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National transport statistics in Denmark
– based on data from periodic vehicle inspection

Transmitted by the Danish Road Directorate

1. Introduction

The national transport statistics in Denmark are used for several different purposes and are a significant element in the decision-taking not only in the area of traffic and transport but also for decisions on, for instance, environmental matters, in the field of energy, tax and duty matters.

A main element in the transport statistics is the specification of the total annual volume of road traffic – vehicle-kilometres – for the various vehicle categories. This specification forms the basis of the transport amount for most vehicles types.

Up to now the specification of road traffic volume has been based on several different sources. For most vehicle categories, the main feature in the method has been that the results from an investigation on travel habits/practices from 1981 (performed by telephone interviews) has constituted the base for determination of the activity level. The development in the level has been determined by the “road traffic index” of the Danish Road Directorate, which is based on approximately 300 permanent traffic count sites distributed on the road network. The statistics for lorries have been based on the journey dairy investigations performed by Statistics Denmark.

It has been known that a major uncertainty was related to the results produced by this method. At the end of the 90s, the Danish Road Directorate became aware of the fact that the method for calculating the road traffic index resulted in an overestimation of the development in

the road traffic volume. Therefore, several new traffic count sites were established and the method of calculating was revised in such a way that the road traffic index today presents a more precise picture of the development in the road traffic volume. However, it is not possible to revise the previous time series for the road traffic index. Therefore, it is also not possible to adjust the previous time series of the road traffic volume yet the calculation is partly based on the road traffic index. With a large certainty, it has been possible to determine that the estimated level of the road traffic volume has been too high, but there is no basis for adjustment.

Furthermore, the previous method had the weakness that only a moderate level of specification could be obtained and even, in some cases, it was necessary to assume the same development over the years for different means of transport.

With the introduction of periodic vehicle inspection from 1 January 1998, registration of the vehicles mileage at each inspection was initiated. This has given new possibilities for determining the traffic volume of Danish vehicles based on an ongoing "total count". In autumn 2002, the Danish Ministry of Transport and Energy and the Danish Road Directorate initiated a project with the purpose of calculating the road traffic volume based on the vehicle inspection data. After completion of the project, the evaluation is that the new method gives a more precise estimation of the actual road traffic volume than previously has been available. Moreover, it is possible to obtain more detailed statistic information. Therefore, it has been decided that such specification should form the basis in order to determine the volume of road traffic in the future.

The road traffic volume can be determined on vehicle inspection data from the year 2001 and forward. As expected, the change in use of method has resulted in a significant level change in the statistics. As it is estimated that the results of the new method are far more reliable, it has been decided that the previous time series (starts in 1980) should be adjusted to avoid discontinuity in data and older data should be brought closer to the presumed actual level.

Below there is a description of how the calculation of the new data is performed and the new data is scrutinized and discussed. Furthermore, the interfaces of the different application areas of the transport statistics are discussed.

2. Data sources

After the introduction of periodic vehicle inspection, most vehicles pass inspections with fixed intervals after the following rules: As a principal rule, passenger cars and vans have their first inspections four years after their first registration and afterwards every second year. Taxis, emergency vehicles, buses and lorries have to pass inspection one year after their first registration and afterwards once every year. Rental vehicles have to pass inspection two years after their first registration and afterwards every second year. Motor cycles are not required to pass periodic inspection. Inspection of motor cycles is only required when they change owners. Mopeds and bicycles do not have to pass any inspections at all. Therefore, alternative methods are applied for the two wheelers – these methods will not be analysed in the present paper.

Until the year 2004, all vehicle inspections in Denmark were performed by a national agency, the Danish Motor Vehicle Inspection Office, which also managed the data collection. By the turn of the year 2004/2005, the vehicle inspection system was privatized. However, Applus+, which bought the Danish Motor Vehicle Inspection Office, is dominating the market. The data

collection is performed individually by the different companies and they report to the national Road Safety and Transport Agency. Still, there are no experiences with the use of data after the new organization of the vehicle inspection in Denmark.

At present, calculations of the road traffic volume have been completed for the years 2001, 2002 and 2003. The calculations are based on data from the Danish Motor Vehicle Inspection Office, special data from the Central Register of Motor Vehicles, the road traffic index from the Danish Road Directorate plus special investigations regarding, among other things, the share of foreign vehicle traffic in Denmark.

For the calculations of 2001, 2002 and 2003, the Danish Motor Vehicle Inspection Office has contributed with data from all inspections performed in the period from January 1997 until June 2004.

Statistics Denmark has contributed with data extraction from the central vehicle register. The data contain information regarding all vehicles which have been active (registered) after 1 January 2001. This delimitation is due to the fact that 2001 is the first year where the road traffic volume is calculated. For these vehicles, information on registration matters have been included since 1 January 1996. With the report, it is among other things possible to follow possible changes in the registration situation during the analysed period. Of special interest for the specification are changes in type or use and the enrolment/cancellation of vehicles (a vehicle can be cancelled from the central vehicle register for a period and then be enrolled again at a later stage). Furthermore, Statistics Denmark has provided a key that procures the vehicle identification in the vehicle register with the vehicle identification in the vehicle inspection data base.

The distribution between national and international traffic for lorries is based on journey dairy investigations performed by Statistics Denmark. For passenger vehicles and vans the distribution is done by sample inquiries performed by the Danish Road Directorate and Statistics Denmark in 1993. Regarding passenger vehicles, the traffic is also weighted in each single month according to the road traffic index of the Danish Road Directorate.

3. Main features of the method

The main features in the new method are as follows:

For each inspected vehicle, the amount of driven kilometres since the previous vehicle inspection are calculated (or since the first registration date if it is a vehicle exposed to its first vehicle inspection). Afterwards, the traffic per day during the specific period is calculated. For all vehicles in the same strata (type, year of first registration, total weight or vehicle weight, fuel and in some cases use of the vehicle), the average daily traffic is calculated. This figure is multiplied by the number of days in a year and by the number of registered vehicles in the strata. Thereby, the road traffic volume for a specific vehicle type has been determined. The total road traffic volume is determined by the sum of the road traffic volume of the approximately 600 strata which the data material has been divided into.

The calculation of a single vehicle's kilometres driven in 2002 is illustrated in figure 1. The figure illustrates the main principles in the calculation of yearly traffic of a single vehicle type, year of first registration, total weight or vehicle weight, fuel and in some cases use of vehicle – a car. The vehicle in the example has driven 37,107 km. between two inspections which

correspond to a yearly traffic of 17,705 km. The average yearly traffic of the actual type of vehicle/ stratum is multiplied by the number of registered vehicles of the same type. The figure also illustrates that it is not possible to limit the registered traffic to a given calendar year. A significant part of the period between the two inspections lies beyond 2002, which is actually the year the information is wanted for. This problem is discussed later.

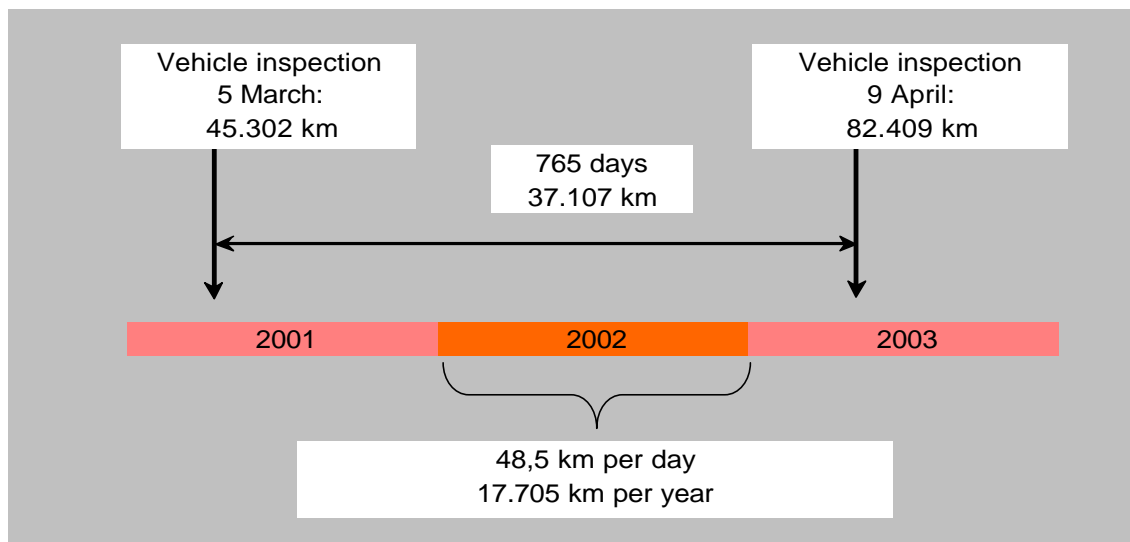


Figure 1: Calculation of traffic in 2002 for a single vehicle

The above figure only illustrates the main features in the calculation of the road traffic volume as several corrections and adjustments are made due to different known circumstances. For instance, for passenger vehicles the driven kilometres between two inspections are distributed by taking into consideration the development in the road traffic index. For vehicles inspected for the first time, four years after the first registration, the fact that the yearly mileage decreases with the age of the vehicle is also taken into consideration. Both in the calculation of yearly traffic and in the specification of the data population, the fact that the vehicle can be out of circulation for a shorter or longer period has been taken into consideration too. In the specification of the national road traffic volume a distinction between the total volume of traffic in Denmark and abroad is made according to results from other investigations.

Initially, as part of the calculations, an identification of usable records is made and a correction of 5 digit or adjusted odometers and misregistrations etc. are made. This error type is identified because it will result in a negative mileage between two inspections. The inspection data is selected in such a way that the annual traffic in a reasonable way represents the traffic in the given periods. The latest inspections for comparison are within certain periods in relation to the specification year. Also requirements as regards the time distance between two inspections based upon the regulation of inspections are included in the calculations. The comparison of two inspections which result in too high mileage (and therefore improbable) are sorted out. Finally, a separation of the part of the traffic of imported used vehicles, which has taken place before the first registration in Denmark, will be done. For each vehicle data on the last inspection and the previous inspection which fulfil both distance requirements and kilometre requirements are extracted.

4. Development of the method and the project progress

The project for establishing a method for calculation of road traffic volume based on vehicle inspection data has contained three phases:

Phase 1

Phase 1 was initiated at the end of 2002 and finalized with a preliminary reporting in January 2003. The conclusions were that data from vehicle inspections constitute an applicable source for the specification of road traffic volume. The first results indicated that the new method would provide significant adjustments compared to the previously used data. Meanwhile, it was also obvious that the new approach contained more potential sources of errors and some methodological difficulties. These can be summoned in the following subjects:

- Time delimitation of the registered traffic into a specific calendar year
- Specification of the traffic abroad
- Inactive periods where vehicles temporarily, for a shorter or longer period, are withdrawn from the central motor register. This disturbs the calculation of the yearly road traffic volume per vehicle.
- Separation of traffic performed by taxis
- Separation of the part of traffic in imported used vehicles that has taken place before the registration in Denmark
- Negative yearly mileage due to wrong registration, 5 digit odometers or adjusted odometers (cheating related to the sale of used vehicles)
- Annual mileage during the first four years of the lifetime of passenger vehicles, where these are not exposed to vehicle inspection
- Round off in the basic information in the vehicle inspection companies

Phase 2

Phase 2 of the project was initiated after the preliminary reporting. This phase included several partial analyses and sensitivity evaluations with the purpose to expose the scope and the significance of the abovementioned problem areas. Based upon this work, several decisions were taken regarding the choice of methodology and correction, etc. These decisions have been included in the calculations afterwards.

Phase 2 was finished with new calculations in the summer 2004. These calculations showed among other things that there might be problems related to the use of vehicle inspection data as the basis for year-to-year specifications of the development in road traffic volume. Calculations from 2001 and 2002 showed a different course in the road traffic volume than that which could be expected from the development in the road traffic index. To the road traffic index, which is based on traffic counts at permanent sites, an uncertainty of the random sampling is attached, and therefore it could not be concluded that the preliminary calculations based on vehicle inspection data are incorrect.

In any case, with the new calculations, it was illustrated that there is a need for adjustment of the level of road traffic volume compared to the previous specifications.

Phase 3

Therefore, in November 2004, Phase 3 of the project was initiated with the purpose to provide a final foundation for the decisions regarding the future statistical production within this

area and to calculate a revised time series for the period 1980 to 2003 where 2003 so far has not been calculated according to the previous method.

Regarding the driving in passenger cars between two vehicle inspections, this was divided among the separate months in accordance with the development in the road traffic index. The purpose is to assure a far more correct distribution of the traffic volume between the different periods within the specification year and also beyond the specification year.

Furthermore, it was decided to calculate the traffic per day of a vehicle according to information from Statistics Denmark on the number of active vehicle days – which means the number of days a vehicle has been registered in the central vehicle register – and on each single vehicle. This was done by a vehicle to vehicle combination of vehicle inspection data with information in the central vehicle register. Annual traffic is, as previously defined, the traffic per day multiplied by the number of days in a year. The population in each stratum which previously was calculated as an average of the population in each month is now calculated as the total actual number of active vehicle days per stratum in the specified year divided with the number of days in the year. The involvement of the specification of the number of active vehicle days in the calculation has resulted in a solution to the problem regarding inactive days and several of the other related problem areas.

The transition from calculations based on average population to calculations based on active vehicle days has caused some problems with the handling and treatment of data from the central vehicle register. An important part of the work in Phase 3 has focused on the solution to these data problems.

5. Results

In table 1, the development in the national road traffic volume from 2001 to 2003 is shown. The data is calculated based on data from vehicle inspections and divided into the major vehicle categories. For comparison the road traffic index and the increase in the index is added to the table as well. In Appendix 1 the road traffic volume for the three years has been calculated into more details regarding weight and fuel.

Based on the vehicle inspection data, a total increase in the road traffic volume from 2001 to 2002 and from 2002 to 2003 has been calculated to be respectively 1.4 % and 2.3 %. These figures can be compared to the increase in the road traffic index of the Danish Road Directorate which in the given periods were 2.2 % and 1.4%. Both methods show an increase in traffic from 2001 to 2003, but based on vehicle inspection data a lower increase is calculated from 2001 to 2002 than with the method of the road traffic index and opposite a higher increase from 2002 to 2003.

	Million vehicle kilometres			Increase in percentage	
	2001	2002	2003	2001-2002	2002-2003
Passenger cars	32.343	32.907	33.496	1,7%	1,8%
Taxis	542	528	504	-2,6%	-4,5%
Vans <= 2 tonnes	1.172	1.060	1.008	-9,6%	-4,9%
Cars and small vans in total	34.057	34.495	35.008	1,3%	1,5%
Buses in scheduled service	349	350	357	0,3%	2,0%
Buses in non-scheduled service	138	142	141	2,9%	-0,7%
Buses for private driving	113			-0,9%	-100,0%
Buses in total	600	604	498	0,7%	-17,5%
Vans 2,01-3,5 tonnes	5.633	5.806	6.270	3,1%	8,0%
Small lorries, 3,51-6 tonnes	110			-11,8%	-100,0%
Big vans and small lorries in total	5.743	5.903	6.270	2,8%	6,2%
Lorries > 6 tonnes	1.351	1.321	1.300	-2,2%	-1,6%
"Tractors"	775	808	833	4,3%	3,1%
Lorries in total	2.126	2.129	2.133	0,1%	0,2%
Total volume of road traffic	42.526	43.131	43.909	1,4%	1,8%
Traffic index	99,7	101,9	103,3	2,2%	1,4%

Table 1: Preliminary specification of the road traffic volume 2001, 2002 and 2003 based on vehicle inspection data

Most probably the differences in the development as a starting point can be explained by the different kinds of uncertainties related to the two methods. Generally, the specification of the road traffic volume based on vehicle inspection data can never be precisely bound to a calendar year. Though the intention is to adjust for this by the use of the traffic index, there is still an uncertainty related to the periodizing. The traffic index is applied for the distribution of mileage between two inspections on months. There are also differences in definitions as the traffic index, unlike data from vehicle inspections, includes traffic of foreign vehicles in Denmark. Furthermore, the applied displacement of half a year in the data collection which has been introduced due to the wish of obtaining current statistic data might disturb the picture in the comparison of year to year development in the road traffic index. This problem is discussed further in Chapter 8 which is dealing with preliminary and final specifications. Also, it cannot be excluded that the population figures applied in the new method still are defective. Deviations have been noticed between the populations in the applied withdrawals from the central vehicle register based on active vehicle days and the previous specifications of the vehicle park based on the vehicle population in a certain moment. Nevertheless, it is important to mention that the differences are within the statistic uncertainties of the specifications. It is expected that also in the coming years, differences in the year to year development of the two methods will occur. Meanwhile the differences should be reduced over the years, unless a significant change in the foreign traffic in Denmark takes place, which as earlier mentioned, only is included in the road traffic index.

6. The significance of the choice of method for the results

For 2001 and 2002, it is possible to compare the figures from the new method with the figures used earlier for the road traffic volume. So far the total road traffic volume has been estimated too high – especially for passenger vehicles – while for lorries an underestimation has been noticed.

The new calculations show that so far the national road traffic volume for passenger vehicles has been overestimated by 12-13 % while the traffic with lorries beyond 6 tons has been underestimated by 26-27 %. The road traffic volume for vans and small trucks results in almost the same figures applying the two different methods/specifications. Regarding the overall bus traffic there has been an underestimation of 4 % – this figure covers up an underestimation of the traffic of city buses/buses in the scheduled service of approximately 15 % while the traffic with tourist buses has been overestimated with approximately 30 %. For all types of vehicles, the previous applied figures resulted in an overestimation of the road traffic volume with 8-9 %.

The difference in the results of the two methods can be appreciated in the table below:

	Million vehicle kilometres 2001			Million vehicle kilometres 2002		
	Vehicle inspection data	Previous method	Difference	Vehicle inspection data	Previous method	Difference
Passenger cars	32.343	36.343	12%	32.907	37.213	13%
Taxis	542	466	-14%	528	461	-13%
Vans <= 2 tonnes	1.172	1.227	5%	1.060	1.180	11%
Cars and small vans in total	34.057	38.036	12%	34.495	38.854	13%
Buses in scheduled service	349	295	-15%	350	299	-15%
Buses in non-scheduled service	138	330	31%	142	326	28%
Buses for private driving	113			112		
Buses in total	600	625	4%	604	625	3%
Vans 2,01-3,5 tonnes	5.633	5.686	-1%	5.806	5.904	0%
Small lorries, 3,51-6 tonnes	110			97		
Big vans and small lorries in total	5.743	5.686	-1%	5.903	5.904	0%
Lorries > 6 tonnes	1.351	1.098	-19%	1.321	1.000	-24%
"Tractors"	775	486	-37%	808	544	-33%
Lorries in total	2.126	1.584	-25%	2.129	1.544	-27%
Total volume of road traffic	42.526	45.931	8%	43.131	46.927	9%

Table 2: Comparison of the calculated road traffic volume, year 2001 and 2002 based on vehicle inspection data and the previous specification (mio. vehicle kilometres)

The new figures for the road traffic volume will have consequences for several derived areas. The following examples can be mentioned:

- As a consequence of the new calculations, the relationship of the road traffic volume for passenger vehicles and buses changes. It can be noticed that during the last 20-25 years the city buses have not lost as big a market share as assumed.
- An often applied measure for road safety is the number of accidents or injured persons in relation to the vehicle kilometres. With the new figures, the total number of vehicle kilometres will decrease and therefore the number of accidents per driven kilometre will increase compared to earlier figures. Also a redistribution between the vehicle categories will take place and thereby a change in the relationship between the accident rates for the different types of vehicles will be noticed.

- The obligations of Denmark in regard to the transport area in the Kyoto Agreement are specified according to the actual energy consumption which is registered by the Danish Energy Authority. There are no changes in the overall contribution of CO₂, etc. from the transport area in defiance of the new lower figures for the transport area. Thereby, the new method has no direct significance in relation to the Kyoto Agreement. On the other hand, the new method has importance for the specification of the energy efficiency as these are measured as the specific consumption per vehicle kilometre. The energy efficiency of passenger vehicles is lower than previously assumed as fewer kilometres are driven according to the new method. Meanwhile, the energy efficiency for lorries improves as these with the new method drive more kilometres than previously assumed.

7. Provisional and final figures

With the new method of calculating, it will not be possible to decide the annual road traffic volume until almost five years after the end of the year of settlement. The reason is that passenger cars are not inspected until four years after the first registration of the vehicle. But other factors also imply that figures will necessarily be provisional for the first couple of years. Therefore, the presented figures from 2001-2003 will be adjusted in the specification of the figures from 2004.

The following will elaborate on why figures for a number of years will be provisional and describe how the data from each of these years will be continuously updated.

Data on periodical vehicle inspections up to half a year after the year of specification is used with the purpose of producing statistics with reasonable actuality. As an example, data on periodical vehicle inspections until June 2004 are used for the provisional calculation of the annual road traffic volume in 2003.

The time frame of the calculations is shown in the figure below.

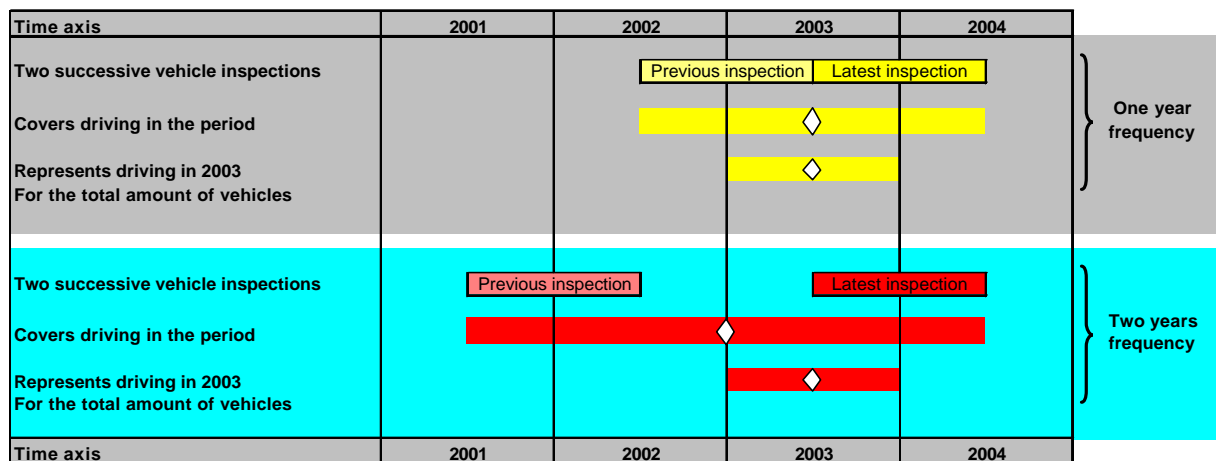


Figure 2: Relation between frequency of periodic inspection and period of traffic when calculating the volume of road traffic in 2003

A reasonable picture of the volume of traffic of a given year is reached by the chosen method for vehicles with an annual frequency of inspection. Thus, the volume of road traffic for a vehicle with an annual frequency of inspection, which has been inspected in July 2003, can be measured by comparing the amount of kilometres driven at the inspection with the amount of kilometres driven at the inspection about one year earlier – that is mid-2002.

Correspondingly, the volume of traffic for a vehicle with an annual frequency of inspection which has been inspected in June 2004 can be calculated by comparing with the odometer mid-2003.

Because the latest data from vehicle inspections are from the period mid-2003 until mid-2004, the result is a specification of the volume of road traffic in the period mid-2002 until mid-2004. The centre of this period is mid-2003. The chosen period, then, in the best possible way represents the volume of road traffic in 2003.

For vehicles with a two-year frequency of periodic vehicle inspections, the volume of road traffic in one year is best calculated by using data from vehicle inspections up until one year after the year of specification. This will be the case in the calculation of the final figures. As mentioned, the provisional calculations only use data from vehicle inspections up until half a year after the year of specification. This is also illustrated in figure 2.

It is seen that the centre of the period is the turn of the year 2002/2003, that is half a year before mid-2003, the year for which results are wanted (see figure 2).

As a minimum, a correct determination of periods for vehicles with a two-year frequency between vehicle inspections, presume that data from vehicle inspections are collected for a full year from the end of the year of settlement.

Add to this, that the longer time passing from the year of specification, the more first-time vehicle inspections can be included in the calculations.

New cars have to be inspected for the first time after four years, in practice at the latest after four years and three months. Final figures, including information about all vehicles which have been active in the year of settlement, can therefore not be produced before almost five years after the end of the year of settlement.

In conclusion, each year topical, but provisional, figures on the volume of road traffic during the latest year can be produced along with revised figures for earlier years, where more data from vehicle inspections are included than in the provisional calculations.

One year after the publication of the first provisional figures, data from vehicle inspections up until one year after the end of the year of specification are included. This solves the problem with displacement in the period for vehicles with two-year frequency.

In addition to this, it is possible to produce figures on earlier years which include more and more first-time inspections.

For example, in 2006 it will be possible to produce the following figures:

- Provisional figures on 2005
- Figures on 2004, based on data from the inspections of vehicles with a two-years frequency between inspections until the end of 2005
- Final figures on 2001
- In addition, it is possible to calculate revised figures on 2002 and 2003 by including more and more first-time vehicle inspections.

In the future, then, it is possible – either each year or with an interval of a couple of years – to produce final figures at least five years back and provisional figures on the recent years.

It will be possible to adjust provisional figures each year by including new data from vehicle inspections, until they are finally decided.

Until now, the calculations of the volume of road traffic from 2001 until 2003 based on data from vehicle inspections have solely been carried out on the basis of available data, and, as mentioned, the form of the production of statistics in the future has not been decided.

8. Production of statistics in the future

It is the assessment, that – based on the completion of the calculations of yearly mileage and volume of road traffic for the years 2001, 2002, 2003 – the production of statistics in the future can be based on data from vehicle inspections, as well as figures on the total amount of vehicles.

As earlier mentioned, road traffic statistics based on data from vehicle inspections has been carried out in several rounds, for example including calculations of sensitivity for uncertain factors and continuously developing the methodology, reducing and eliminating uncertain factors.

As a whole, it is the assessment, that statistics on the volume of road traffic which are based on data from vehicle inspections are more reliable than statistics based on the data used up until now.

The results calculated, using data from vehicle inspections, are based on a ‘total counting’. This means that, in principle, on the one hand, there are no sample inquiry uncertainties in the results. On the other hand, as mentioned in the above, there are uncertainties concerning results as a consequence of other structural circumstances concerning methodology and delimitation.

It has been decided that, in the future, the information published by the Danish Road Directorate on the volume of road traffic in Denmark will be based on data from vehicle inspections. This decision is based on the assessment that the new method produces more reliable results than has been the case up until now, and because it has been demonstrated that it is possible to plan a reasonable, continuously production of statistics.

The new method of calculating will be used from 2001 and on. In this paper, provisional figures for 2001 till 2003 have been presented. It is the expectation that figures for 2004 can be presented before the end of 2005. In connection with this, the figures on 2001-2003 will be consolidated on the basis of new vehicle inspection data.

As mentioned in this paper, the previous method resulted in an overestimation of the total volume of road traffic. The new method of calculating means a shifting in data in 2001 (and 2002 because of the overlap between the two methods in the years 2001 and 2002.)

Because of this, a revised time series on the years 1980 till 2000 will be conducted.

The revised time series will not change for the year 1980 (except for lorries). The figures on the remainder years will be adjusted gradually with the purpose of gradually adjusting the time series to the 2001-volume, which is decided on the basis of data from vehicle inspections. The revised time series awaits a consolidation of the calculations of the volume of road traffic in 2001, alongside with the calculations of 2004-figures.

A settlement of the volume of road traffic based on a reading of the odometer demands considerable resources. It is, therefore, considered whether the settlement should be produced annually or with a regular frequency of, for example, 3-5 years.

In the intervening years, the volume of the road traffic could be estimated, as before, by using other sources. This would primarily be the traffic index published by the Danish Road Directorate and the journey diary from Statistics Denmark (lorries).

However, if the latter method is chosen, it will not be possible to reach the highly detailed account of the volume of road traffic for the years where only projections are being made. The choice of model will depend on the need for the detailed statistics and whether it is possible to find financing for the work.

9. Reduction of sources of errors and insecurities

The new method of calculating gives a more reliable picture of the volume of road traffic than so far. But regardless of the development and improvement of the methods of calculating, there is still a need and possibilities for improving the data foundation of the calculations.

Three areas of interest should be brought into focus here:

1. The volume of traffic for the first four year of the cars' lifespan, where data from vehicle inspections are, normally, not available
2. The accuracy of the reading of the odometer and the importance of adjusted odometers
3. The share of mileage driven abroad

Ad 1. When distributing the volume of road traffic of passenger cars and vans the first four years, it is presumed that the yearly mileage is slightly declining. This assumption is, for example, based on the sample inquiries carried out by the Danish Road Directorate and Statistics Denmark in 1993.

The sample inquiries do not give a clear picture, even though they indicate a decline in the yearly mileage during the first four vehicle years. More precise and updated knowledge about the development in the traffic during the first four vehicle years is a condition to be able to distribute the volume of road traffic for new vehicles correctly.

It should be noticed that cars are driven the most in their first years. This means that a wrong distribution of the yearly mileage will have a relatively big influence on final results.

Ad 2. The reading of the odometer at vehicle inspections is the main data source for the method of calculating. Until the turn of the year 2004/2005, The Danish Motor Vehicle Inspection Office has been responsible for the reading of the odometer and the data collecting. The responsibility for data collecting and handling has now been handed over to Denmark's Road Safety and Transport Agency in connection with the privatization of the vehicle inspection system.

It is the general impression that Denmark has a reliable data source. But the data material contains some observations which lead to obviously wrong results, for example negative yearly mileage between two inspections.

These types of mistakes can be caused by several things: 5-figured odometers, which have run out, reading mistakes and adjusted odometers. It is our assessment that the risk of these types of mistakes has been increased in the new situation, where the vehicle inspection is performed by many different companies. For these reasons, Denmark wishes to work on improving the reading

procedures securing that the registration of the odometer at the companies offering inspections will be as correct as possible. For example, an automatic check of the present reading compared to the latter reading.

Ad 3. The basic result of the method is 'the volume of road traffic of Danish cars' (in and out of Denmark). When settling the domestic volume of road traffic, it is necessary to be able to sort out the volume of road traffic abroad in Danish vehicles. The sources of these kind of information are few and, in certain cases, old. Therefore, the settlement of the volume of road traffic based on data from vehicle inspections is marked by some insecurity when it comes to separating it into a domestic and a foreign share. The division of the volume of road traffic between Denmark and abroad would have a much better foundation if existing settlements were improved and expanded and new investigations were carried out.

A decision about future investigations and improvement projects has not been reached. The main priority now is to make sure that the new method of calculating functions in the execution phase of the project. When this is secured, an assessment of which areas are mostly in need of improvement and development will be made.

10. New possibilities with the new statistics

The new method of calculating means more precise data and a more detailed account. This opens up the possibility for more detailed analysis in cases, where the volume of road traffic is taken into consideration.

First of all, the level of details has been improved when it comes to the division of the different categories of vehicles. In principle, it is now possible to divide on all levels within the information which is a part of the central vehicle register.

In practice, it will probably in particular be interesting to divide the categories of vehicles per year of first registration, fuel, and weight. It has still not been decided how detailed the statistics produced on the basis of the data from vehicle inspections will be. But the necessary data will be collected and handled in a way which makes it possible to make special data reports on a very detailed level.

It is expected that the detailed reports, for example, could be used within energy and environmental analysis, traffic safety, analysis of taxes and dues, more general traffic and transportation analysis and the coupling of these analysis with, for example, analysis divided into socioeconomic and geographical parts.

Bilag 1.

Provisional calculation of the volume of road traffic in 2001, 2002, and 2003 on the basis of data from vehicle inspections. Division of the categories on cars, fuel and weight classes.

	Million vehicle kilometres			Increase in percentage	
	2001	2002	2003	2001-2002	2002-2003
Passenger cars	32.343	32.907	33.496	1,7%	1,8%
<i>Petrol</i>	29.044	29.039	28.518	0,0%	-1,8%
Vehicle weight <= 1 tonne	13.197	12.263	11.154	-7,1%	-9,0%
Vehicle weight 1,01-1,5 tonne	15.474	16.341	16.906	5,6%	3,5%
Vehicle weight > 1,5 tonne	373	435	458	16,6%	5,2%
<i>Diesel</i>	3.299	3.868	4.978	17,2%	28,7%
Vehicle weight <= 1 tonne	706	807	860	14,3%	6,6%
Vehicle weight 1,01-1,5 tonne	2.184	2.575	3.512	17,9%	36,4%
Vehicle weight > 1,5 tonne	408	486	606	19,0%	24,8%
Taxis	542	528	504	-2,6%	-4,6%
Petrol	35	29	23	-17,7%	-19,9%
Diesel	507	499	481	-1,5%	-3,7%
Buses	599	604	609	0,8%	0,9%
Buses in scheduled service	349	350	357	0,3%	1,9%
Buses in non-scheduled service	138	142	141	3,0%	-0,5%
Buses for private driving	113	112	112	-0,2%	-0,4%
Petrol	24	24	24	-2,2%	-0,2%
Diesel	88	89	88	0,3%	-0,4%
Vans	6.805	6.866	7.278	0,9%	6,0%
<i>Petrol</i>	1.672	1.576	1.549	-5,7%	-1,7%
Gross weight <= 2 tonne	766	673	621	-12,1%	-7,7%
Gross weight 2,01-3,5 tonne	906	903	928	-0,3%	2,7%
<i>Diesel</i>	5.133	5.289	5.729	3,0%	8,3%
Gross weight <= 2 tonne	406	387	387	-4,7%	0,0%
Gross weight 2,01-3,5 tonne	4.727	4.902	5.342	3,7%	9,0%
Lorries 3,51-6 tonne	110	97	84	-12,0%	-13,4%
Lorries	1.351	1.321	1.300	-2,3%	-1,6%
Gross weight 6,01-7,5 tonne	26	26	29	0,3%	12,8%
Gross weight 7,51-16 tonne	254	246	237	-3,1%	-3,8%
Gross weight > 16 tonne	1.072	1.049	1.034	-2,1%	-1,4%
Road tractors	775	808	833	4,2%	3,1%
Total traffic volume	42.526	43.130	44.104	1,4%	2,3%
Traffic index (2000 = 100)	99,7	101,9	103,3	2,2%	1,4%