Geographic Regions of Utah

- Semi-arid West versus High Moisture Midwest
- Production practices affecting grain conditions and manure handling
- Training approach may need evaluation
Predictors of Perceived Hazard Risks

- Adoption of safety practices (Jenkins et al., 2012; Kingman et al., 2004)
- Liability concerns (Mosher et al., 2012)
  - Death
  - Injury
- Confined Space Exposure (Payne et al., 2012; Roberts & Field, 2010)
  - Entries
  - Number of confined spaces on-site
  - Experience
  - Production type
- Demographic variables (Payne et al., 2012; Wadud et al., 1995)
  - Age
  - Gender
  - Education
Hazard Risk Score

• Hazards identified by NCERA-197 Agricultural Safety and Health Research and Extension Committee Confined Spaces in Agriculture White Paper

• 16 work tasks were selected (Riedel & Field, 2011)
  – Reviewed by a panel of 4 members of the NCERA-197 committee

• Owner/operators were asked to rate agricultural confined space work tasks as either not a risk, low risk, moderate risk, or high risk for a potential fatal injury

• Coding of the ratings
  – 4 = high risk to 1 = not a risk
  – Possible score range was 16 up to 64
Methods

• Utah Agricultural Statistics Office
  – Sampling frame (399)
  – Mailing and telephone calls

• A $5 gift card to farm or ranch supply store was offered as an incentive for participating

• Of the 328 respondents (82% response rate) only 17 respondents were female.
Variables of interest

• Injury concern while working alone in a confined space
  – 4-point rating scale
  – Not at concerned to very concerned

• Death concern while working alone in a confined space
  – 4-point rating scale
  – Not at concerned to very concerned

• Experienced a close call while working in confined space
  – Yes/No
Variables of interest

• Knowledge of anyone injured or killed due to confined space working.
  – Yes/No

• Farmers safe behaviors
  – Yes/No (Kingman et. al, 2004)
  – Higher score given for unsafe behavior practices

• Demographics
  – Age
  – Education
  – Production type
  – Mode of response
Distribution of responding farmer and ranch owner/operators

- Central: 10%
- SW: 26%
- North: 51%
- East: 13%
Demographics

• Age of participants
  – <40 years old 6.7%
  – 40-59 years old 51.1%
  – 60 + years old 42.2%

• Education
  – High school completion 23.3%
  – <4 yrs higher education 43.4%
  – 4 + yrs higher education 33.2%

• Majority of participants were male 94.8%
Respondent Age and Education

• Owner/operators farmers reporting between the ages of 20-39 consisted of only a small portion (7%) of the respondents.
• Most farmers (76.6%) reported being between 50 to 70 years of age.
• Reported education level of the respondents differed by regions.
  – Approximately half of the owner/operators in the southwest (55.4%) and central (50%) regions reported having at least two or more years of college education.
• 34.1% of the farmers in the north region reported having two or more years of college education.
Top Three Reported Confined Spaces

Number of Responses

Grain Bin: 247
Grain Truck: 205
Bulk Feed Bin: 106
Safety Practices

- 49.8% entries without an outside observer watching
- 58.1% of sites not assessed for confined spaces/develop a response plan
- 90.5% of operations did not have a written response plan
- 52.7% did not train employees on hazards of confined spaces
- 96% of operations had not had local emergency first responders visit for training
- 74.3% of operations indicated that confined spaces were not labeled with safety alerts
Safety Equipment and Training Needs

• Respirators were the most common piece of safety equipment that farm owner/operators ($n = 128, 37.5\%$) had access to, yet only 86 of those individuals indicated using them.
Top 4 Training Needs as Indicated by Respondents

- Rescue Procedure: 157
- Working safely with grain storage systems: 151
- Use of respiratory protection equipment: 147
- Hazard Assessment: 139

All Respondents
### Average hazard risk score in each region

<table>
<thead>
<tr>
<th>Region</th>
<th>Hazard score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>41.3</td>
</tr>
<tr>
<td>East</td>
<td>41.8</td>
</tr>
<tr>
<td>North</td>
<td>42.2</td>
</tr>
<tr>
<td>Southwest</td>
<td>43.6</td>
</tr>
</tbody>
</table>

No significant differences between regions on Hazard risk score ($p > 0.20$)

Lower scores would indicate they do not perceive high risk for a fatal injury associated with work tasks.
## Response Type

<table>
<thead>
<tr>
<th></th>
<th>Mail</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>East</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>North</td>
<td>82</td>
<td>75</td>
</tr>
<tr>
<td>Southwest</td>
<td>36</td>
<td>44</td>
</tr>
</tbody>
</table>
## Production Types

<table>
<thead>
<tr>
<th>Region</th>
<th>Animal f (%)</th>
<th>Grains f (%)</th>
<th>Others f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>17 (4.1)</td>
<td>8 (3.5)</td>
<td>4 (2.0)</td>
</tr>
<tr>
<td>East</td>
<td>17 (3.2)</td>
<td>12 (3.7)</td>
<td>8 (3.4)</td>
</tr>
<tr>
<td>North</td>
<td>86 (4.7)</td>
<td>50 (3.5)</td>
<td>21 (3.5)</td>
</tr>
<tr>
<td>Southwest</td>
<td>51 (3.5)</td>
<td>7 (1.9)</td>
<td>22 (2.8)</td>
</tr>
</tbody>
</table>

$N = 303$
Central Region Issues

• Response by mail
  – 17.6% had experienced a close call while working in a confined space.
  – Average hazard score for owner/operators responding by mail was 2.0 points higher than those responding by telephone. However it is not statistically significant (p=0.226).

• Response by telephone
  – 36.4% had experienced a close call while working in a confined space
Eastern Region Issues

• In East region, grain production has the highest hazard scores 55.7, which is significantly higher than animal production (p=0.031).
Northern Region Issues

• For those responding by mail, there perception of hazard risk score was on average 2.4 points higher. This difference was not statistically significant (p=0.315).
  – Hazard score is highest in grain production at 44.9 points but not significantly different from animal and other production.
Southwest Region Issue

- Hazard risk score is significantly lower in grain production than other types of production.
General Conclusions

• The four studied regions are different in their types of production, farmers’ age and education and level of hazard concerns and safe behavior.
General Conclusions

• There is more “other” production in the southwest region than in the other three regions.

• In all regions, animal production is more prominent followed by grain production.

• North and Southwest regions have more young farmers (20-39 years old) than Central and East regions.

• The farmers’ education level is highest in Southwest and lowest in the North.
General Conclusions

• Owner/operators who replied by telephone seem to have less injury and death concerns.

• Injury and death concern while working alone in confined spaces are higher for farmers with higher hazard score.

• Safe behavior negatively affected farmers’ hazard scores.
  – Increasing SAFE behavior leads to increase in perception of fatal injury risks.
General Conclusions

- 48.7% operations were grain and dairy
- Training needs reflected the lack of safety practices for operations
- Few site assessments for confined space hazards
- Personal proximity may be a possible link to promote change in behavior with regards to high risk task associated with confined spaces.
Lessons learned...

• We concluded a need for outreach and educational efforts to increase safety behaviors regarding confined space work.

• This needs to be strategically targeted for each region based on predicting factors.

• Targeting agricultural producers' social networks to address human factors such as worker’s attitude and/or lack of skill or knowledge that effect hazard perceptions of confined spaces in agriculture.
References


