INVESTIGATION OF TRANSPORT CONDITIONS IN PARTICIPATING COUNTRIES IN THE EC PROJECT: PL920262

CHRISTENSEN L., BARTON GADE P. and BLAABJERG L.O.

Danish Meat Research Institute, Roskilde, Denmark

W-2.01

SUMMARY

The aim of this investigation was to investigate transport conditions in participating countries, partly to look at transport vehicle design presently used and partly to get some idea of transport conditions in general. The results were to be used in the first instance to build a flexible truck body for the Danish part of the project: Optimal design of 2-tiered vehicles, especially concentrating on ventilation and tier height.

Visits were made to each country (Portugal, Italy, Belgium, The Netherlands, Germany, the U.K. and Denmark) for observation of loading at farms, transport vehicle design and off-loading at factories. For each visit had been prepared a questionnaire comprising a number of questions relating to transportation such as legislation, trade demands, climatic conditions, responsibility and economy. Although a survey of this kind is brief and only shows some part of the conditions in any one country, results were as valid as possible. The results showed that transport vehicle design was relatively constant within any one country and that the various countries solved problems with transport conditions in slightly different ways. Two remaining problem areas were noted: the use of fixed decks in multitiered vehicles without a lift device at factories to eliminate the necessity of pigs negotiating steep slopes and how to off-load the lower deck on 3-tiered vehicles without stressing the animals. Tier heights are generally too low to allow manual off-loading, as is the case with 2-tiered vehicles.

Stocking densitites when standardised to 100 kg were relatively constant with the majority of transports lying between 0.35 and 0.39m^2/100 kg pig. There was little relationship between average stocking densitites and transport mortality figures, even when differences in halothane susceptibility of the pig populations were taken into account. The mortality rate during transport varied from 0.03% to 0.5% in the countries visited.

Results from the investigations have been utilised for the design and construction of a pig transport vehicle which is expected ready in February/March 1994. The vehicle is then ready for a number of experiments that are aimed at documenting the optimum transport condition. The investigations are expected finalised in 1996 and may form basis for detailed rules concerning transport common for the EU countries together with results from other AIR-project participants.

Introduction

The EC is supporting a project on the pre-slaughter handling of pigs in relation to welfare and meat quality under the AIR-programme (PL920262). The aim of the project, which combines practical experiments with more fundamental research, is to make a series of recommendations and guidelines for the optimal pre-slaughter handling of pigs which takes into account pig genotypes and climatic conditions in Europe. The project uses standardised protocols for methods of measurment so that results from the various research groups are directly comparable.

The aim of the Danish Meat Research Institute's part of the project was to look into optimal design of two-tiered vehicles for pig transport, particularly with respect to ventilation requirements and tier heights.

A flexible truck body will be built that can regulate ventilation and tier height, and although two-tiered vehicles will be concentrated upon, it is the intention to simulate a condition corresponding to three tiers, so that this aspect will also be incorporated into the work. Furthermore, it is our aim to develop a final product than can compete with other designs on the market, i.e. is commercially viable and that can be applied throughout the European Community, despite the wide differences in climate that occur.

The aim of this work was therefore twofold. Firstly, to look at transport vehicle design presently used, so that any innovations occurring could be incorporated into the experimental truck body. Secondly, to get some idea of transport conditions in general, including those affecting transport costs, so that the final set of guidelines can be based on practical conditions in the various countries. Due to budgetary restraints it was only possible to visit participating countries.

It is clear that a survey of this kind will necessarily be brief and only show some part of the conditions in any one country. However, strenuous efforts have been made to ensure that the observations are as generally valid as possible. If finances permit, transport conditions will be reinvestigated towards the end of the project, so that any changes occurring can be incorporated into the final set of guidelines.

Materials and Methods

A set of 10 questions was presented to each country:

1. What regulations are in force at present e.g. stocking density etc. ?

2. Does the industry have special regulations ?

3. What is the procedure for approval of vehicles for pig transport ?

4. How are regulations controlled ?

5. How many pigs are imported/exported, live annually ?
   - Pigs for further fattening (25-30 kg)
   - Slaughter pigs
   - Other

6. What pig breeds are commonly used in breeding programmes ?

7. How is pig transport organised in the country ?

8. What are "normal" transport conditions for the country
   - climate
   - transport distances
   - transport mortality
   - transport damage

   In the event of the latter 2 categories, how is responsibility placed?

9. What are typical transport costs per pig ?

10. What are typical truck designs ?
    - lorry, trailer, semitrailer etc.
    - floor area
    - no. of decks
    - height between decks in multi-tiered vehicles
    - group sizes on trucks
    - construction material (surfaces)
    - loading arrangements
    - ventilation type (natural, mechanical)
    - size of ventilation openings (approximate)
    - position of mechanical ventilation (if any)
    - other

For each country, efforts were made to see loading at one or more farms, transport vehicle design presently used by visiting one or more abattoirs. At abattoirs the dimensions of typical trucks were measured and, if possible, actual (and possible) stocking densities were noted. Where applicable, trucks for international (long distance) transport were included.

Due to various circumstances it was not always possible for partners to obtain answers to questions 1-10, despite strenuous efforts on their part. Often the information was simply not available or it was considered commercially sensitive.

Results and Discussion

The most important results are summarised in Table 1.

Most countries had regulations regarding transport and if controlled, this was carried out either by the police or by veterinarians at abattoirs. Only one country (Denmark) had special industry recommendations supplementing the official regulations. These recommendations, which are based on a framework agreement between the Federation of Danish Pig Producers and Slaughterhouses and the Danish Hauliers Association, have been incorporated into the contracts which abattoirs have with independent hauliers.

There were large differences between countries with respect to import and export of slaughter pigs, some having very little or no import/export (Portugal, UK and Denmark), others an appreciable amount (Italy, Belgium, Germany and Holland). A similar situation existed for weaners for further fattening. Within countries average transport distances were generally short i.e. less than 100 km from the factory. The use of 3-tier vehicles prolonged transport times, as more stops were necessary to fill the truck. This was most pronounced in Holland where the average transport distance was estimated to be 50 km but the transport time 2-3 hours. All countries had longer transports but these were a very small percentage of the total. Similarly, international transports could be very long - up to several thousand km, but again these comprised a small percentage of the total. Many international transports were as short as national transports eg. from the South of Denmark to the North of Germany, from Holland to Belgium etc.

Slaughter weights were most commonly in the region of 80-85 kg. The UK and Denmark slaughtered at lower weights - on average 65 and 75 kg respectively and Italy at a higher weight - about 125 kg slaughter weight, as in the Northern part of the country the pigs were to be used for Parma ham production. Some countries always castrated male pigs (Italy, Belgium and Germany), some produced only entires (Portugal and the UK), the remaining producing both entires and castrates.

Pig populations varied as to breed combination but could mainly be characterised as halothane resistant. Only 2 countries which stressed carcass conformation in breeding programmes (Belgium and Germany) had appreciable numbers of halothane susceptible animals. As could be expected, transport mortality was affected to a high degree by the stress susceptibility of the pig population, being highest in Germany and Belgium i.e. 0.5 and 0.3% respectively. There is no doubt that the Belgium figures would have been higher, if tranquillizers had not been used for stress susceptible animals. The use of tranquillizers is legal in Belgium, incidentally.

Stocking densities, when standardised to a live weight of 100 kg were relatively constant across the countries, varying mainly between 0.35 and 0.39 m^2/pig. One country was on average lower than this, Holland with 0.33m^2/pig and one higher, Germany with 0.40 m^2/pig. There was little relationship between average stocking densities and transport mortality figures, even when differences in stress susceptibility were taken into account. Thus the commonly held view that giving pigs more room on the truck will reduce transport mortality does not seem to be valid - at least for the stocking density intervals used in this material.

In our opinion transport mortality is mainly affected by the stress susceptibility of pig populations concerned. In Denmark meat quality has been included in breeding programmes for many years and since 1986 efforts to totally eliminate the gene for stress susceptibility have been made. Figure 1 shows the mortality figures for all Danish slaughter pigs from 1974 to 1992 and the fall in transport mortality from 1986 has been especially great. In 1993 the figures for transport mortality were at the lowest yet i.e. 0.022%.

Transport vehicle design was relatively constant within any one country but varied between countries among other reasons because of climate. The various countries solved problems with transport conditions in slightly different ways but often with the same result. Thus, all countries used mainly natural ventilation but ventilation openings were larger in countries with warmer weather. Similarly, ventilation openings were larger when tier heights were lower. With the exception of Portugal, ventilation openings could be manually adjusted in cold or wet weather.

Similarly, for on- and off-loading, various solutions were used to minimise or eliminate slopes on multi-tiered vehicles. Portugal used split level loading at larger farms, fixed decks and lifts at factories that could accommodate a whole deck load. Italy used a portable race (slope $\approx 15°$) for loading, mobile decks and an adjustable lift at the factory. Belgium and Holland had an external lift for loading, mainly fixed decks and it was only at the factory that steep slopes (mainly internal) had to be negotiated. Individual abattoirs did, however, have lifts in Holland. Germany used ramps at farms, mobile decks but non-adjustable ramps at factories.

The UK also had ramps at many farms, some mobile but mainly fixed decks and adjustable ramps at factories. Pigs from upper levels had to negotiate steep slopes, both internal and external on off-loading, when decks were fixed. Finally, Denmark had a tail-gate lift for loading, mobile decks and adjustable ramps at factories.

In fact, only two problem areas remain here - the use of fixed decks without the possiblity of on and off-loading via a lift system and how to off-load the lower deck on 3-tiered vehicles with or without mobile decks without stressing the animals. On 2-tiered vehicles the tier height is such that a man can enter and off-load considerately. With 3-tiers this is impossible and pigs have to be forced in some way to leave the truck. Three of the countries visited had many 3-tiered vehicles, Italy, Belgium and Holland and off-loading the lower deck gave problems in all countries. England had a few 3-tiered vehicles and here the decks were mainly mobile, so that the 2nd deck could be raised slightly. In this way a man could (and did) crawl in to off-load the animals.

Conclusion

On the basis of the survey, the following design was proposed for the experimental truck:

1. The truck must have 2 decks, the upper one of which must be fully mobile. The lower deck free height must be minimum 1.3 m and the upper deck free height minimum 1.2 m.

2. The sides of the truck must be built of double walled aluminium alloy (space between walls minimum 10 mm). The roof must be insulated similarly.

3. The floor of both decks must be covered with 10 mm thick rubber flooring.

4. Compartment walls should be built on a 100 cm high aluminium alloy framework with a lower solid 40-60 cm section of glass fibre composite and bars in the rest. Enough compartment walls must be available for every 2.5 m of the length of the vehicle.

5. All inner surfaces must be smooth and without projections or cavities.

6. The sides of the truck must have 50 cm high adjustable ventilation openings along the whole length of the truck, if the stability of the vehicle allows this. Adjustment of the openings must be automatic from the driver's cabin.

7. There must be the possibility of fitting permanent lengthwise ventilation channels under the roof and on the underside of the upper deck as well as at the front of the truck by the cabin.

8. The ventilators required by regulations must be fitted in collaboration with the Institute.

9. The truck must be fitted with a vertical loading device. The floor of the lift must be fitted with the same rubber flooring as the floor of the vehicle.

10. There should be the possiblity of leading cables for experimental equipment through the truck's wall for each compartment of 15 pigs and along the wall to the driver's cabin.

11. In each compartment measuring equipment or safety cage for the same must be able to be bolted to the floor and it must be possible to do this down to the chassis itself. The equipment will be bolted fast and will be used in all compartments on both levels.