

# ANALYSIS OF THE NUMBER OF ANIMALS THAT WERE RUN OVER ON SLOVENIAN ROADS

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## ABSTRACT

The background of our research lies on the observation that road safety is crucial for ensuring quality in the road traffic management. In recent years there has been a huge investment in building of new roads and highways, and the improvement of living standards lead us to an increase in the number of drivers and vehicles on the road.

Drivers and other road users, vehicles and roads are the most important factors determining road safety. However, we believe that attention should also be devoted to an additional factor, namely domestic and wild animals that at some point find themselves on the roads and represent a threat to itself and drivers.

In this paper we present findings of a detailed analysis about the animals that were run over on Slovenian roads during the period from 2005 to 2009. The data were also compared with data from a similar study done in 1996, helping us to get a picture about the growth in the number of animals that were run over in the last fifteen years.

**Keywords:** road traffic, run over animals

## 1 INTRODUCTION

We live in a time when road transport is of paramount importance. The development of road infrastructure is an indicator of the development of countries, regions and cities. In Slovenia the length of highways represents today just 1.69 percent of the total road network. The rest of the network is represented by a lower category of roads where there are no wire fences to prevent animals from gaining access to the road. Therefore, it often happens that animals are involved in car accidents.

The paper presents the number of animals that have been run over on Slovenian roads, a factor in the safety level of Slovene roads.

## 2 RUN OVER WILD ANIMALS

Today in Slovenia the data about run over animals are collected by the Institute of Slovenia's forests. Since the largest share among run over animals is represented by deer, we will devote this first part of the article to deer, and later we will focus also on the other wild animals such as wild boar, hare, fox and pheasant. These animals were also part of a similar study done in 1996, so this helps as to get a clearer picture about the increase in the number of wild animals that were run over in the last fifteen years.

### 2.1 Deer

From the data in table 1, we can see that of the years depicted 2006, the most deer were killed- 12,668. In the same year there was also the highest number hit by cars -6,484, 51 % of the total of dead deer. In 2007, the number of dead deer decreased to 8,905, while the number

hit by cars decreased to 5,226, which is 59 % compared with deer killed by vehicles. In the years 2008 and 2009 both the number of dead and run over deer increased.

If we compare the data from the year 1994 and 2009, we can see that the number of dead deer increased by 64.39 %, while the number of hit deer increased by 82.12 %.

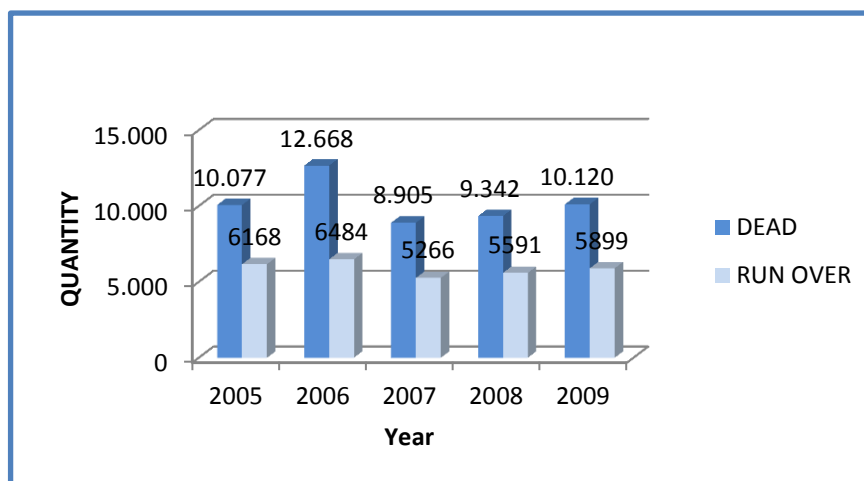
**Table 1: Number of dead and run over deer**

NUMBER OF DEAD AND RUN OVER DEER			
YEAR	DEAD	RUN OVER	%
1994	6,156	3,239	52
2005	10,077	6,168	61
2006	12,668	6,484	51
2007	8,905	5,266	59
2008	9,342	5,591	60
2009	10,120	5,899	58
<b>TOTAL (2005-2009)</b>	<b>51,112</b>	<b>29,408</b>	<b>58</b>

Source: adapted from source [3]

According to the Institute of Slovenia's Forests and the Hunting Association of Slovenia, which are the only institutions that collect indicative data about the wild animal population in Slovenia, the number of deer in 2009 and 2010 ranged between 130,000 and 150,000.

In 2009 in Slovenia between 21.8 % and 25.1 % of the total deer population were shot, while the share of deer run over amounted to between 3.9 % and 4.5 %. Considered by percentage this may not seem like a lot, yet, on the other hand, 5,899 deer actually is a significant number.



**Figure 1: Number of dead and run over deer;** Source: authors

Table 2 shows the share of deer run over in comparison with deer shot in 1993 and between 2005 and 2009. We can see that in 1993 the number of shot deer was much higher than in later years, 38.83 % higher than in 2009. In 1993 the number of deer run over was 41.53 % lower than in 2009. The index of run over deer was the largest in 2006 (22%), and the lowest in 2007 (16%). The highest number of deer shot from 2005 to 2009 was 33,724 in 2008, which may merely indicate there was an increase in the deer population at the time.

**Table 2: Comparison of run over and shoot deer**

COMPARISON OF RUN OVER AND SHOOT DEER				
R	YEA	RUN OVER	SHOT	%
	1993	3,449	45,431	7,6
	2005	6,168	32,863	19
	2006	6,484	30,066	22
	2007	5,266	32,966	16
	2008	5,591	33,724	17
	2009	5,899	32,724	18

Source: adapted from source [3]

The total number of dead deer in 2005 was 10,077, while in 2009 there were 10,120 dead deer, which means that the number of dead deer increased only by 0.4 %.

**Table 3: Dead and run over deer in Slovenian regions**

DEAD AND RUN OVER DEER IN SLOVENIAN REGIONS							
	2005			2009			
REGION	DEAD	RUN OVER	%	DEAD	RUN OVER	%	INDEX
NOVOMEŠKA	503	319	63	440	257	58	0,80
GORENJSKA	1417	928	65	1453	799	55	0,86
KOČEVSKO-BELOKRANJSKA	485	300	62	539	343	64	1,14
NOTRANJSKA	457	249	54	539	279	52	1,12
PRIMORSKA	413	314	76	468	342	73	1,09
POHORSKA	826	374	45	772	310	40	0,83
POSAVSKA	485	269	55	489	295	60	1,10
POMURSKA	1111	866	78	959	786	82	0,91
SAVINJSKO-KOZJANSKA	1161	619	53	1026	534	52	0,86
SLOVENSKO-GORIŠKA	711	491	69	807	490	61	1,00
TRIGLAVSKA	263	143	54	280	126	45	0,88
ZAHODNO-VISOKOKRAŠKA	500	298	60	592	334	56	1,12
ZASAVSKO	472	224	47	468	229	49	1,02
KAMNIŠKO-SAVINJSKA	535	281	53	434	204	47	0,73
PTUJSKO-ORMOŠKA	738	493	67	854	571	67	1,16
TOTAL	10077	6168	61	10120	5899	58	0,96

Source: adapted from source [3]

In table 3 above we can see the percentage of dead and run over deer in Slovenian regions. The regions with the highest number of run over deer in 2009 were Gorenjska and Pomurska, the same as it was in 2005. Looking at the run over deer in Slovenian regions, we can see that the regions where there was an increase in 2009 over 2005 were Kočevska, Belokranjska, Notranjska, Primorska, Posavska, Zahodno Visoko-Kraška and Ptujsko-Ormoška region.

Comparing the dead deer and run over deer in 2009 with the data of 1995, we can see that in the year 1995 there were 6,156 dead deer and 3,239 run over deer. From this we can conclude that the number of dead deer increased by 64 % compared with the year 1995, while the number of run over deer increased by 82 %, which may be attributed to the large number of registered vehicles and longer road network. In 1995, the length of the Slovenian road network amounted to 14,836 km and there were 833,158 registered vehicles. In 2009 the length of the road network was 38,925 km and there were 1,366,561 registered vehicles.

Considering the length of the Slovenian road network in 2009 and the run over deer in the same year, we can calculate that for every kilometre of road there was an average 6.6 run over deer, or an average of 659 deer hit per 100 kilometres of roads. If we compare these data with the data of 1995 we can see that at that time there were 4.6-deer run over for each kilometre of road and on average 458 deer per 100 kilometres, which is much less than today.

**Table 4: Slovenian roads data**

	1995	2000	2005	2006	2007	2008	2009
SLOVENIAN ROAD NETWORK (km)	14,836	20,177	38,485	38,562	38,709	38,872	38,925
HIGHWAYS (km)	293	427	568	580	580	616	658
REGIST. MOT. VEHICLES IN SLO	833,158	1,035,395	1,204,242	1,235,297	1,286,903	1,343,252	1,366,561
REGISTRED CARS IN SLOVENIA	698,211	847,941	960,213	980,261	1,014,122	1,045,183	1,058,858
KILOMETERS COVERED (mio km)					12,121	12,711	
KILOMETERS COVERED (by cars)					10,133,50	10,549,10	

Source: adapted from source [5]

From table 4 we see that the road network in Slovenia in 2009 compared with 1995 increased by 162 %, while highways increased by 125 %. The number of registered vehicles and cars increased, too, by 64 % and 62 %, respectively.

## 2.2 Other wild animals

In this sub-section we will analyse the other wild animals that were included in this study, wild boar, hare, fox and pheasant.

**Table 5: Dead and run over wild animals**

ANIMAL/YEAR	2005	2006	2007	2008	2009	TOTAL
DEER						
DEAD	10,077	12,668	8,905	9,342	10,120	51,112
RUN OVER	6,168	6,484	5,266	5,591	5,899	29,408
%	61	51	59	60	58	58
WILD BOAR						
DEAD	145	154	153	209	186	847
RUN OVER	73	69	74	108	72	396
%	50	45	48	52	39	47
HARE						
DEAD	1,064	799	882	854	744	4,343
RUN OVER	905	733	817	743	690	3888
%	85	92	93	87	93	90
FOX						
DEAD	1,070	1,181	1,227	1,371	1,295	6,144
RUN OVER	707	725	840	921	891	4084

%	66	61	68	67	69	66
PHEASANT						
DEAD	615	144	121	177	64	1121
RUN OVER	158	50	58	58	47	371
%	26	35	48	33	73	33

Source: adapted from source [3]

In 2009 5,899 deer were run over, 72 wild boar, 690 hares, 891 foxes and 47 pheasants. Foxes, the most often hit by cars after deer, were hit most often in 2008 and 2009.

When comparing 2005 and 2009 we see that in 2005 there was the highest number of dead and run over hares-1064 dead hares and 905 run over hares. This means that 85 % of all dead hares died on the roads. In later years the number of run over hares decreased, and in 2009 we had 744 dead hares and 690 run over hares, which means that now 93 % of hares died on roads.

In 2005 dead pheasants totaled 615, while run over pheasants amounted to 158. That represents 26 % of all dead pheasants. In the next years the numbers decreased, and in 2009 we had 64 dead pheasants and 47 run over pheasants, which represents 73 % of the dead. This means that the main cause of pheasant death is road vehicles.

In the case of wild boars the picture is a little bit different. In 2005 there were 145 dead boars and 73 run over boars, which accounts for 50 % of the dead boars. In both cases the numbers increased, and were the highest in 2008, while in 2009 the numbers decreased and we had 186 dead boars and 72 run over boars, which account for 39 % of all dead ones. We can conclude that the number of run over wild boars is decreasing.

According to the Institute of Slovenia's forests and Hunting Association of Slovenia, the population of the above mentioned wild animals for the years 2009 and 2010 was as follows:

- deer between 130,000 and 150,000 head
- wild boar between 20,000 and 30,000 head
- hares between 5,000 and 7,000 head
- fox approximately 20,000 head
- pheasant between 5,000 and 7,000 head

According to the above estimates, we can see that the proportion of run over animals in comparison with the estimated population in all cases is very small. We can therefore conclude that the highest share of those run over is in the hare category.

### 2.3 Domestic animals

The data about run over domestic animals were the most difficult to obtain, since nobody collect them intentionally. Today, the responsibility for removing dead animals from the road falls to hygienists – the National Veterinary Institute, so we asked them for the data. Even there the data are not collected specifically, but it was possible to obtain some information from the notes of the hygienists in various regions of Slovenia.

The obtained data are shown in the table below. Table 6 shows that from 2009 to 2010, the number of run over dogs and cats increased. In 2009 the highest number of run over dogs was in the areas of Murska Sobota and Nova Gorica, while the highest number of run over cats was in the Maribor-Ptuj and Kranj-Ljubljana area. In 2010, both the number of run over dogs and cats increased. The highest number of dogs were run over in the area of Ljubljana-Kranj and Murska Sobota, representing 27.46 % and 24.03 % run over dogs, or a total of 225 dogs, which is 51.49 % of all run over dogs.

**Table 6: Number of domestic animals runs over**

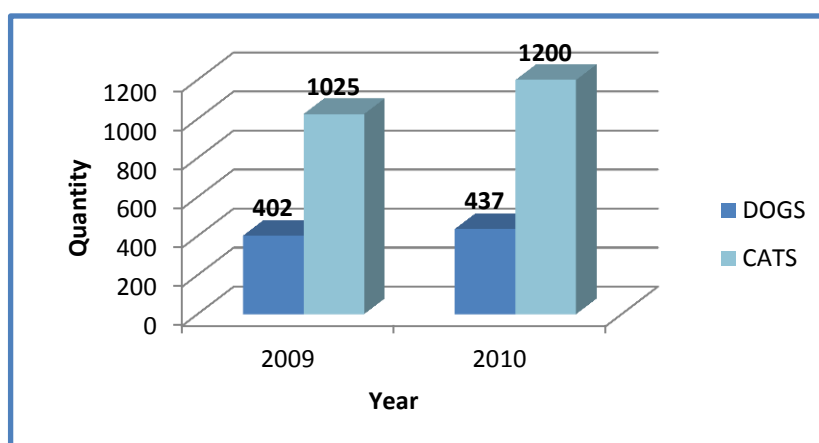
REGION/ANIMAL	DOGS		CATS	
	2009	2010	2009	2010
Murska Sobota	102	105	82	74
Celje	35	41	57	52
Novo Mesto	44	46	122	145
Nova Gorica	86	68	232	318
Maribor, Ptuj	64	57	297	296
Ljubljana, Kranj	71	120	235	315
TOTAL	402	437	1025	1200

Source: UL-VF, NVI

The highest number of cats has been run over in the area of Ljubljana-Kranj and Nova Gorica, which in percentage stood at 26.25 % and 26.50 %. Together this amounted to 633 cats or 52.75 % of all run over cats.

The relationship between run over cats and dogs is next: if we suppose the number of cats is 100 %, then the number of run over dogs is 36 %, which means that on our roads the number of run over cats is three times higher than the number of run over dogs.

The length of the Slovenian road network in 2009 was 38,925 km. We may thus calculate that every 96.83 km a dog was run over and every 37.98 km a cat was run over. We can also obtain a more drastic number-that every 27.32 km one or the other domestic animal was run over in Slovenia.



**Figure 2: Run over domestic animals by years;** Source: authors

If we compare the run over dogs and cats in 2010 and 1995, when the total number of run over dogs was 618 and total run over cats was 661 we can see that the number of run over dogs decreased by 29.3 % in 2010, while the number of run over cats increased by 81.5 %. Today the number of run over cats in Slovenia is three times higher than the number of run over dogs.

In 1995, the road network in Slovenia was 14,836 km long, which would mean that for every 24 km a dog was run over, for every 22.44 km a cat. Together, this would mean that for every 11.60 km one of these domestic animals would die on the road.

### 3 CLAIMS

To obtain a more realistic picture of the phenomenon of run over animals on Slovenian roads, we asked an important insurance company for information on the amount of claims received regarding accidents that involved animals. Most insurance companies do not collect

data in such a way that could help our research, while some of them simply do not want to make the information public.

But one company provided us with figures enabling us to obtain an approximate idea of the amount of such claims. The number of claims was as following:

- in 2008-1766 claims
- in 2009-2215 claims
- in 2010-1826 claims

According to the insurance company, the amount of damage to the cars is increasing from year to year, which is mainly attributable to the fact that vehicle prices are higher every year, as well as to the fact that over the years the prices of car repairs are much higher.

Using the information we were able to obtain, we concluded that the annual cost to insurance companies due to accidents, involving animals is between 2,000,000 and 2,500,000 euro.

#### **4 SURVEY RESULTS**

As earlier mentioned, we used a survey as an buttress to this study. This survey was done on a sample of 50 drivers within the area of Primorska.

Respondents were randomly selected and of different ages. Survey questions were linked to gender, age, how long they have had a driving license, how many kilometers per year they drive, and whether they have hit any animal, and, if so, which one. The survey involved 22 females and 28 males. The ages of respondents ranged from 18 to 67 years.

The results of the survey are as follows:

Respondents ran over a total of 33 animals, including four dogs, nine cats and twenty other animals-deer, hedgehogs, foxes, birds and frogs.

Fourteen people ran over just one animal, while four people ran over two animals. Two people ran over three animals and one person ran over five animals. Five animals were run over by a person in the group below 25 years of age. Most animals have been run over by people over 45 years old (8-12: people-animals), followed by persons below 25 years (5-10: people-animals), followed by people below 35 years (6-9: people-animals), and finally two persons in the group up to 45 years, who ran over two animals.

#### **5 CONCLUSION**

From the data obtained, we can conclude that in recent years the number of animals run over has been increasing constantly, and the numbers far exceed those of 1995. Among the selected animals that most often hit in recent years is the deer, but if the percentage of previously extant animals killed on the road is taken into account, the hare suffers most. The total number of domestic animals run over in 2009 and 2010 compared with 1995 also increased, but the relationship is not the same. The number of cats increased by a little more than 80 %, while the number of run over dogs decreased by almost 30 percent.

We presume that the reason for this situation lies in the construction of new roads and highways in recent years, as well as in the increase in the volume and speed of traffic.

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