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Commercial and Farm Vehicle Theft in Urban and Rural Australia

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COMMERCIAL AND FARM VEHICLE THEFT IN URBAN AND RURAL AUSTRALIA

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ABSTRACT

The aim of this research was to identify the extent of commercial and farm vehicle theft in Australia and to explore the theft profile of these vehicles in urban and rural areas. The research was conducted using data from the National Comprehensive Auto-theft Research System (CARS) database. The database holds police data on all motor vehicle thefts and vehicle registration data from all Australian states and territories.

While passenger vehicle and light commercial vehicle (PLC) theft in Australia has decreased significantly since 2001, theft of commercial and farm vehicles has remained constant. Nonetheless, theft of commercial and farm vehicles in rural areas has a significant impact on the owners in terms of loss of income and means of transport.

In the 2006/07 financial year, the estimated value of commercial and farm vehicle theft in Australia was $164.2 million. Utilities and motorcycles were the most popular theft targets and accounted for $43 million in unrecovered vehicles.

Motor vehicle theft is a significant and challenging problem. While Australian and international statistics on the incidence of motor vehicle theft are available (CARS 2007; FBI 2006; UK Home Office 2007), there is limited research into farm vehicle crime. Crime has been a part of Australian farm life since colonial times (Barclay 2001), however the complexity in preventing or reducing it lies in the numerous forms that exist including theft of livestock, horticulture, equipment, vehicles and fuel among various others.

Research conducted by the Australian Institute of Criminology (AIC) indicates that farmers experience crime rates up to double that of the general population (17% compared with 9%; Anderson and McCall 2005), and that farmers are particularly prone to repeat victimization (McCall and Homel 2003). Despite these

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[*]The National Comprehensive Auto-theft Research System (CARS) is a statistical and research service funded by the National Motor Vehicle Theft Reduction Council (NMVTRC) to inform effective vehicle theft reduction strategies. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the National Motor Vehicle Theft Reduction Council. Further information about the NMVTRC and CARS is available at www.carsafe.com.au and www.ncars.on.net.

figures, no comprehensive attempts have been made to prevent or reduce farm crime.

This research focuses on identifying the extent of one aspect of farm crime in Australia, that is, theft of motorized vehicles and equipment. For the purposes of this study, farm vehicle theft has been limited to self-propelled vehicles including utilities, motorcycles, trucks, and plant and equipment (such as tractors and truck mounted equipment). It should be noted that some of these vehicle body types are multi-purposed and can be used commercially on building sites in urban areas as well as in farms in the rural setting.

This study quantifies new knowledge to contribute to the scarce research available on theft of such vehicles as well as present implications for future policy.

LITERATURE REVIEW

Australia continues to fight against theft of motor vehicles. While there have been considerable reductions in motor vehicle theft over the years, a vehicle continues to be stolen every nine minutes in Australia. With more than 70,000 thefts of motor vehicles in the 2006/2007 financial year, there is still a long way to go in theft prevention. International comparisons show that Australia has a similar rate of motor vehicle theft per population to other western countries. In 2006, the motor vehicle theft rate in Australia was 3.7 per 1,000 population while United Kingdom (England and Wales) and United States of America had a theft rate of 4.0 per 1,000 population (FBI 2006; UK Home Office 2007).[1]

Several theories exist about theft of motor vehicles including routine activity and rational choice theory. The routine activity approach is when crime opportunities arise for motivated offenders lacking capable guardianships (Cohen and Felson 1979). On the other hand, the rational choice perspective is when offenders are rationally deciding in terms of choosing targets and selecting the theft location, considering factors such as the existence of security personnel or devices (Cornish and Clarke 1986). These theories form the basis for two distinct categories of motor vehicle theft offenders: opportunistic and professional. Opportunistic theft is primarily for short-term personal use such as transportation, to commit another crime, or joyriding.

[1]Caution must be used when making comparisons between countries because definitions of motor vehicle theft, recording methods and periods of measurement all vary by country.

Professional theft is usually for cash profit through illegal on-selling of vehicles as a whole, or as components. While the overall motor vehicle theft trend is known, no evidence is available on trends of particular commercial and farm-related vehicle theft nor have comparisons been made between these vehicles in rural and urban settings of Australia.

Australian data on farm related vehicle crime is limited to surveys conducted by the Australian Institute of Criminology (AIC). Their most recent National Farm Crime Survey, 2002-03, of 4,717 completed questionnaires from farmers on their experiences and perceptions of crime, found that 17% of farmers surveyed reported experiencing some type of crime in the past 12 months, with theft of machinery, equipment, vehicles, materials, tools or spare parts being the most common (6%), followed by livestock theft (5%) (Anderson and McCall 2005). This survey also showed that both farms that were in very remote locations and those in very accessible areas were more prone to experiencing crime than farms in other areas, but the type of crime varied by level of remoteness of the property. Highly accessible farms were more likely to experience theft of machinery and equipment, vehicles, tools and spare parts, as well as robbery, while very remote farms were more likely to experience livestock theft, illegal hunting and illegal dumping of waste. Differences were also seen between states and territories with Tasmania (TAS) showing the highest rate of crime victimization (26%) while Queensland (QLD) and Victoria (VIC) showed the lowest (14%).

An analysis by postcode showed that farms on or near state/territory borders were more likely to experience crime than farms in other locations. Very large farms were also more likely to experience crime than smaller farms.

Recent qualitative research has shown that farm crime is characterized by low rates of reporting to the police, meaning that studies based on police recorded crime data are likely to underestimate crime rates. In 2002-03 only 40% of farmers surveyed said they had reported the crime to police but this varied widely depending on the type of crime (Anderson and McCall 2005). Theft of vehicles was commonly reported to police (66%) although this dropped from 82% found in the previous survey (2001-02) (McCall 2003). Reporting rates also varied by jurisdiction with Tasmania showing the highest reporting rate (47%) while New South Wales (NSW) reported the lowest (36%). The most common reason given for not reporting the theft of farm vehicles was that police were thought to be unable to do anything about the crime due to a lack of proof (38%). Twenty one percent of farmers thought that the police could not do anything about it and 8% of vehicle

owners did not report theft due to a lack of insurance as a police report is required to submit an insurance claim.

Overseas research on farm vehicle theft are mainly based on agricultural crime as a whole and do not focus on theft of farm vehicles. However, studies include a qualitative survey of farm crime in Scotland in 1998 based on 1,022 randomly selected farmers (George Street Research 1999). It showed similar findings to the AIC survey regarding the extent of farm crime and the attitudes of farmers and under-reporting of thefts. A smaller scale qualitative research (120 farmers) was conducted in the United Kingdom and found that 55% had suffered burglary with farm machinery being the most popular target (BBC 1999).

To date there have been no Australian studies investigating theft of commercial and farm vehicles and machinery, in particular.

Given the high rate of crime experienced by farmers, the impact on vehicle owners both socially and economically, and the lack of previous research into this topic, an investigation of trends in theft of commercial and farm vehicles and machinery is worthwhile. The current study differs from the previous Australian research in that while previous studies have been based on victimization surveys, this study is based on reported vehicle theft data provided by police in each Australian jurisdiction.

Therefore the broad aims of this paper are as follows:

1. To determine the extent of commercial and farm vehicle theft in Australian States and Territories.
2. To outline any trends in:
    a. Vehicle-related factors (i.e., types of vehicles stolen, vehicle age, recovery status and estimated value of vehicles)
    b. Temporal factors (i.e., month, day and time stolen), and
    c. Geographical factors (i.e., locations of recovered vehicles).

METHODOLOGY

The current study uses data from the National Comprehensive Auto-theft Research System (CARS) database. Established to provide consistent and comprehensive motor vehicle theft data Australia-wide, the database holds police data on all motor vehicle thefts and vehicle registration data from all Australian states and territories.

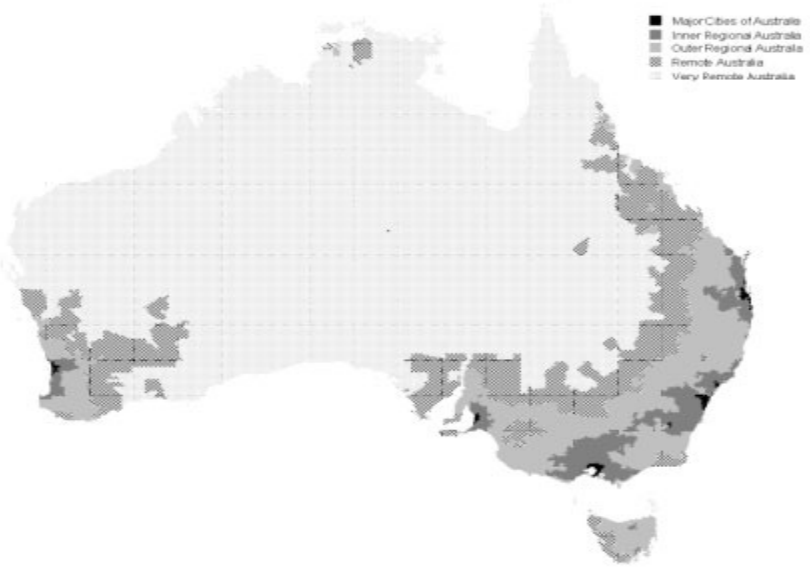
This study utilizes police data on self-propelled farm vehicle thefts that occurred in all jurisdictions between July 1999 and June 2007. For the study, farm vehicles were classified based on the following self-propelled body types; utilities,

motorcycles, trucks and plant and equipment (including truck mounted equipment where the sole purpose of the truck is to move the equipment).

The locations of farm vehicle thefts were divided into five regions based on the Australian Bureau of Statistics' (ABS) Remoteness Structure of the 'Australian Standard Geographical Classification' (AGSC) (Australian Bureau of Statistics 2006). The remoteness areas are classified according to an index based on the road distance to urban centers as a measure of service access. These remoteness areas (RAs) include 'Major Cities of Australia, Inner Regional Australia, Outer Regional Australia, Remote Australia and Very Remote Australia'. For example, farms that have the least access to service centers are classified as 'very remote'. The 2006 ABS RA data were released at the collector district (CD) level.

This was redistricted to create an Australian map aggregated by RA category. RA data for Australian postcodes was then calculated by overlaying derived postcode data on the aggregated RA layer and assigning the RA category that made up the largest proportion of a derived postcode area (Map 1). This RA data by postcode was then merged back into CARS theft data for both the theft incident postcode and recovered location postcode. Thefts with an unknown postcode were excluded from the sample (this accounted for 0.4% of cases). Throughout the paper, three comparison levels of remoteness are used: major cities to represent urban areas; regional (combining outer and inner regional) and remote (combining remote and very remote) areas to represent rural areas.

MAP 1. MAP OF AUSTRALIA DEFINED BY LEVEL OF REMOTENESS.



Registration data on commercial and farm vehicles were used to derive a RA category based on the 'garaged' postcode of the registered vehicle. Some cases, however, did not link to a remoteness area and were accounted for by determining the remoteness area of the closest postcode. This was carried out for approximately 10 percent of the registered vehicle figures. Unknown figures refer to postcodes that were completely invalid and therefore could not be linked to any remoteness area. In addition, these figures do not represent all of the possible vehicles as many motorcycles and tractors are not registered and potentially other types of commercial and farm vehicles may also not be registered.

Study Limitations

There are several study limitations to be noted. Firstly, as mentioned previously, not all thefts of commercial and farm vehicles or equipment are reported to police therefore the findings may be an underestimate of the extent of vehicle theft. Secondly, for the purposes of this study, defining farm vehicles using CARS body type data was only feasible and as some of these vehicle body types are multi-purposed and can be commercially used on building sites in urban areas there is an unavoidable overlap with vehicles used in rural settings. Also, there is an unavoidable crossover in vehicles that can be used for noncommercial passenger only transport, particularly in urban areas. This refers to motorcycles included to incorporate off-road motorcycles that are commonly used on farms. However, the data could not be separated into on and off-road motorcycles. It is believed that many motorcycles stolen from major cities would be used for noncommercial passenger purposes and therefore the data does not clearly represent motorcycle theft in a farm setting. Findings need to be considered with caution.

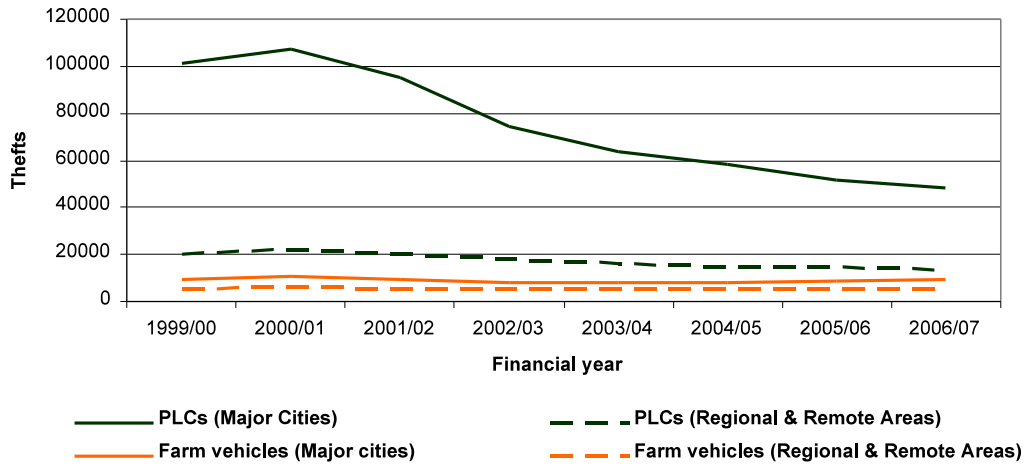
On the other hand, CARS does not provide data on non-self propelled machinery such as trailers and tractor attachments such as hoes, and therefore such equipment, which may be found on farms are excluded. For simplicity, the word farm is used throughout this research article to refer to commercial and farm vehicles.

FINDINGS

National Profile of Farm Vehicle Theft

While theft of PLC vehicles has significantly reduced throughout Australia over time, both in major cities and regional and remote areas, farm vehicle theft[2] has remained relatively constant, as shown in Figure 1. The decline in PLC theft since the peak in 2001 has been substantial with a reduction from 107,175 thefts in 2000/01 to 61,933 thefts in 2006/07 (42% decrease). On the other hand, there have not been any significant changes in farm vehicle theft (14,522 thefts in 1999/00 to 14,439 thefts in 2006/07) suggesting this to be of concern.

FIGURE 1. COMPARISON OF ALL PLC VEHICLE THEFTS WITH FARM VEHICLE THEFTS, IN MAJOR CITIES AND IN REGIONAL AND REMOTE AREAS, 1999/00 - 2006/07.



PLC vehicles in major cities of Australia made up the greatest volume of thefts with 48,556 in 2006/07 compared with 9,169 thefts of farm vehicles in major cities in 2006/07 (Table 1). Also, theft of farm vehicles occurred more in major cities compared with regional and/or remote areas.

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[2]This category includes vehicles with a body type of utility, truck, motorcycle and truck mounted equipment. Utilities are part of the passenger/light commercial vehicles category as well as the farm vehicles category and therefore results in an overlap in the two groups.

A comparison of farm vehicle theft between the jurisdictions of Australia in 2006/07 shows the theft rate per 1,000 population to be highest in Northern Territory (NT) and Western Australia (WA) (Table 2). This, clearly, is due to these jurisdictions consisting largely of remote and very remote areas (Map 1). Overall, there is a low recovery rate of farm vehicles in Australia (53.6%), particularly in Victoria. The recovery rates of farm vehicles, in particular, are considerably lower than that of all vehicles in Australia (72.8%). There are several different explanations for these differences that will be discussed throughout this paper.

TABLE 1. THEFT COMPARISON OF PLC AND FARM VEHICLES IN THE DIFFERENT REMOTENESS AREAS, 2006/07.

	PASSENGER/LIGHT COMMERCIAL VEHICLES		FARM VEHICLES	
AUSTRALIAN REMOTENESS AREAS	NUMBER OF THEFTS	PROPORTION OF THEFTS (%)	NUMBER OF THEFTS	PROPORTION OF THEFTS (%)
Major cities.	48,556	78.4	9,169	63.5
Inner regional.	8,308	13.4	2,812	19.5
Outer regional.	3,550	5.7	1,568	10.9
Remote.	698	1.1	369	2.6
Very remote. ...	753	1.2	508	3.5
Unknown.	68	0.1	13	0.1
Total.	*61,933	100.0	14,439	100.0

*This figure does not match the total figure of passenger/light commercial vehicle theft in Australia for 2006/07 as thefts with an unknown postcode were excluded from the sample.

Table 3, which presents theft and recovery data for each jurisdiction, broken down by region type, highlights that theft of farm vehicles followed a similar pattern across major cities and regional and remote areas, in 2006/07. Generally, the recovery rate of farm vehicles was higher for those stolen in regional and remote areas as opposed to major cities.

The number of registered farm vehicles, as shown in Table 4, was greater in regional and remote areas than major cities, as expected. The highest proportion

of registered farm vehicles was in Queensland followed by New South Wales. However, as previously mentioned, this is not an accurate representation of farm vehicles due to many of these vehicles not being registered. It is valid that these do not require registration as most of commercial and farm vehicles are not used on the road.

TABLE 2. SUMMARY OF THEFTS AND RECOVERIES OF FARM VEHICLES ACROSS AUSTRALIA, 2006/07.

JURISDICTION*	NUMBER OF THEFTS	RECOVERED	PERCENT RECOVERED	THEFT RATE PER 1,000 POPULATION
ACT.	192	123	64.1	0.57
NSW.	4,995	2,517	50.4	0.73
NT.	284	196	69.0	1.34
QLD.	2,518	1,524	60.5	0.61
SA.	1,116	597	53.5	0.71
TAS.	265	209	78.9	0.54
VIC.	2,723	1,121	41.2	0.53
WA.	2,346	1,458	62.1	1.13
Total.	14,439	7,745	53.6	0.69

*ACT=Australian Capital Territory, NSW=New South Wales, NT=Northern Territory, QLD=Queensland, SA=South Australia, TAS=Tasmania, VIC=Victoria, WA=Western Australia

Overall, postcodes situated closer to urban areas were more likely to experience theft of farm vehicles. This is demonstrated by data for 2006/07, in which major cities recorded 9,169 thefts while regional areas recorded 4,380 thefts and remote areas documented 877 thefts (Table 1). The greater volume of thefts in major city areas has remained the case for the last eight years and this is demonstrated by major cities accounting for approximately 60% of the farm vehicle thefts from 1999/00 until recently.

TABLE 3. SUMMARY OF THEFTS AND RECOVERIES OF FARM VEHICLES IN MAJOR CITIES AND REGIONAL AND REMOTE AREAS OF AUSTRALIA, 2006/07.

	MAJOR CITIES			REGIONAL AND REMOTE AREAS		
JURISDICTION *	NUMBER OF THEFTS	PERCENT OF THEFTS	PERCENT RECOVERED	NUMBER OF THEFTS	PERCENT OF THEFTS	PERCENT RECOVERED
ACT.	171	1.9	64.3	21	0.4	61.9
NSW.	3,201	34.9	48.4	1,794	34.1	54.0
NT.	0	0.0	0.0	284	5.4	69.0
QLD.	1,474	16.1	57.5	1,041	19.8	64.9
SA.	830	9.1	53.1	285	5.4	54.4
TAS.	0	0.0	0.0	265	5.0	78.9
VIC.	1,898	20.7	42.4	818	15.6	38.6
WA.	1,595	17.4	59.2	749	14.2	68.5
Total.	9,169	100.0	51.2	5,257	100.0	58.0

*ACT=Australian Capital Territory, NSW=New South Wales, NT=Northern Territory, QLD=Queensland, SA=South Australia, TAS=Tasmania, VIC=Victoria, WA=Western Australia

TABLE 4. SUMMARY OF REGISTERED FARM VEHICLES IN MAJOR CITIES AND REGIONAL AND REMOTE AREAS OF AUSTRALIA, AS OF DECEMBER 31, 2006.

JURISDICTION	MAJOR CITIES	REGIONAL AND REMOTE AREAS	UNKNOWN	TOTAL	% OF REGISTERED VEHICLES
ACT.	25,272	2,623	0	27,895	0.9
NSW.	320,822	413,091	5,451	739,364	24.8
NT.	0	36,956	27	36,983	1.2
QLD.	304,729	458,719	2,320	765,768	25.7
SA.	93,958	141,947	19	235,924	7.9
TAS.	0	101,462	412	101,874	3.4
VIC.	286,106	399,755	81	685,942	23.0
WA.	185,139	199,144	89	384,372	12.9
Total.	1,216,030	1,753,697	8,395	2,978,122	100.0

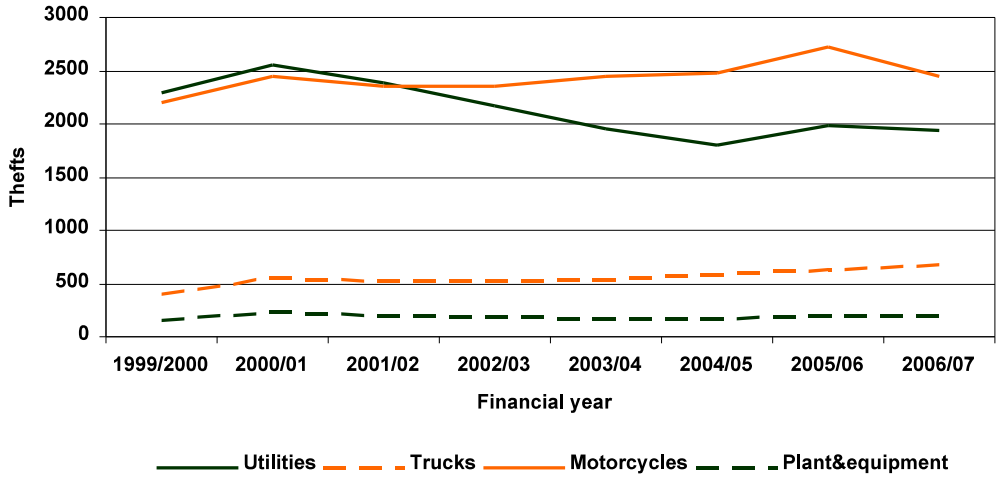
NOTE: The figures for registered vehicles are provided as a guide only as not all farm vehicles require registration. ACT=Australian Capital Territory, NSW=New South Wales, NT=Northern Territory, QLD=Queensland, SA=South Australia, TAS=Tasmania, VIC=Victoria, WA=Western Australia

Stolen Vehicle Profile

Type of vehicles stolen. Among the four types of farm vehicles, thefts of utilities and motorcycles were more common than trucks and plant and equipment in regional and remote areas. While utilities have shown an overall reduction in thefts since 1999, rapidly declining since 2001, thefts of motorcycles and trucks have increased, and plant and equipment theft has remained stable (Figure 2). A similar theft pattern was seen in major cities for the different farm vehicles. Appendix A outlines the number of thefts of the four different types of farm vehicles, by region type, 1999/00 to 2006/07.

To determine whether there were any differences in the theft profile of these vehicles in the different regions, a comparison of this was made for the most recent financial year (2006/07), as shown in Figure 3.

FIGURE 2. THEFT OF FARM VEHICLES IN REGIONAL AND REMOTE AREAS BY VEHICLE TYPE, 1999/00 - 2006/07



While the proportion of thefts of the different farm vehicles were similar in the major cities compared with regional areas, obvious differences in theft of these vehicle types were identified in remote areas compared with the other regions. As opposed to major cities and regional areas, remote areas recorded fewer thefts of motorcycles and more utility thefts. Remote area thefts of trucks were almost double than that found in regional areas and more than such thefts in major cities (Figure 3).

As previously discussed, motivations for theft are varied. A vehicle may be stolen for joyriding or transport, to aid in the commission of another crime or for other profit motivated schemes such as rebirthing. A crude indicator of whether a vehicle is stolen for short or long term gain is recovery status. Non-recovered vehicles are considered stolen for profit and may involve fraud, theft for parts, rebirthing, or export overseas. Recovery status can differ widely depending on the type of vehicle stolen.

While differences between recovery rates of vehicles in major cities versus regional areas of Australian States and Territories, in 2006/07 were only small, (Table 3) substantial differences in the proportion recovered were seen in remote

areas and some variations were seen depending on the types of vehicles stolen (Figure 4).

FIGURE 3. THEFT OF FARM VEHICLES IN MAJOR CITIES, REGIONAL AND REMOTE AREAS BY VEHICLE TYPE, IN 2006/07.

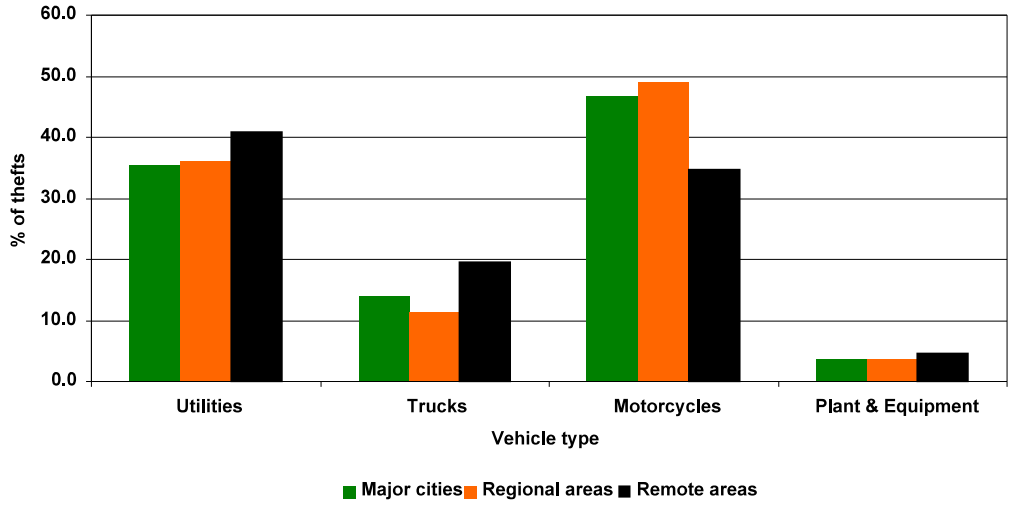
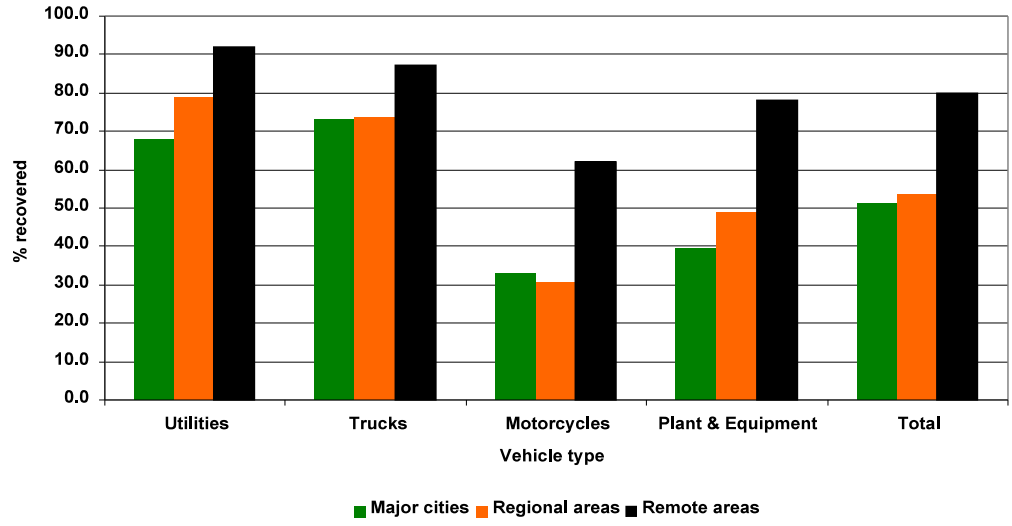


FIGURE 4. PROPORTION OF FARM VEHICLES RECOVERED IN MAJOR CITIES, REGIONAL AND REMOTE AREAS CITIES IN 2006/07, BY VEHICLE TYPE.



In particular, motorcycles and plant and equipment stolen from remote areas were recovered to a much greater extent than in the other regions. Overall recovery patterns were similar with the different vehicle types, in that utilities and trucks recorded the highest recovery rates in all region types.

Age of vehicles stolen. The 2006/07 CARS annual report showed that older vehicles were more popular theft targets overall (CARS 2007). The characteristic of farm vehicles differs from the motor vehicles as a whole. While theft of older vehicles remains to be common, Figure 5 shows that during 2006/07, many farm vehicle thefts (44% in major cities; 34% in regional areas and 38% remote areas) were made up of newer vehicles (manufactured from 2000-2007). This was similar to the motorcycle theft profile and hence might be dominated by newer motorcycles being stolen. Nonetheless, there were many vehicle thefts in regional and remote areas for which the year of vehicle manufacture was unknown. Most of this group was made up of motorcycle and plant and equipment theft, as shown in Figure 6 below.

FIGURE 5. PROPORTION OF THEFTS OF ALL TYPES OF FARM VEHICLES DURING 2006/07 IN AUSTRALIA, BY YEAR OF MANUFACTURE.

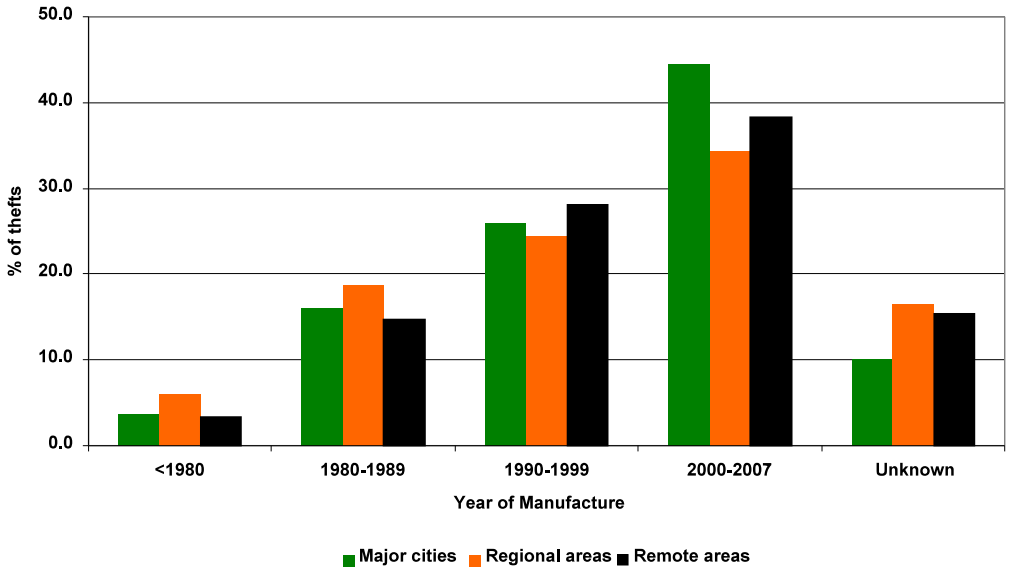


Figure 6 and Figure 7 show a breakdown of the year of manufacture into the different types of farm vehicles, differentiated by region type.

They indicate that almost half the newer vehicles stolen in regional and remote areas (44%) and over half in major cities (57%) were motorcycles and approximately one third constituted trucks in both regions.

Despite unknowns, theft of plant and equipment in regional and remote areas may be largely dominated by vehicles manufactured after 1990 and this was similar in major cities. Newer plant and equipment were more popular theft targets than the older vehicles (Figure 7). The larger proportion of these late model plant and equipment vehicles being stolen in major cities compared with regional and remote areas may be due to the availability of these newer vehicles in major cities. It is believed that in regional and remote areas there would be many older plant and equipment as they are expensive to replace in the short-term. Overall, the least number of stolen farm vehicles was those manufactured before 1980 and while these may be easy target vehicles, are probably not worth enough to be stolen for financial gain. Alternatively, theft of newer vehicles may also be associated with older vehicles ceasing to exist.

FIGURE 6. PROPORTION OF STOLEN FARM VEHICLES IN REGIONAL AND REMOTE AREAS OF AUSTRALIA DURING 2006/07, BY YEAR OF MANUFACTURE AND VEHICLE TYPE.

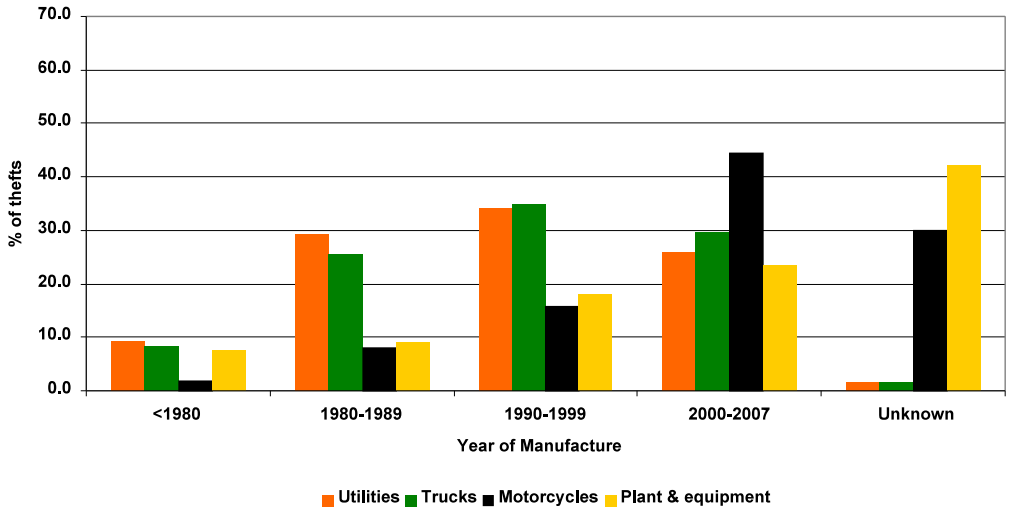
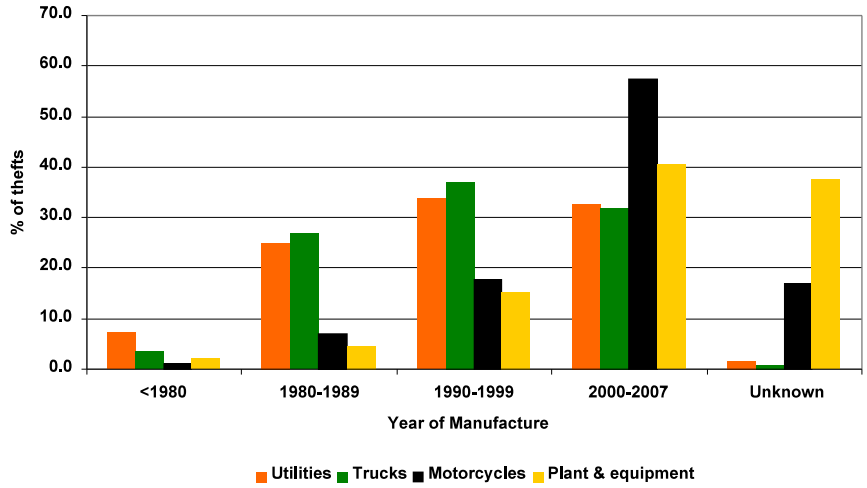


FIGURE 7. PROPORTION OF STOLEN FARM VEHICLES IN MAJOR CITIES OF AUSTRALIA DURING 2006/07, BY YEAR OF MANUFACTURE AND VEHICLE TYPE.



Value of vehicles stolen. An attempt was made to estimate the value of stolen farm vehicles, as to date, there has been limited data reported on the value of these types of vehicles. These figures are based on the vehicle value estimates provided to police by the victim at the time the theft was reported. While many stolen vehicles have unspecified values (approx. 60%), the data is presented as a guide. To obtain a better indicator of vehicle value, the data reported in this paper are based on four states that provide value estimates on more than 80% of the stolen vehicles. This includes the states Northern Territory, South Australia, Tasmania and Victoria and was considered a reasonable indicator of the Australia-wide situation.

Table 5 shows the mean values of the four different types of farm vehicles. Plant and equipment were by far the most valuable and motorcycles were the least valuable. However, the total value of stolen vehicles was dominated by utilities followed by trucks. This was due to the large proportion of utilities being stolen and while trucks were the third most popular theft target, they have a mean value of almost $25,000 each.

Although motorcycles represent the lowest mean vehicle value, they have the most significant impact in terms of cost, because of the low recovery rate contributing the most to the value of unrecovered vehicles.

TABLE 5. MEAN AND TOTAL VALUE ESTIMATES OF STOLEN AND UNRECOVERED VEHICLES BY VEHICLE TYPE, IN 2006/07.

VEHICLE TYPE	MEAN VALUE OF STOLEN VEHICLE ($)*	TOTAL VALUE OF STOLEN VEHICLES ($)#	TOTAL VALUE OF UNRECOVERED VEHICLES ($)^
Utilities.	10,937	56,707,080	19,669,767
Trucks.	24,465	47,951,636	11,737,911
Motorcycles.	5,132	34,632,767	23,314,643
Plant and equipment.	45,704	24,908,527	12,194,621
Total.	-	164,200,011	66,916,943

*The mean vehicle value is based on the four states (NT, SA, TAS, VIC) that have the most comprehensive value estimates. #The total value of stolen vehicles was calculated using the mean value of stolen vehicles multiplied by the total number of thefts in Australia. ^The total value of unrecovered vehicles was calculated by the mean value of unrecovered vehicles (not reported here) of the four states (NT, SA, TAS, VIC) multiplied by the total unrecovered vehicles Australia-wide.

A breakdown of estimated value by the type of region indicates the following results: the total value of stolen farm vehicles in major cities in 2006/07 was approximately $113.3 million, while regional areas reported approximately $41.5 million and thefts in remote areas were estimated to be worth $ 8.9 million[3].

Temporal Factors

Month, day and time of vehicle stolen. Examination of temporal patterns of farm vehicle theft across urban and rural areas reveal minimal differences regarding the calendar month, the day and time in which vehicles were stolen. Across all regions, thefts of farm vehicles were most popular on Fridays and Saturdays between 4.00pm and midnight, similar to the all vehicle theft trend.

[3]These figures used the mean value of stolen vehicles (based on NT, SA, TAS and VIC figures) which varied depending on the region and multiplied by the number of thefts in that region.

Vehicles recovered by days elapsed since theft. In this analysis, the number of days between reported vehicle theft and recovery were compared between major cities and regional/remote areas. Data used was based on the earliest possible time of theft. Regional and remote area recovery times were not separated as in other results due to the similar vehicle recovery times found in the two areas. After one day of being stolen, 58% of farm vehicle thefts were recovered from a regional or remote area compared with 41% of farm vehicles being recovered from a major city during the same time. The recovery rate at one week was high, although higher for thefts in regional and remote areas.

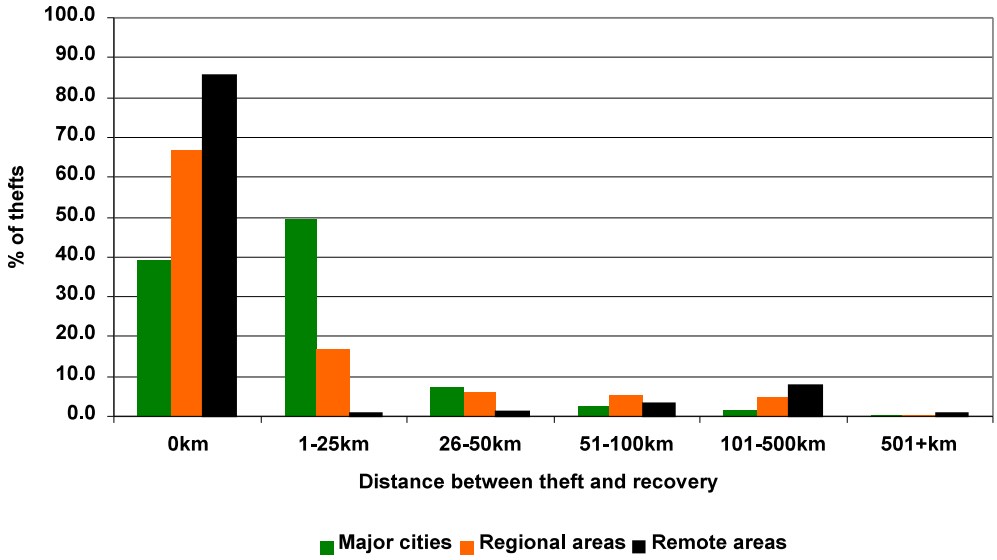
A closer look at the time from theft to recovery for the different body types of farm vehicles revealed interesting findings. While there was hardly any difference in the time to recovery of motorcycles in major cities versus regional and remote areas, there were considerably higher numbers of utilities, trucks and plant and equipment recovered more quickly when stolen from regional and remote areas.

Geographical Factors

Distance between vehicle theft and recovery location. The following analysis examined the distance between where the vehicle was stolen and where it was recovered. This distance was based on the centroids of the theft and location postcodes, and the Euclidean (or 'straight-line') distance between these. Therefore a vehicle stolen and recovered within the same postcode was recorded here as recovered zero kilometers from the theft location. This gives a rough indication of the distance between the two locations, but it does not take into account any driving that occurred between theft and recovery of the vehicle. These figures do not include data for Victoria and Western Australia as recovery postcodes are not provided by these states. Figure 8 indicates that most of the vehicles were stolen and recovered within the same postcode. Postcodes in regional and remote areas may constitute large areas therefore explaining the peaks of theft proportions in these areas recovered in the same postcode (0km). Thefts in major cities were less likely to be recovered in regional and remote areas and generally, the theft of farm vehicles is localized.

Findings on the distance between theft and recovery, broken down by vehicle type, indicate that over three-quarters of the plant and equipment vehicles were largely recovered in the same postcode. This also ties in with the short recovery time (<1day) for many of plant and equipment vehicles (72%). Closer analysis of the 101-500km distance group highlights that two-fifths were made up of recovery of newer model vehicles (those manufactured from 2000 onwards).

FIGURE 8. DISTANCE BETWEEN CENTROIDS OF THEFT AND RECOVERY POSTCODES BY REGION TYPE IN 2006/07.



DISCUSSION

While recent surveys, conducted by the AIC, indicated that theft of machinery, equipment, vehicles, materials, tools or spare parts are very common, as reported by farmers, the extent of the problem of farm vehicle theft and any differences between urban and rural areas remained unclear. To profile farm vehicle theft, a first for Australia, this study summarized farm vehicle theft statistics from Australian States and Territories.

The findings from this research show that farm vehicle theft has remained stable throughout Australia for the last eight years and remains a concern in both urban and rural areas. This is an Australia-wide problem, more heavily affecting the larger populated cities. However the theft rate per 1,000 population was greatest in Northern Territory and Western Australia as they are very remote regions of Australia.

The total estimated value of farm vehicles stolen during the 2006/07 financial year was $164.2 million and $66.9 million worth of farm vehicles remained unrecovered during this period. While theft patterns of farm vehicles were driven by thefts in major cities, worth approximately $113.3 million in 2006/07, the impact of farm vehicle theft does extend to the wider community. There are, also,

other costs associated with theft of farm vehicles, not taken into consideration in these figures, such as temporary replacement costs and loss of productivity.

Motorcycles followed by utilities represent most of farm vehicle theft. While they have been popular targets since at least July 1999, there have been changes over time. In particular, utilities have seen a dramatic reduction in thefts since 2001 and the introduction of immobilizers on all new cars sold from July 2001 may partly explain this trend. Although fitting of immobilizers is not compulsory for utilities, some manufacturers include immobilizers as standard equipment in utilities.

Motorcycles are, indeed, the biggest problem among farm vehicles. This is both in terms of high percentage of theft and low rate of recovery. Newer models are more often stolen than older motorcycles. This finding may be a result of profit-motivated schemes toward stealing motorcycles because of the wider market for stolen motorcycles as opposed to other farm vehicles. The portability of motorcycles allows them to be easily loaded onto another vehicle and/or disassembled into parts. Motorcycles, although worth the least individually among other types of farm vehicles, constituted the greatest financial problem with respect to the total estimated value of unrecovered farm vehicles, making up more than one third of the total.

In all regions, approximately two fifths of the farm vehicles stolen in 2006/07 were manufactured since 2000. Newer model plant and equipment vehicles were popular, particularly in major cities, where they also have low rates of recovery.

Anecdotal evidence suggests that there is an extensive and accepted theft culture regarding theft of plant and equipment vehicles. This theft culture may contribute to the low recovery rate found for plant and equipment vehicles. Like off-road motorcycles, there are no mandatory registration requirements for plant and equipment vehicles and identification marks are often limited to non-unique serial numbers, complicating interpretation or verification of vehicle legitimacy by non-experts. Individually, plant and equipment vehicles have a higher average value than motorcycles ($45,704 vs. $5,132), therefore when they are stolen, it potentially has a more detrimental impact on the owner.

Farm vehicles stolen from regional and remote areas have shorter recovery times than those from major cities. Within one week, 75% of the farm vehicles stolen in major cities and 85% of those stolen in regional and remote areas were recovered. Despite this, the issue of farm vehicle theft remains localized. Many vehicles were recovered less than 25km from where it was stolen.

Plant and equipment vehicles, in particular, are mostly recovered in the same postcode that also explains the short recovery time of these vehicles. Those not

recovered locally are largely made up of newer model vehicles, that is, those manufactured since 2000.

Overall, findings stated in this paper are likely to be an underestimate of the farm vehicle theft profile due to under-reporting by owners.

The most common reason given by farmers, for not reporting the crime was that police were thought to be unable to do anything about the crime (Anderson and McCall 2005). Reporting rates are also likely to be related to whether or not the farmer had insurance as a police report is generally required to submit an insurance claim.

CONCLUSION

Farm vehicle theft is more of a problem in major cities, both regarding the volume and estimated value of thefts. While theft in regional and remote areas is a smaller problem, it can have a larger negative impact on the owners as the vehicle is generally very important to their livelihood. Of the farm vehicles focused on in this paper, motorcycles are the biggest concern, in particular newer models that are more valuable. They contribute most to the theft numbers, are recovered the least and in turn cost the community the most with the total value of unrecovered vehicles amounting to $23.3 million in 2006/07. This highlights future crime prevention strategies should focus on motorcycles as a priority. This may pose significant challenges as off-road motorcycles are outside the mainstream vehicle registration system.

Although addressing the theft of all types of farm vehicles may be difficult, this research has given an insight into the problem, highlighting areas of concern regarding popular vehicles and target areas that may help to reduce the incidence of this crime in the future. This research is the first of its kind in Australia and there is very limited international work therefore further research is required into farm vehicle theft to identify the most effective strategies to prevent such crime.

Policy Implications

To reduce the incidence of commercial and farm vehicle theft, vehicle security needs to be increased. In Australia, the introduction of immobilizers as mandatory standard equipment has been shown to reduce the incidence of PLC vehicle theft (Kriven and Ziersch 2007). Motorcycles sold new in Australia do not require immobilizers as standard equipment, and this study has shown motorcycle theft to be the biggest part of the farm vehicle theft problem. Unfortunately, even if a motorcycle has an immobilizer, it can still be lifted onto another vehicle and taken

away, so an effective strategy that addresses both stopping motorcycles from being started and stopping them from being easily movable is needed.

An immobilizer fitment scheme may be considered for new trucks as well as plant and equipment vehicles and possibly retrofitted in older vehicles similar to the scheme introduced in WA made compulsory in 1999. The WA immobilizer fitment scheme requires all passenger vehicles aged up to 25 years to be fitted with an immobilizer on change of ownership if the vehicle does not already contain one. Following the introduction of the scheme, thefts of passenger/light commercial vehicles fell dramatically in WA. This may be an effective strategy to address the theft of older commercial and farm vehicles, some of which are expensive.

Beyond individual vehicle security, increased security in areas such as commercial/building sites in major cities and farms in rural areas may reduce theft of all types of farm vehicles, in particular, during times when the area is not occupied.

Also important in reducing the incidence of commercial and farm vehicle theft is increasing owner awareness of the importance of securing vehicles. This might involve highlighting the social and economic impact of a theft to owners of farm vehicles or encouraging awareness about the importance of locking vehicles after use and securing the vehicle keys.

As discussed previously, most commercial and farm vehicles are not required to be registered as they are not used on public roads. This prevents any form of accurate tracking and identification of the vehicle after it has been sold. A proposed strategy to improve this is to use the current registration infrastructure to incorporate farm vehicles as well. This may be complex as farm vehicles may not comply with the standards associated with registering a vehicle for use on public roads. Therefore an alternative to this is to create a personal property register to incorporate vehicles that do not require registration. In this way, a record of the vehicle's identity will exist along with current owner details. This would also address concerns of some second hand dealers, who will be more certain they can guarantee title of the vehicles they sell.

Crime prevention approaches that are found effective in reducing the number of farm vehicles stolen in Australia will also help to address the overall motor vehicle theft problem, particularly motorcycles and will reduce the cost to the community.

REFERENCES

Anderson, Katherine M. and Marissa McCall. 2005. *Farm Crime in Australia*. Canberra: Australian Institute of Criminology.

Australian Bureau of Statistics. 2006. *Statistical Geography Volume 1: Australian Standard Geographical Classification*. Cat No. 1216.0. Australian Bureau of Statistics, Canberra.

Barclay, Elaine. 2001. *A Review of the Literature on Agricultural Crime: Report to the Criminology Research Council*. NSW: Institute for Rural Futures, University of New England.

British Broadcasting Commission (BBC). 1999. *Crime Wave Strikes Farmers*, Countryfile, Retrieved July 19, 2008 (http://www.bbc.co.uk/search).

Comprehensive Auto-theft Research System (CARS). 2007. "CARS Annual Report 2006/07." Retrieved June 18, 2008 (http://www.ncars.on.net/publish.asp).

Cohen, Lawrence E. and Marcus Felson. 1979. "Social Change and Crime Rate Trends: A Routine Activities Approach." *American Sociological Review* 44:588-608.

Cornish, Derek and Ronald V. Clarke. 1986. "Introduction." Pp. 1-16 in *The Reasoning Criminal*, edited by D. Cornish and R.V. Clarke. New York: Springer-Verlag.

Federal Bureau of Investigation (FBI). 2006. "Motor vehicle theft." Retrieved June 18, 2008. (http://www.fbi.gov/ucr/cius2006/offenses/property_crime/motor_vehicle_theft.html).

George Street Research. 1999. *Crime and the Farming Community: The Scottish Farm Crime Survey, 1998*. Edinburgh: The Scottish Office, Central Research Unit.

Kriven, Sophie and Emma Ziersch. 2007. "New Car Security and Shifting Vehicle Theft Patterns in Australia." *Security Journal* 20(2):111-22.

McCall, Marissa. 2003. *Results from the 2001-02 National Farm Crime Survey*. Australian Institute of Criminology Trends and Issues in Crime and Criminal Justice, No.266.

McCall, Marissa and Peter Homel. 2003. *Preventing Crime on Australian Farms: Issues, Current Initiatives and Future Directions*. Australian Institute of Criminology Trends and Issues in Crime and Criminal Justice, No.268.

UK Home Office. 2007. *Crime in England and Wales 2006/07*, edited by S. Nicholas, C. Kershaw and A. Walker. Retrieved June 18, 2008 (http://www.homeoffice.gov.uk/rds/pdfs07/hosb1107.pdf).

APPENDIX A

TABLE 6. THEFT OF FARM VEHICLES, BY VEHICLE AND REGION TYPE, 1999/00-2006/07.

	FINANCIAL YEAR							
Remoteness area	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Major cities								
Utilities.	4,591	5,121	4,575	3,822	3,305	3,167	3,135	3,246
Trucks.	1,172	1,323	1,220	1,088	1,214	1,133	1,188	1,288
Motorcycles.	3,343	3,831	3,599	3,167	3,385	3,667	3,963	4,291
Plant and equipment.	347	360	325	253	273	269	270	344
Regional areas								
Utilities.	1,881	2,067	1,945	1,764	1,602	1,523	1,633	1,578
Trucks.	349	477	451	435	449	470	489	499
Motorcycles.	1,853	2,104	1,982	2,000	2,182	2,217	2,338	2,144
Plant and equipment.	139	192	173	149	159	145	177	159
Remote areas								
Utilities.	415	494	436	408	345	276	355	359
Trucks.	50	70	70	92	92	118	140	172
Motorcycles.	347	335	366	349	266	255	381	305
Plant and equipment.	21	35	32	33	17	29	23	41
Total.	14,522	16,435	15,198	13,572	13,309	13,289	14,108	14,439