Risk Factors for Farm Vehicle Public Road Crashes

Michael D. Schulman  
(michael_schulman@ncsu.edu)  
Theresa M. Costello

With funding from: National Institute for Occupational Safety and Health and the North Carolina Agricultural Research Service

Farm Equipment and Motor Vehicle Safety Conference  
NC Agromedicine Institute  
April 2010
Objectives

- Identify driver, vehicle, and environmental risk factors associated with farm vehicle public road crashes in NC

- Compare crash farms and no-crash farms: descriptive and multivariate analysis
Background

- Public road crashes major public health problem
- Increasing demand for public road use with population growth
- Urbanization impacting how public roads are shared
- Crash report data: 300 farm vehicle crashes annually in NC
- Farm vehicle crashes: rare event
  - Official statistics may underestimate problem
  - Vehicle Miles Traveled (VMT)
  - Severity
- NC farmer input through focus groups and mail surveys:
  - Public road conflict and crashes are major safety problems
Methods

• Telephone survey, Winter 2003
• NC farm owners or owner/operators from USDA database
• Two stages of sampling and interviews
• Eligibility
  – over 18 yrs
  – actively farming
  – drive farm vehicle on public roads
  – Crash: farm vehicle public road crash since 1992
• Initial Sample: 424 total
  – Stage 1: 208 no crash, 28 crash (12.9% prevalence)
  – Stage 2: 188 crash
Demographic Characteristics of Farm Respondents: Crash and No-Crash Farms

<table>
<thead>
<tr>
<th></th>
<th>CRASH (N=216)</th>
<th>NO-CRASH (N=208)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*p &lt; .01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age</td>
<td>49*</td>
<td>46</td>
</tr>
<tr>
<td>Mean Years Farming</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td>Mean Number Farm Helpers</td>
<td>8*</td>
<td>5</td>
</tr>
<tr>
<td>Mean Acres Farmed</td>
<td>782*</td>
<td>293</td>
</tr>
<tr>
<td>Mean Gross Farm Sales</td>
<td>$179,660*</td>
<td>$86,500</td>
</tr>
</tbody>
</table>
Who Was Driving Farm Vehicle When Most Recent Crash Occurred: Crash Farms (n = 216)

- Farmer Respondent: 32%
- Non-Family Hired Help: 39%
- Family, Relative or Friend: 29%
Farm Vehicle Involved In Most Recent Crash: Crash Farms (n = 216)

- Tractor: 62%
- Truck: 30%
- Other + Specialty: 15%
- Combine: 4%

Response frequency percentage
Non-Farm Vehicle Involved In Most Recent Crash: Crash Farms (n = 216)

- Passanger Car: 49%
- Truck: 29%
- SUV: 5%
- Tractor Trailer: 5%
- Minivan: 7%
Road Conditions That Contributed to Farm Vehicle Public Road Crashes: Crash Farms

- Nowhere to Pull Off: 3%
- Narrow Roads/Bridge: 9%
- Too Much Traffic: 3%
- Poor Visibility: 14%
- Bad Weather: 3%
- Blind Curves: 8%

Response frequency percentage (n = 216)
Non-Farm Vehicle Driver Behaviors That Contributed to Farm Vehicle Public Road Crashes: Crash Farms (n = 216)

- Speeding: 31%
- Unsafe Passing: 24%
- Lack Experience: 12%
- Impatient Drivers: 29%
- Not Understand Hand Signals: 5%

Response frequency percentage
Logistic Regression Results: Statistically Significant Predictors and Odds Ratio Point Estimates (variables that increase or decrease the odds of being a crash farm)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-English Speaking Help</td>
<td>4.61</td>
</tr>
<tr>
<td>Non-Family Hired Help</td>
<td>4.32</td>
</tr>
<tr>
<td>Perceived Public Road Conflict</td>
<td>1.77</td>
</tr>
<tr>
<td>Non-Farm Public Road Use</td>
<td>1.40</td>
</tr>
<tr>
<td>Farm Injury History</td>
<td>1.34</td>
</tr>
<tr>
<td>Youngest Driver</td>
<td>1.02</td>
</tr>
<tr>
<td>Oldest Driver</td>
<td>0.96</td>
</tr>
<tr>
<td>Perception of Danger</td>
<td>0.53</td>
</tr>
<tr>
<td>Low Farm Income</td>
<td>0.26</td>
</tr>
</tbody>
</table>
Farmers Recommend Driver, Vehicle and Public Road Environmental Changes for Improved Safety (n = 424)

- Widen Roads: 34%
- Educate Non-FV Drivers: 33%
- Road Signage: 22%
- Slow Lanes: 21%
- Speeding Laws: 14%
Limitations

- Data from one state
- Recall and self-report
- Lack information on specifics of crashes
- Lack information on road conditions and geography of crash and non-crash farms.
Conclusion

- **Crash Farms**: use hired help, use non-English speaking help, report younger drivers, more public road conflict, and higher non-farm public road use

- **No-Crash Farms**: report older drivers, low farm income, higher perception of public road driving danger

- Farm and non-farm vehicle public road sharing, conditions, and driver behaviors contribute to crashes.