.5 per 100,000 workers in Illinois (Runyan, 1993). Findings from Minnesota and Indiana studies indicated 24% and 14%, respectively, of total fatal farm injuries were sustained by children 15 years of age or younger (Aherin, Murphy, & Westaby, 1992). Silletto and Hull (1988) reported 89 percent of all tractor fatalities occurred to persons 1-15 years old. Sheldon (1992) reported 27 cases of children under the age of eighteen were entrapped or suffocated in flowing grain in storage facilities and transport vehicles in Indiana and Wisconsin from 1970- 1990. Sixty percent of these cases involved children in the 6-11 age group.

Some of the most traumatic injuries occur during interactions with machinery, especially tractors (Bean, 1991). Tractor accidents have been identified as the leading cause of deaths and disabling injuries on farms (Runyan, 1993). Tractors are the most frequent cause of fatal farm accidents (one-third to one-half) but account for a much smaller percentage (5 to 10 percent) of nonfatal farm accidents, according to Murphy (1992). In a hospital study that spanned six and one-half years and focused on 105 children, Cogbill, Busch, and Stier (1985) found that animals were involved in 40% of the injuries (32% horses, 8% cows). Horses are often the cause of

many injuries experienced in work and pleasure settings. The National Electronic Injury Surveillance System Summary (1995) reported 13 9,765 equestrian injuries in the United States for 1993 and 1994.

In a recent study of data obtained from five years of emergency room logs, Joerger and Sommers (1997) found livestock, rural-based agents of injury, and machinery accounted for 56.8% (2,141) 29.2% (1,101) and 13.9% (524), respectively, of the agricultural injuries treated in rural Utah hospital emergency rooms. Children of age 16 years and younger experienced 29.8% (1,125) of all agriculturally-related injuries treated in rural hospital emergency rooms. Children ages 0-16 years experienced 28.2% of the livestock injuries, 34.2% of the machinery injuries, and 30.9% of the rural-based injuries. Silletto and Hull (1988) reported 10 to 14 year old youth experienced a much larger accident rate per hour of tractor use than any other age group with 43 accidents per million hours of use.

The findings from these studies indicate children sustain a large proportion of injuries from livestock, tractors and machinery, and rural-based agents such as irrigation canals, equipment, and fencing activities. In addition to the benefits of engineering and the administration of laws, regulations, and policies, education and persuasion of individuals continue to be viable strategies for controlling the number of injuries (Aherin, Murphy, & Westaby, 1992; Murphy, 1992). Planners of farm safety education programming know the importance of basing agricultural safety instruction on a sound body of research, anecdotal evidence, and input from stakeholders who influence and participate in the training programs.

Purposes and Objectives

The purpose of this study was to examine the nature of the beliefs of selected stakeholders concerning the content for agricultural safety instruction for Utah youth. The objectives that

guided this study were to compare the beliefs of selected stakeholder groups concerning which agricultural safety topics should be taught to youth relating to:

1. livestock,
2. machinery and facilities, and
3. rural-based injuries.

Procedures

Participants for this descriptive study were purposefully selected subjects with educational and occupational experiences in agriculture and education settings. The populations for the study included 150 farmers and ranchers, 36 secondary agricultural education teachers, 16 preservice agricultural education teachers, 85 non-farm students and 128 farm students in grades 9-12. The students were enrolled in secondary agricultural education programs from ten secondary agricultural education programs.

A questionnaire comprised of three sections was developed and field tested by the authors. The questions were based upon research findings of Joerger & Sommers (1997) and Aherin, Murphy, and Westaby (1992). Participants were instructed to indicate their level of agreement concerning agricultural safety topics of instruction for youth ages five to sixteen years and adults in Section I and Section II, respectively, by circling the appropriate response in the adjoining Likert-like scale. The scale consisted of the following choices: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1, No Information = 0. Respondents provided demographic data in the third section of the questionnaire. The face and construct validity of the instrument was established by a panel of experts familiar with agricultural health and safety education and research issues. Changes in the layout and language of the questionnaire resulted after field testing the questionnaire with a group of 11 farmers. The

Cronbach's alpha reliability coefficients for section one and two were .93 and .97, respectively.

The questionnaire was administered by the authors, project assistants, and pre-service agricultural education student teachers. Data from the 150 farmers and ranchers were collected by the authors at a Farm Bureau state committee meeting and at the annual Farm Bureau Convention. Questionnaires were sent to and completed by 36 randomly selected secondary agricultural education teachers using procedures described by the Dillman survey method. Data were collected from questionnaires administered to the 16 preservice agricultural education teachers during a pre-service agricultural education course by the primary author. After receiving instructions, agricultural education preservice teachers administered the questionnaire to the secondary students who were enrolled in ten agriscience and technology education programs while completing their student teaching experience.

The data were analyzed using SPSS/PC+ (Norusis, 1994). Descriptive parameters were calculated for each question for each group of participants. A grand mean and standard deviation were calculated for each question for all participants when combined into one group. One-way analysis of variance procedures were used to further examine the differences between the means of the groups. Least Significant Difference (LSD) post hoc analysis procedures were used to detect differences between group means. An alpha level of .05 was established a priori.

Findings

Objective 1: Compare the beliefs of selected stakeholder groups concerning which agricultural safety topics associated with livestock should be taught to youth.

The data in column two of Table 1 indicate the participants agreed youth should receive instruction in the use of safe practices when

Table 1. Comparison of Means of Stakeholder Beliefs Concerning the Livestock Safety Training Needs of Youth

Safety Topics	Stakeholder Groups (M/SD)						F Value
	Total (n=450)	Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	
Horses	2.92 1.17	2.92 ^a 1.17	3.77 ^{ab} .42	3.56 ^{ac} 1	2.76 ^{bc} 1.23	2.70 ^{bc} 1.17	7.75*
Beef Cattle	2.68 1.21	2.63 ^a 1.31	3.37 ^{ade} .54	3.38 ^{ade} .99	2.46 ^{bcd} 1.24	2.61 ^{bce} 1.12	5.29*
Dairy Cattle	2.62 1.21	2.50 ^{ab} 1.34	3.26 ^a .55	3.25 ^{ac} .97	2.47 ^{bc} 1.25	2.40 ^{bc} 1.03	4.33*
Swine	2.43 1.23	2.23 ^a 1.40	3.06 ^{ab} .71	3.13 ^{ac} .99	2.32 ^{bc} 1.20	2.48 ^{bc} 1.08	4.97*
Sheep	2.41 1.23	2.31 ^a 1.36	2.91 ^{ab} .91	3.00 ^{ac} .94	2.29 ^{bc} 1.17	2.60 ^{bc} 1.10	3.11*
Exotic Animals & Fish	2.30 1.05	1.84 ^{ab} 1.46	2.67 ^{ab} .80	2.63 .86	2.36 1.28	2.68 ^a .87	3.71*
Poultry	2.15 1.23	1.91 ^a 1.40	2.62 ^a .87	2.56 ^a .86	2.25 ^a 1.18	2.21 ^a 1.10	3.43*
<u>M</u>	2.50						
<u>SD</u>	.23						

Notes: Scale: No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1.

Like superscripts (^{a,b,c,d,e}) among means of participant groups indicate significant differences.

* $p < .05$.

working around and with horses, beef cattle, and dairy cattle. The groups disagreed there was a need for instruction relating to the use of safe practices when working with and around swine, sheep, poultry, and exotic livestock and fish.

The data from the individual groups of participants suggest the agricultural teachers and pre-service agriculture teachers indicated a significantly stronger level of agreement for the need for safety education for livestock than farmers and students enrolled in agriscience and technology classes who lived in farm and non-farm

residences. They either strongly agreed or agreed that youth should receive safety instruction relating to the care and handling of all types of livestock. The mean scores of the farmers indicate they disagreed there was a need for safety instruction for youth relating to the care and handling of swine, sheep, poultry, and the exotic livestock and fish for youth. Non-farm students agreed there was only a need for instruction in the safe handling of horses.

Objective 2: Compare the beliefs of selected stakeholder groups concerning which agricultural

safety topics associated with machinery and facilities should be taught to youth.

The data in column two of Table 2 indicate the respondents as a combined group strongly agreed or agreed youth should receive instruction in the use of safe practices when working around and with tractors, machinery, electricity, power-

take-offs, all terrain vehicles, agricultural facilities, grain bins and silos, and augers and elevators. However, the data indicate there were significant differences in the levels of agreement regarding the need for safety training between the groups with one exception; all groups strongly agreed youth should receive instruction for safely operating tractors.

Table 2. Comparison of the Means of the Beliefs of Stakeholder Concerning the Machinery and Facilities Safety Training Needs of Youth

Safety Topics	Total (n=450)	Stakeholder Groups (M/SD)					F Value
		Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	
Tractors & Safe Tractor Driving	3.60 .47	3.69 .68	3.9 .37	4	3.55 .41	3.38 .90	1.14
Machinery	3.57 .81	3.66 .79	3.89 ^a .40	3.94 ^b .24	3.30 ^{ab} 1.07	3.50 .70	5.28*
Electrical Safety	3.47 .87	3.52 ^a .86	3.86 ^b .35	3.88 ^c .33	3.27 ^{abc} 1.01	3.36 ^{abc} .87	47.38
Power Take Off (PTO)	3.45 .96	3.67 ^a .82	3.91 ^b .37	3.94 ^c .24	3.01 ^{abcd} 1.11	2.34 ^{abcd} 1.40	11.68
Augers & Elevators	3.39 1.02	3.51 ^d 1.05	3.83 ^b .45	3.94 ^c .24	3.13 ^{abcd} 1.14	3.22 ^{abcd} .99	5.79*
ATV's	3.28 1.06	3.59 ^a .91	3.80 ^b .40	3.81 ^c .39	2.80 ^{abc} 1.28	3.03 ^{abc} 1.03	14.40
Grain Bins & Silos	3.15 1.05	3.33 ^a 1.07	3.6 ^b .55	3.88 ^a .33	2.80 ^{ab} 1.14	2.96 ^{ab} .99	8.61*
Facilities Safety	2.81 1.15	2.83 ^a 1.20	3.43 ^{ab} .55	3.19 .95	2.4 ^b 1.26	2.71 ^b 1.10	4.07*
M	3.34						
SD	.22						

Note: Scale No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1. Like superscripts (a,b,c,d,e) among means of participant groups indicate significant differences.

*p < = .05.

The mean scores of the farmers and agricultural and preservice agriculture teachers reflect they strongly agreed youth should receive instruction in the use of safe practices when operating and working around tractors, machinery, electricity, power-take-off shafts, all terrain vehicles, and augers and elevators.

Objective 3: Compare the beliefs of selected stakeholder groups concerning which agricultural safety topics associated with rural-based injuries should be taught to youth.

The data in column two of Table 3 indicate the participants agreed youth should receive

instruction in safe practice when working with and around pesticides, irrigation equipment and canals, and while stacking hay and constructing and repairing fences. The mean scores of each group of participants indicate they agreed or strongly agreed youth should receive instruction in the use of safe practices for fencing, stacking hay, pesticides, and when working with and around irrigation equipment and canals. However, the data in Table 3 further show the agricultural educators and pre-service agricultural educators indicated a significantly stronger belief than the farmers, and secondary students from farm and non-farm backgrounds that these topics of instruction should be taught to youth ages 5 to 16 years.

Table 3. Comparison of the Means of the Beliefs of Stakeholders Concerning the Rural-based Agricultural Injury Safety Training Needs of Youth

Safety Topics	Stakeholder Groups (M/SD)						F Value
	Total (n=450)	Farmers (n=150)	Agricultural Teacher (n=36)	Pre-Service Ag Teachers (n=16)	Non-farm student (n=85)	Farm Student (n=128)	
Pesticides	3.20 1.06	3.39^a .98	3.80^a .47	3.81^b .39	2.77 ^{ab} 1.24	3.02 ^{ab} 1.16	10.64*
Irrigation & Canal Safety	3.15 ³ 1.05	3.42^a .91	3.49^c .55	3.5^d 1.0	2.80 ^{abd} 1.28	2.92 ^{abd} 1.02	8.28*
Stacking Hay	3.03 1.09	3.23^a 1.15	3.57^b .55	3.69^c .46	2.67 ^{abc} 1.16	2.79 ^{abc} .99	9.32*
Fencing	2.77 1.09	2.77^a 1.20	3.23^{ab} .59	3.44^{ac} .61	2.53 ^{bc} 1.13	2.72 ^{bc} .99	4.29*
<u>M</u>	3.04						
<u>SD</u>	.17						

Note: Scale: No Opinion=0, Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1. Like superscripts (^{a,b,c,d,e}) among means of participant groups indicate significant differences.

*p <= .05

Analysis of the grand means of the total scores in Tables 1, 2, and 3 indicate by category the participants in the study believed educators should place emphasis, in order, on machinery and facilities (M 3.34, SD .22); rural-based sources of injury (M 3.04, SD .17); and livestock safety topics (M 2.50, SD .23) when delivering farm safety programming for youth.

Conclusions

The farmers, secondary pre-service and practicing agricultural educators, and secondary student participant groups in this study believe youth should receive farm safety education from the machinery and facilities, rural-based hazards, and livestock categories. This prioritization mirrors the order and percentage of injuries reported by Joerger and Sommers (1997).

Within the livestock category, the stakeholders as a group agreed or strongly agreed youth should receive instruction in proper use of safe practices when working with and around horses, dairy cattle and beef cattle. The machinery and facilities safety topics they strongly or agreed should be taught were tractor, machinery, electrical, pto, augers and elevators, ATVs, grain bins and silos, and facilities safety. Farm safety education topics within the rural-based category that stakeholders agreed should be taught were pesticides, fencing, stacking hay, and irrigation and canal safety.

Stakeholder groups differed in their levels of belief concerning the need to teach the youth different farm safety education topics within each category. Other than for farm safety topics within the machinery and facilities category, pre-service and practicing secondary agriculture teachers placed the greatest importance of all stakeholder groups on the need for teaching farm safety topics to youth.

Secondary students with farm and non-farm backgrounds consistently indicated the lowest

priority for teaching farm safety topics to youth. Their mean scores may reflect their lack of exposure to hazards in farm and ranch settings, farm safety education programming, or the belief they are invulnerable and “bullet proof”. Consequently, it is important for teachers of farm safety topics to carefully choose age-appropriate instructional strategies.

Recommendations

The findings and conclusions of this study led the authors to forward several recommendations for practice and research. First, Utah safety educators should involve members of these stakeholder populations when selecting topics for farm safety education programs. This study indicates their opinions reflect accurate knowledge of the nature and number of farm injuries being experienced by youth. Second, farm safety education programs should prioritize programming to reflect stakeholder beliefs and research findings that indicate emphasis should be placed, in order, on machinery, rural-based, and livestock safety topics. Third, secondary students from farm or non-farm backgrounds who are enrolled in secondary agriculture classes need additional instruction in farm safety topics to heighten their awareness and concern for the safety hazards that exist on farms and ranches. Fourth, farm safety educators need to select, design, and/or be provided with quality age-appropriate farm safety instructional materials and teaching strategies.

Several ideas for related research are offered as a result of completing this study. Researchers need to investigate the barriers that prevent, and factors that lead to the adoption and use of safe practices by different age groups of children and adults who work in farm and ranch settings. The nature, amount, and effectiveness of current farm safety programming actually being delivered to youth by the agricultural teachers needs to be examined. From a related and programmatic perspective, researchers need to

identify the number and nature of agricultural injuries of adults along with the perceived farm safety instructional needs of the adults.

References

- Aherin, R.A., Murphy, D.J., & Westaby, J.D. (1992). Reducing Farm Injuries: Issues and Methods. American Society of Agricultural Engineers. St. Joseph, MI.
- American Medical Equestrian Association. (1995). National Electronic Injury Surveillance System Summary: 1995.
- Bean, T. L. (1991). Farm Machinery and Vehicles. Papers and Proceedings of the Surgeon General's conference on Agricultural Safety and Health. Des Moines, IA, Apr. 30-May 3, pp. 274-277.
- Cogbill, T.H., Busch, H.M., Jr., & Stier, G.R. (1985). Farm accidents in children. Pediatrics. 76 (4), 562-566.
- Joerger, R.M. & Sommers, C. (1997, June). An analysis of the 1989-93 Utah agricultural injuries by age. NIFS Technical Paper NO. 97-5. National Institute of Farm Safety Annual Summer Meetings. Indianapolis, IN.
- Lawver, D. & Frazee, L. (1995). Factor Analysis of variables related to student attitudes and perceptions concerning agricultural mechanics laboratory safety. In Proceedings of the 22nd Annual National Agricultural Education Research Meeting. Denver, CO.
- Miller, G. (1995). Magnetic fields field exposures in agricultural science laboratories. In Proceedings of the 22nd Annual National Agricultural Education Research Meeting. Denver, CO.
- Murphy, D. J. (1992). Safety and Health for Production Agriculture. American Society of Agricultural Engineers. St. Joseph, MI.
- National Farm Medicine Center (1996). Children and Agriculture: Opportunities for Safety and Health. A report from the National Committee for Childhood Agricultural Injury Prevention. Marshfield, WI.
- National Safety Council (1992). Accident Facts: 1992 Edition. Chicago, IL.
- Norusis, M.J. (1994). SPSS 6.1 for Windows. Chicago, IL.
- Pollack, S.H., McConnell, R., Galilee, M., Schmidt, J., Oregon, R., & Landrigan, P. J. (1990). Pesticide Exposure and Working Conditions Among Migrant Farmworker Children in Western New York State. Paper presented at the American Public Health Association annual meeting. New York City, NY.
- Runyan, J.L. (1993). A Review of Farm Accident Data Sources and Research. Washington, D C.
- Silletto, T.A. & Hull, D.O. (1988). Safe Operation of Agricultural Equipment. Hobar Publications. St. Paul, MN.
- Sheldon, E. J. (1994). Computer-Aided Instruction in Farm Tractor and Machinery Safety Education. [Online]. Available: http://abe.www.ecn.purdue.edu/ABE/Research/research94/REPORT.94.Book_72.html.
- Swanson, J.A., Sachs, M.I., Dahlgren, K.A., & Tinguely, S.J. (1987). Accidental farm injuries in children. American Journal of Diseases of Children, 141, 1276-1279.
- The Council. (2000). About Agricultural Education. [Online]. Available: <http://www.agedhq.org/aged.htm>.