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University of Veterinary Medicine
Research Institute of Veterinary Medicine
Hlinkova 1/A
040 01 Košice
Slovak Republic

REQUIREMENTS IN EUROPEAN COUNTRIES FOR THE MANUFACTURE AND USE ON PUBLIC ROADS OF MANURE SPREADERS AND SLURRY TANKERS

CAVALLO E.

*Institute for Agriculture and Earthmoving Machinery. Italian National Research Council.
Strada delle Cacce 73. 10135 Torino, Italy
Tel +39 011 39 77 225; Fax +39 011 3489 218; E-mail e.cavallo@ima.to.cnr.it*

SUMMARY

The paper is a collection of information which is useful to emphasise the existing differences between some European Countries' regulations concerning the requirements related to the construction and the use on public roads of manure spreaders and slurry tankers used in agriculture.

The survey shows that there aren't many differences in dimensions permitted. On the contrary, the maximum permitted mass of these special types of trailers can vary a lot from one Country to another. This fact can affect the costs of livestock farms and the competition among European manufacturers of agricultural machines.

INTRODUCTION

In order to spread slurry and manure from livestock farm on the soil, these materials must first be transported from the store to the surfaces where they will be distributed. In most cases, the same equipment is used to transport the materials on public roads and to carry out the distribution operations. Specialized livestock farms are sometimes obliged to spread manure and slurry on fields far-away from the storage: thus, the road transport acquires significant importance with regards to the economy of the operation.

The need to contain the handling costs of the animal manure and slurry means that is necessary to carry out the spreading in the shortest time possible during specific periods of the seasons. This is even more important for contractors.

Farmers and contractors from different countries can use different models of slurry tankers and manure spreaders with different construction characteristics, such as maximum dimensions and permissible masses, and following national traffic requirements, both made compulsory by national Road Vehicle Construction, Use Regulations and Traffic Rules.

MATERIAL AND METHOD

Collecting information on regulations concerning the requirements related to the design, the construction and the traffic regulation on public roads of manure spreaders and slurry tankers in force in European country has been difficult. Furthermore the legislation for agricultural vehicles itself is generally very complicated, because of the many exemptions from general traffic or homologation regulations. The sources of information have been

wide-ranging: official texts of laws and regulations, documents prepared by manufacturers' associations, traffic and road safety authorities. For those countries for which no documents were available, a questionnaire about the basic aspects of traffic legislation and construction rules have been sent to those people who are supposed familiar with the subject, and the answers received were added to the material collected. For this reason, the sources of information have differing degrees of depth and reliability.

RESULTS

Traffic regulations from European's countries, in general, do not deal with the operative and functional processes of farm machines. They are classified only considering those aspects in relation to road traffic. For this reason manure spreaders and slurry tankers towed by agricultural tractors belong to the main class of the agricultural trailers, and nearly always, because of their design, to the specific category of the unbalanced agricultural trailers: agricultural trailers that don't bear all of their mass on their own wheels but a percentage is borne by the drawing vehicle. Self-propelled manure spreaders and slurry tankers exist, but they are not so common and they are not considered in this paper.

This paper is not intent to be an exhaustive summary of European's countries traffic regulations of manure spreaders and slurry tankers but only a comparison among aspects that can affect the capability of work of these special classes of agricultural trailers. These characteristics are the dimensions and mass of the trailer itself and when connected to an agricultural tractor, the maximum speed allowed on public roads, and some other technical features. In most of the countries, agricultural vehicles exceeding the permitted dimensions or maximum mass have limitations discouraging their use. Special permits must be granted by the traffic authorities, escorts, and compensation for higher road surface wear could be required.

France (SNCVA, 2000)

Unbalanced manure spreaders and slurry tankers must respect the maximum dimensions of 12 m in length, 2,55 m in width. The height has no limit. The combination of tractor and unbalanced trailer mustn't exceed 18 m.

The maximum permitted mass for unbalanced agricultural trailer is 32 t. The maximum axle load is 13 t when there is only one axle. In the case of a grouped axle the maximum axle load depends on the space between the axles: it can rise from 7,35 t to 13 t.

For the agricultural unbalanced trailers the static vertical load transmitted to the hitch of the tractor is limited to 3 t. On the basis of the previous information unbalanced manure spreaders and slurry tankers can have the following maximum permitted mass: with a single axle 13 t; with 2 axle spaced from 1,35 m to 1,80 m 24 t; with 2 axle spaced more than 1.80 m 29 t; with 3 axles 32 t. When the combinations of tractor and unbalanced trailer are on public roads their maximum permitted mass mustn't exceed 38 t if they have up to 4 axles and 40 t if they have more than 4 axles. Furthermore, the mass of the trailer must be less than 4.5 times the mass of the tractor if there isn't any assisted braking system or less than 5.5 times the mass of the tractor if there is an assisted braking system.

Agricultural trailers with permitted maximum laden weight higher than 6 t must be equipped with an hydraulically or pneumatically assisted braking system. For trailers with lower masses inertia brakes are permitted.

The maximum speed on public roads of manure spreaders and slurry tankers in France is 25 km/h.

United Kingdom (Mc Mahon A., 2000)

The maximum length allowed for manure spreaders and slurry tankers in UK depends on the number of wheels: for trailers with less than 4 wheels the maximum length is 7 m, while the maximum length for trailer with more than 4 wheels is 12 m. In both situations, the drawbar is not included. The maximum overall width is 2.55 m. The possible maximum length on public roads of the combination of tractor and trailer is 18.75 m.

The maximum permissible laden weight of unbalanced trailers equipped with any numbers of wheels is 18,290 kg and no more than 35% of the maximum gross weight of the trailer is to be borne by the towing vehicle.

The maximum permitted laden weight of the agricultural combination of tractor and unbalanced trailer depend on the distance between the rearmost axle of the trailer and the rearmost axle of the towing vehicle: for spacing not exceeding 2.9 m the maximum laden weight is 20,000 kg while for spacing exceeding 2,9 m is 24,390 kg. When the mass of the drawing vehicle is higher than 1/4 of the gross weight of the trailer drawn, or the maximum gross weight of the trailer exceed 14,230 kg, the brakes fitted on the trailer shall be operated by the service braking system fitted on the tractor.

The maximum speed allowed for agricultural trailers is 20 mph (approximately 33 km/h)

Germany (Lober M. and Ulich F., 2002)

The maximum dimensions allowed in Germany are 12 m in length, 2,5 m in width and 4 m in height. The maximum length of the tractor and trailer combination permitted on roads is 18 m.

The maximum permitted axle load is 10 t when there is only one axle. In case of grouped axles, the maximum axle load depends on the spacing between the axles: from 11 to 20 t for 2 axles and from 21 t to 24 t for 3 axles. The maximum mass of the combination of trailer and towing vehicle is 40 t. The static vertical load of agricultural unbalanced trailers to be borne by the hitch of the tractor depends on the designed speed of the trailer and the hitch type. It is typically 2 t for 40 km/h approved trailer but, for example, 3 t are allowed for piton fix type and 4 t are permitted for ball coupling of 80 mm, when speed is less than 40 km/h.

For trailers with maximum permissible mass up to 8 t and maximum speed of 25 km/h inertia or one line pneumatic brakes are required. For higher speed and mass 2 lines pneumatic brake system is compulsory.

The maximum speed allowed for trailer towed by tractor on public road is 50 km/h.

Switzerland (BUL-SPAA-SPIA, 2001)

The maximum dimensions of trailers are 2,55 m in with, 12 m in length and 4 m in height. The maximum length of combination of tractor and trailer is 18,75 m while the maximum mass must be lower than 34 t (40 t from year 2005). The maximum mass allowed on 1 axle trailers is 10 t. Maximum mass for 2 axle trailer rises from 11 t to 16 t increasing the spacing between axles. The same occurs for 3 axle trailers: maximum permitted mass raises from 21 t to 24 t. The maximum vertical static load on the tractor hitch mustn't exceed 40% of the gross total weight of the trailer, with a maximum static vertical load of 3 t. The maximum speeds of trailers on public roads are 30 or 40 km/h, depending on the deceleration of the braking system fitted. A trailer approved for 30 km/h must guarantee

deceleration of 2.8 ms^{-2} . Trailers with a maximum gross total weight higher than 3 t must fit continuous braking system. Trailers approved for 40 km/h and maximum total design mass higher than 750 kg must be equipped with continuous braking systems acting on all wheels and a guaranteed deceleration of 3.1 ms^{-2} . For both categories, overrun brakes are allowed for mass up to 6 t. Trailers with higher mass require hydraulic or pneumatic braking systems.

The Netherlands (De Vries, 2002)

The maximum dimensions of trailers are 3 m in width, 12 m in length and 4 m in height. For combinations of tractors and trailers the maximum length is 18 m, while the maximum mass is 50 t. The maximum axle load is 10 t. The trailer must be fitted with a reliable braking system. The maximum speed allowed on roads is 25 km/h.

Italy (Cavallo E., 2000)

The maximum width and height of manure spreader and slurry tankers are 2.55 m and 4 m. The maximum permissible length is 7.50 m if they have one axle or 12.50 m if they have two or more axles. When these vehicles are towed by tractors, the combination mustn't exceed 16.50 m in length.

The limit mass at full load that these vehicles mustn't exceed depends on the number of axles and the type of the tyres fitted. In the most favourable of conditions, these vehicles cannot exceed 6 t with 1 axle, 14 t with 2 axles and 20 t with 3 or more axles. The single most loaded axle can bear not more than 10 t. This value rises to 14 t for an adjacent pair of axles spaced no more than 1.2 m. The maximum static vertical load allowed on tractor's hitch for unbalanced trailer is 2.5 t.

Agricultural trailers with mass higher than 6 t must be fitted with a braking system that acts on all axles and must be operated by a different energy than that of man or the kinetic action or the inertia of the trailer. Trailers fitted with continuous automatic braking system, the most efficient one, the tractor can tow a trailer with a maximum mass of 5 times its own, still remaining within the maximum limit mass of 20 t.

The maximum speed allowed on the road for farm tractors towing trailers is 40 km/h.

DISCUSSION

Construction aspects and terms of use on public roads of slurry tankers and manure spreaders in European countries' regulations taken into consideration show that there aren't any significant differences in dimensions. Substantial differences exist in the maximum laden weight allowed in construction of agricultural trailers.

The existence of different regulations on traffic of agricultural trailer cause higher operational costs of slurry and manure spreading to farmers in some countries. At the same time, different technical requirements, imposed by law represent an obstacle for agricultural machinery's manufacturers to gain access to a wider market. Different standards among European countries on couplings between tractors and trailers is the most chaotic subject.

The survey shows that is necessary to achieve a more similar legislation about construction and use of manure spreaders and slurry tankers among European countries. This is essential to assure to farmers and manufactures the same condition of work, especially in bordering countries.

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