CRASHES INVOLVING FARM TRACTORS AND OTHER FARM VEHICLES/EQUIPMENT IN NORTH CAROLINA 1995-1999

Prepared for:
Commercial Motor Vehicle Enforcement Section

NC Division of Motor Vehicles

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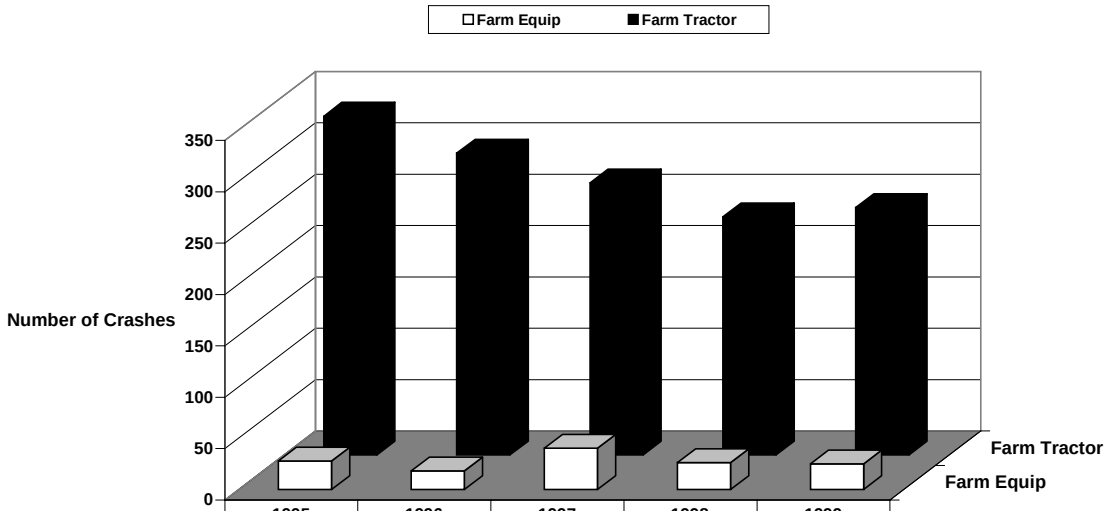
The following information on farm tractor and farm equipment involved crashes in North Carolina was prepared by the University of North Carolina Highway Safety Research Center (HSRC) at the request of the Commercial Motor Vehicle (CMV) Enforcement section of the North Carolina Division of Motor Vehicles (NCDMV). The data are for the five-year period 1995-1999.

CRASH FREQUENCY

Over the five-year period, 1995-1999, farm tractor-involved roadway crashes have decreased approximately 24 percent (from an average of 312 over the 2yr period 1995-99 to 236 for the 2yr period 1998-99 (see Figure 1). Crashes involving other motorized farm vehicles/equipment have remained relatively unchanged, with an average of approximately 27 per year (range: 18-40).

Figure 1
Farm Equipment and Farm Tractor Crashes in North Carolina
1995-1999

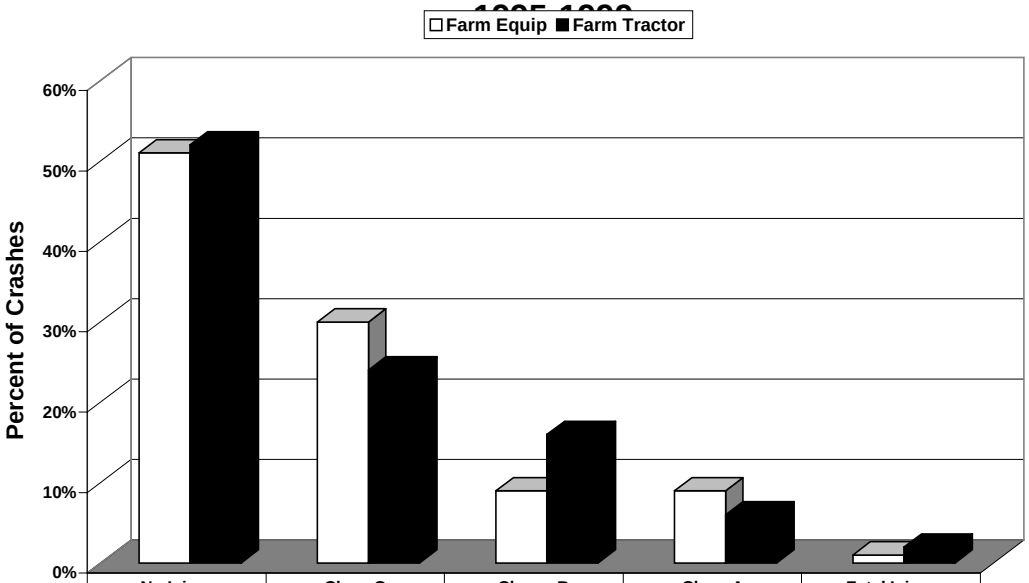


	1995	1996	1997	1998	1999
Farm Equip	28	18	40	26	25
Farm Tractor	330	294	265	232	241

ACCIDENT SEVERITY

Figure 2 shows data documenting the relative severity of crashes involving farm vehicles on the roadway. The data show that only 1 percent of all reported crashes involving farm vehicles/equipment other than farm tractors, per se, involved a fatality. Two percent of all crashes involving farm tractors involved a fatality. For both classes of vehicles (i.e., non tractor farm vehicles/equipment and farm tractors, per se), in slightly more than 50 percent of all crashes, no injury was reported.

Figure 2
Accident Severity Associated With Farm Vehicle-Involved Crashes



	No Injury	Class C	Classs B	Class A	Fatal Injury
Farm Equip	0.51	0.3	0.09	0.09	0.01
Farm Tractor	0.52	0.24	0.16	0.06	0.02

CRASHES BY COUNTY

Table 1 provides a list of crashes by individual county over the five year period from 1995 through 1999. The data are for farm tractors and other farm equipment *combined.* Robeson County had the highest number over the five year period with 54. The median number of crashes per county for the five-year period was 13. The smallest number of recorded crashes occurred in Cartaret, Clay, Dare, and Tyrrell counties, each of which had one recorded crash.

Table 1
Farm Tractor and Farm Equipment Involved Crashes in North Carolina
By Individual County
For the Period 1995-1999

County	Number of Crashes		County	Number of Crashes
Robeson	54		Stanley	13
Johnston	49		Cabarrus	12
Wake	47		Craven	12
Duplin	45		Wilkes	12
Columbus	43		Alexander	11
Sampson	43		Jones	11
Pitt	40		Warren	11
Wayne	40		Hertford	10
Edecombe	35		Orange	10
Nash	33		Pender	10
Guilford	30		Vance	10
Wilson	29		Anson	9
Harnett	28		Caswell	9
Iredell	28		Durham	9
Forsyth	27		Gates	8
Bladen	26		Lee	8
Mecklenburg	26		Perquimans	7
Halifax	24		Scotland	7
Randolph	24		Ashe	6
Rowan	24		Davie	6
Greene	23		Yancey	6
Franklin	22		Alleghany	5
Alamance	21		Chowan	5
Brunswick	21		Currituck	5
Martin	21		Hoke	5
Northhampton	21		McDowell	5
Union	21		Montgomery	5
Person	20		New Hanover	5
Surry	20		Richmond	5
Bertie	19		Washington	5
Granville	19		Caldwell	4
Rockingham	19		Haywood	4
Chatham	18		Macon	4
Cumberland	18		Polk	4
Davidson	18		Camden	3
Beaufort	17		Hyde	3
Cleveland	17		Mitchell	3
Yadkin	17		Transylvania	3
Catawba	16		Watauga	3
Lenoir	15		Cherokee	2
Moore	15		Jackson	2
Buncombe	14		Madison	2
Henderson	14		Pamlico	2
Pasquotank	14		Carteret	1
Stokes	14		Clay	1
Burke	13		Dare	1
Gaston	13		Tyrrell	1
Lincoln	13			
Onslow	13			
Rutherford	13			

TYPE OF VEHICLE INVOLVED IN CRASH

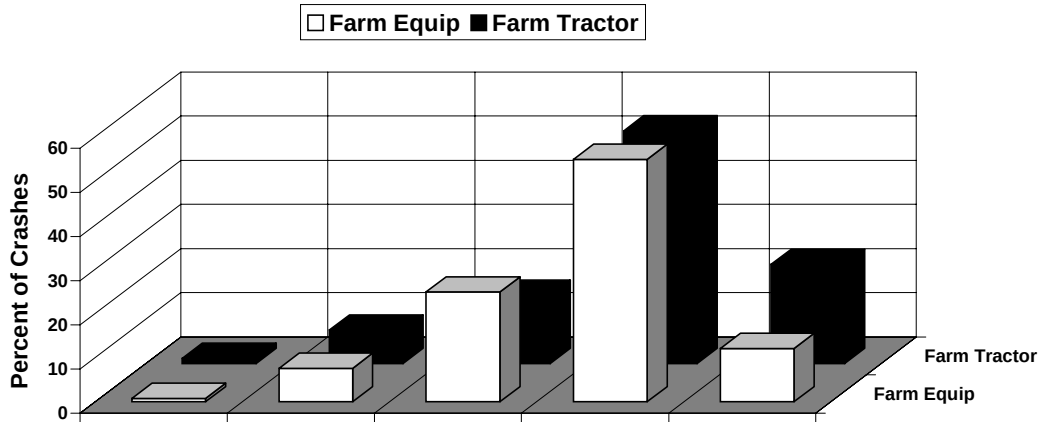
Table 2 lists the type of non-farm vehicle involved in the crash by age of the non-farm vehicle driver/operator. Vehicle types are ranked in order of their frequency of occurrence. The data show that 2,4 door passenger vehicles were the most frequency involved followed by pickup trucks. With respect to the age of the non-farm vehicle operator involved in the crash, the data show that the number of crashes increases as a function of age for drivers age 15 to 60, and then decreases for non-farm vehicle drivers 61 and over.

Table 2
Type of Non-Farm Vehicle Involved in Crashes with Farm Tractors and/or Farm Equipment By Age of Non-Farm Vehicle Driver

	10 to 14	15 to 20	21 to 30	31 to 60	61+	Total
2,4 Dr Sedan	0	177	231	351	153	912
Pickup Truck	0	50	60	142	31	283
Tractor Trailer	0	1	18	48	5	72
Van	0	1	14	46	11	72
Truck, 2 Axle	0	7	17	40	5	69
SW Passenger	0	6	13	37	12	68
SW Truck	0	0	9	18	3	30
Truck, 3 Axle	0	0	3	11	5	19
Motorcycle	0	0	3	4	1	8
Pedestrian	0	0	1	4	1	6
School Bus	0	0	0	5	0	5
Tractor Only	0	0	0	3	0	3
4 Axle Truck	0	0	3	0	0	3
Commercial Bus	0	0	0	1	0	1
Taxi	0	0	0	1	0	1
Bicycle	1	0	0	0	0	1
Self Contained RV	0	0	0	0	1	1
Other Motor Vehicle	0	0	0	0	0	0
Totals	**1**	**242**	**372**	**711**	**228**	**1554**

Figure 3 shows the distributions of driver ages for the driver/operator of the farm equipment, either farm tractor or other piece of farm equipment. The most frequently represented age group for drivers of both farm tractors and for other farm vehicles/equipment is the 31-60 year old group. In the 21-30 year old group, drivers/operators of non-tractor vehicles were more likely to be involved in crashes than were the drivers/operators of farm tractors. The opposite trend was true for driver/operators in the 61 year and over group, where a higher percentage of crashes were recorded for tractor operators than for operators of other farm vehicles.

Figure 3
Farm Driver Age by Vehicle Type 1995-1999

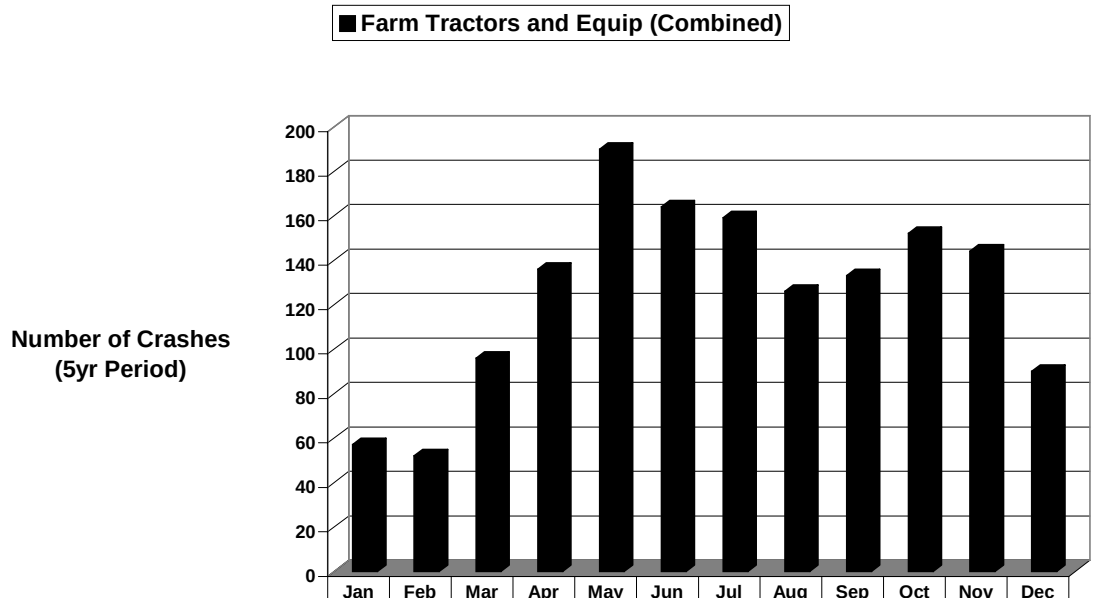


	10-14	15-20	21-30	31-60	61+
Farm Equip	0.75	7.52	24.81	54.89	12.03
Farm Tractor	1.18	7.58	15.46	52.71	22.45

CRASHES BY MONTH OF THE YEAR

Figure 4 shows the frequency of farm tractor and other farm vehicle/equipment crashes by month of the year. As would be expected, such crashes exhibit seasonal trends, with the highest number occurring in the months of April through July and again during the months of August through November.

Figure 4
Crashes by Month of the Year, 1995-1999

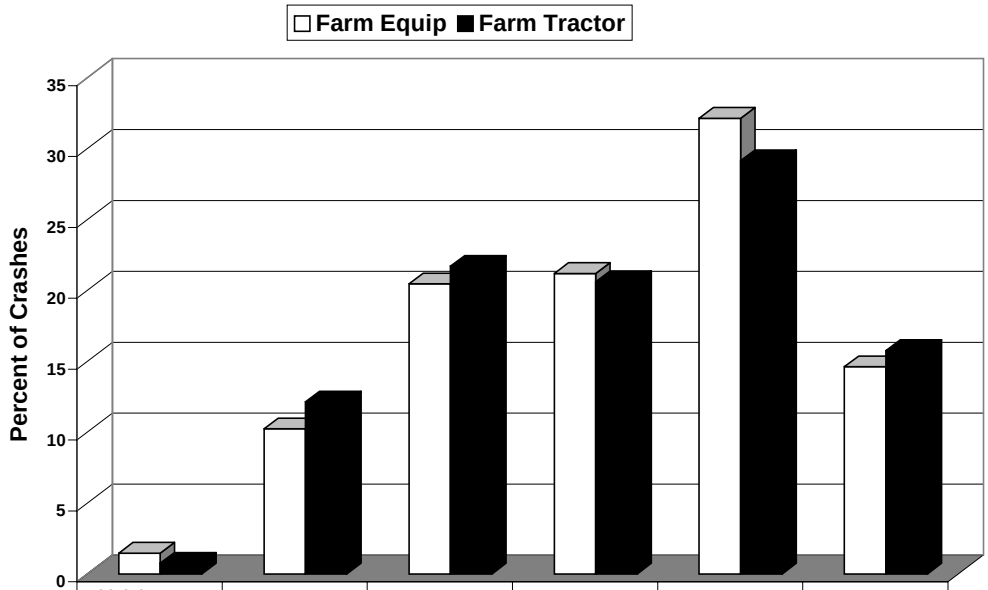


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Farm Tractors and Equip (Combined)	57	52	96	136	190	164	159	126	133	152	144	90

CRASHES BY TIME OF DAY

Figure 5 shows that farm tractor and other farm vehicle/equipment crashes peak during the period from 3pm to 6pm. Approximately 30 percent of all farm vehicle crashes were recorded during this period. The next most dangerous periods were from 9am to 3pm.

Figure 5
Crashes by Vehicle Type and Time of Day 1995-1999

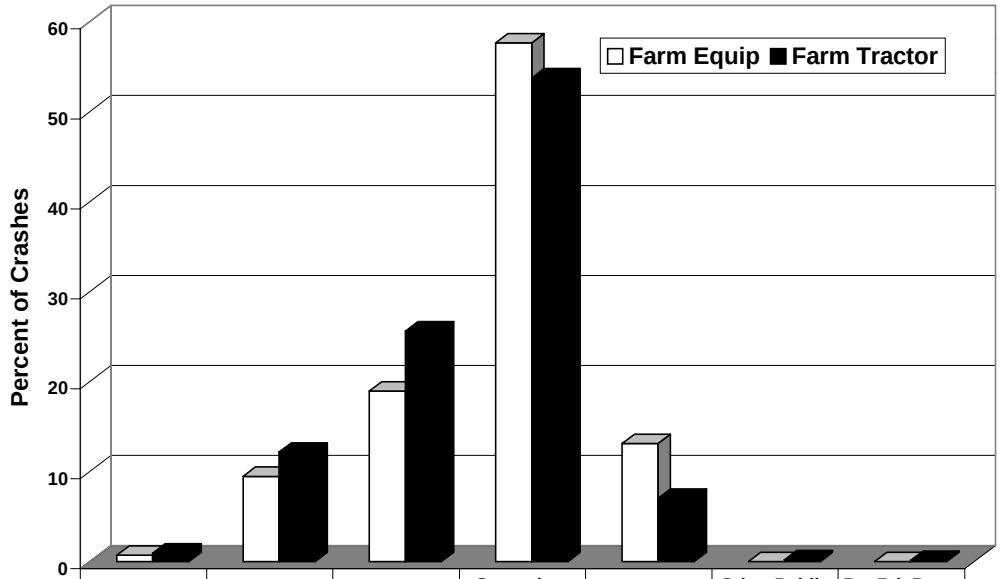


	Midnight to 5:59 AM	6:00 to 8:59 AM	9:00 to 11:59 AM	Noon to 2:59 PM	3:00 to 5:59 PM	6:00 to 11:59 PM
Farm Equip	1.46	10.22	20.44	21.17	32.12	14.6
Farm Tractor	0.74	12.13	21.69	20.59	29.12	15.74

FUNCTIONAL CLASS OF ROADWAY

Figure 6 shows that approximately half of all farm tractor and farm vehicle/equipment crashes occurred on secondary routes. Twenty-six percent of farm tractor crashes and 19 percent of farm equipment crashes were reported on NC-numbered routes. Farm equipment and farm tractor crashes on US-numbered routes were 9 and 12 percent, respectively.

Figure 6
Road Class by Vehicle Type 1995-1999



	Interstate	US Route	NC Route	Secondary Route	Local Street	Other Public Road	Pvt Rd, Prop, Dvwy
Farm Equip	0.73	9.49	18.98	57.66	13.14	0	0
Farm Tractor	0.96	12.2	25.64	53.78	7.05	0.22	0.15

CRASHES AND POSTED SPEED OF ROADWAY

Figure 7 is a plot of cumulative crash frequencies for farm tractors and other farm vehicles as a function of the posted speed of the roadway. The figure shows that fewer than 30 percent of all crashes, for either type of vehicle, occurred on roadways where the posted speed was 50mph or less. A sharp rise in the probability of a crash occurs when going from posted speeds of 50mph or less to speeds in excess of 50 mph. Irrespective of the particular posted speed, the data in Figure 8 show that speed was indicated as being involved in approximately 1/3 of all farm vehicle-involved crashes, and that the likelihood of speed being indicated as a factor varied inversely with the age of the driver (with the exception of a slight reversal for drivers 61 years of age and older.)

Figure 7
Crashes and Posted Speed by Vehicle Type 1995-1999

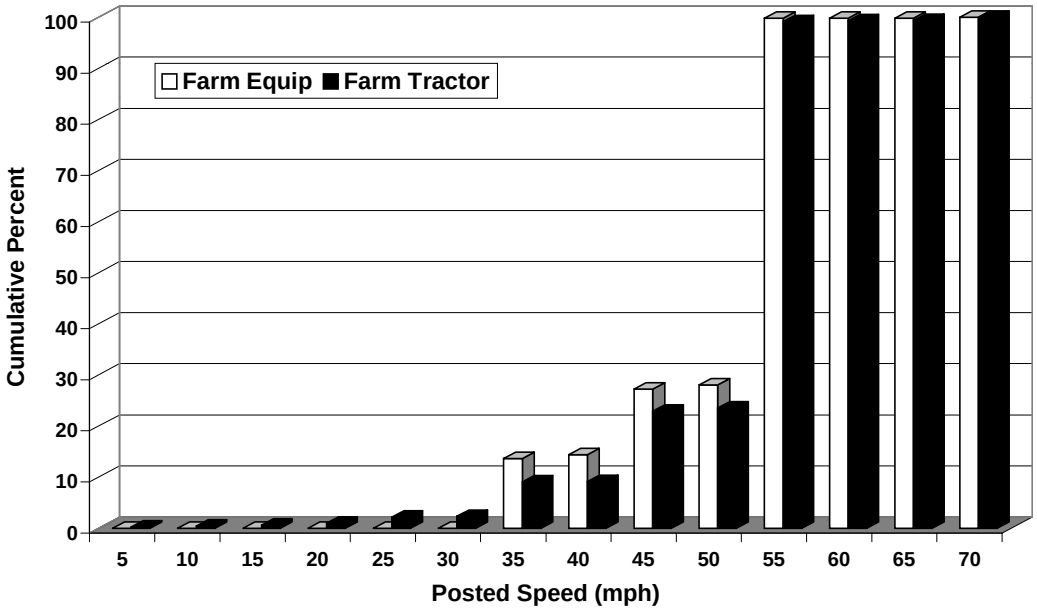
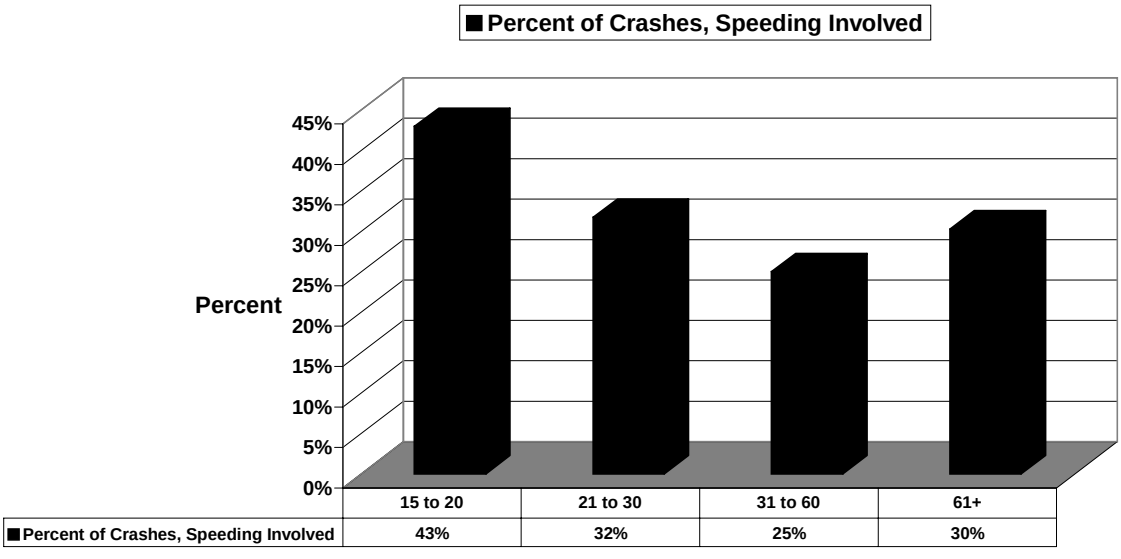


Figure 8
Percent of Farm Vehicle-Involved Crashes Where Speeding Was Involved 1995-1999



	15 to 20	21 to 30	31 to 60	61+
Percent of Crashes, Speeding Involved	43%	32%	25%	30%

VIOLATIONS

Table 3 provides data on the likelihood of a violation on the part of the farm vehicle driver/operator. The data are reported separately for the drivers/operators of tractors and other farm vehicles/equipment. The data for the period 1995-1999 indicate that the farm equipment driver/operator was cited in slightly over half the crashes (approximately 53 percent) and that the farm tractor operator was cited in approximately 47 percent of the reported crashes. The table provides information on the frequency of violations issued for each class of farm vehicle.

Table 3
Violations for Driver/Operator of Farm Vehicle

	Farm Equip		**Farm Tractor**
No Violation	***46.62***	***No Violation***	***53.01***
Veh Equip	11.28	Safe Movement Viol	15.84
Safe Movement Viol	11.28	Yield	6.41
Yield	9.02	Veh Equip	6.34
Left of Center	4.51	Other	4.79
Other	3.76	No Signal	2.47
Fail to Reduce Speed	2.26	DWI Alcohol	2.4
Improper Turn	2.26	Improper Turn	1.85
No Signal	2.26	Left of Center	1.55
Improper Backing	2.26	Fail to Reduce Speed	1.55
DWI Alcohol	1.50	Improper Parking	1.08
Stop Sign	0.75	Exceed Safe Speed	0.62
Other Impr Passing	0.75	Improper Backing	0.39
Improper Lane	0.75	Stop Sign	0.31
Improper Parking	0.75	Other Impr Passing	0.31
Traffic Signal	0.00	Improper Lane	0.31
Exceed Safe Speed	0.00	Impr Lane Change	0.31
Pass on Hill	0.00	Following Too Close	0.23
Impr Lane Change	0.00	Traffic Signal	0.15
Following Too Close	0.00	Pass on Hill	0.08

Table 4 provides information on the violations cited for the driver of the non-farm vehicle. Data are provided as a function of the age of the non-farm vehicle driver. The data show that failure of the non-farm vehicle driver to reduce speed was the most frequent violation and that speed-related violations represented four of the most frequently occurring non-farm driver violations. (Refer back to earlier figure showing that speeding violations were an inverse function of driver age; i.e. became less likely as the driver got older).

Table 4
Non-Farm Driver Violations

	10 to 14	15 to 20	21 to 30	31 to 60	61+	Total
No Violation	0	70	143	337	86	636
Fail to Reduce Speed	0	61	91	139	58	349
Other Improper Pass	0	35	65	108	45	253
Safe Veh Movement	0	5	19	34	6	64
Exceed Safe Speed	0	20	7	15	5	47
Exceed Speed Limit	0	18	13	12	3	46
DWI-Alcohol	0	6	10	14	3	33
Yield	0	1	3	5	3	12
Pass on Curve	0	3	2	2	4	11
Other	0	1	0	7	2	10
Veh Equipment	0	1	2	3	0	6
Pass on Hill	0	3	1	1	0	5
Improper Lane	1	0	1	2	1	5
Following Too Close	0	0	3	1	1	5
Stop Sign	0	2	1	0	0	3
Traffic Signal	0	2	0	1	0	3
DWI-Drugs	0	1	0	0	1	2
No Signal	0	2	0	0	0	2
Left of Center	0	0	0	2	0	2
Rt Turn on Red	0	1	0	1	0	2
Improper Backing	0	0	1	0	0	1
Total	**1**	**232**	**362**	**684**	**218**	**1497**

SUMMARY

Between 1995 and 1997, there were 1499 crashes on North Carolina roads involving farm tractors and/or other farm vehicles/equipment. 1362 crashes involved farm tractors; 137 crashes involved other farm vehicles/equipment. Robson Co. led the state with 54 farm vehicle-involved crashes during this period.

Crashes followed seasonal trends; were most likely to occur during the period between 3 and 6pm; and were most likely to involve a collision with a 2/4 door passenger vehicle or pickup truck.

On the average, the likelihood that such a crash resulted in an injury was about 50/50; with the probability of a fatality involved being generally about 1-2 chances in 100.

Crashes were most likely to occur on secondary routes or NC-numbered highways.

More than 70 percent of all farm vehicle-involved crashes occurred on roads with posted speeds in excess of 50mph. Speed was indicated as being involved in these crashes from 25 to 43 percent of the time, depending upon the age of the non-farm vehicle driver. Speed involvement was highest for drivers in the 15–to-20 year old range and decreased through age 60. Speeding violations accounted for four of the top five, non-farm vehicle driver violations. Failure to reduce speed was the most frequently identified violation.