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Report 152

Hazard identification and characterization of welfare aspects during transport of farm animals

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ANIMAL SCIENCES GROUP
WAGENINGEN UR

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Keywords: Transport, farm animals, welfar, hazard identitification and charactarization.

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Report 152

Hazard identification and characterization of welfare aspects during transport of farm animals

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July 2008

Preface

Since there is a lot of discussion on transport of farm animals within Europe, representatives of the Dutch Ministry of Agriculture, Nature Management and Food, together with representatives of European Livestock Transporters, ADAS and Animal Sciences Group of Wageningen UR, took the initiative to organise a workshop on transport of farm animals. Representatives of research organizations, ministries, NGO's, transporters and trade were invited. A total of 72 participants from 17 EU countries were present in the workshop on April 6 and 7, 2008. The objective was to set priorities for research and policy with regard to livestock transport through dialogue and debate on issues of welfare, legislation and economic aspects. To fulfil this objective commitment was explored on so-called 'blank spots' in research and policy.

Summary

Within the EU, free movement of animals from one Member State to another (e.g. surplus of animals in one region and demand in another) and more uniformity among production animals and production systems has resulted in more long distance transport from farm to farm or from farm to slaughterhouse. Since there is a lot of discussion about transport of farm animals within Europe a workshop on transport of farm animals was organized. The objective of the workshop was to identify research priorities and obtaining commitment with regard to livestock transport through dialogue and debate on issues of welfare, legislation and economic aspects. The second objective of the workshop was to try to set research priorities and to obtain consensus among stakeholders about potential risks and “blank spots” in the transport of livestock, in particular with regard to animals welfare aspects.

The majority of the hazards identified for transported animals is common for all the species that were considered (cattle, pigs, poultry, sheep, horses). Hazards characterized as serious or very serious in at least three species included: inadequate ventilation, insufficient space allowance, transport duration, lack of appropriate food and water during transport, incorrect handling during loading, poor fitness prior to transport, introduction of pathogens before and during transport and the inappropriate application of resting periods during transport. There were special hazards mentioned for some species, weight groups within species, and weaned or un-weaned animals. For a considerable number of hazards that were identified, no exposure assessment could be made during the risk assessment exercise, because participants at the workshop felt that insufficient information was available.

The workshop participants generally agreed that it is a good idea to install a platform to go on with the dialogue and to set up research regarding the incidence of hazards and the impact of transport on especially young animals.

CONTENTS

1 Introduction

Europe has a long history of transporting livestock over long distances. At the beginning of the seventeenth century tens of thousands oxen travelled every year by road and by sea from Denmark and Schleswig-Holstein to the Netherlands. Around 1570 no less than a quarter of a million oxen were traded on the continent each year. By way of comparison: in 2000, 11.9 million pigs and 3 million cattle were transported between EU member states, or 12 million and 3.8 million, respectively if one includes import and export (EUROSTAT, 2000; Gijsberts & Lambooij, 2005). Nowadays transport distances of farm animals by road to another farm or to the slaughter-house are expanding because of the economic consequences of greater opportunities for long distance and international trade, improved infrastructure and increased demand for live animals for fattening and slaughtering. Within the EU, free movement of animals from one Member State to another and more uniformity in types of animals has resulted in more long distance travel to another farm or from the farm to the slaughterhouse. Although there are large variations in the definition of "acceptable" animal welfare conditions, due to cultural, philosophical or religious differences between individuals, it is generally agreed that farmed animals should be spared unnecessary suffering throughout successive stages in their lifecycle, including raising, transporting or killing.

Besides ethical aspects, humane treatment of animals in the production chain is an important component of the quality and safety of meat. Consumers' concerns for animal welfare have important implications for the future consumption of meat and for producers and retailers of animal-based food products within the EU. The Committee of the Ministers of the EU is aware that man has a moral obligation to respect all animals and to have due consideration for their capacity for suffering. They are convinced that the transport of farm animals is not by definition incompatible with their welfare. The Council Directive (93/119/EC) on the protection of animals during transport (1991) and Council Regulation (EC) on the protection of animals during transport and related operations (2005) are based on the adoption of common provisions laid down in the "European Convention for the Protection of Animals during International Transport" (1968 and revised version 2003). Different EU-member states do have legislation based on health and welfare of animals, ethical considerations and/or protection and safety of man and animal.

Quality schemes are developed or are in development in several countries such as UK (ABM Livestock Scheme, RSPCA standards for pigs), NZ (Code of Animal Welfare), Australia (Cattle and Swine Trucking Guide), Denmark (Handbook of Pig Transport), France (Guide de Bonnes Pratiques du Transport) and The Netherlands (Welfare Code for Transport).

Since there is a lot of discussion about transport of farm animals within Europe representatives of the Dutch Ministry of Agriculture, Nature Management and Food Quality, together with representatives of European Livestock Transporters, ADAS and Animal Sciences Group of Wageningen UR took the initiative to organise a workshop on transport of farm animals. It was agreed to invite representatives of research, ministries, ngo's, transporters and trade from all EU member states. The objective of the workshop was to try to set research priorities and to obtain consensus among stakeholders about potential risks and "blank spots" in the transport of livestock, in particular with regard to animals welfare aspects.

2 Approach

The participants of the workshop comprised representatives from 15 EU member states (Norway included) and from the most important stakeholders with regard to livestock transport: research, government, livestock transport industry and ngo's (see annex I for a list of participants).
The workshop was announced by inviting the policymakers in charge of the animal transportion 'file'. Representatives from NGO's and branche organizations known to be involved in animal transportations were invited directly. Representatives from research were invited based on their participation in the animal transport research network. However, participants that announced themselves were not excluded.
As a methodological tool, an approach based on risk assessment was used, that has been developed by a working group of the European Food Safety Authority (EFSA) for the assessment of animal welfare risks of husbandry and management conditions of farm animals (EFSA, 2006). It should be emphasized here that this approach was merely employed to provide a clear structure for the discussion; completion of the risk assessment exercise was never a purpose in its own right. Correspondingly, other methodological tools might have been applied to facilitate the same goals.

Key elements in the risk assessment approach were: (1) the identification of hazards (environmental factors that may compromise animal welfare), (2) the characterization of the hazards identified (estimation of the impact of each hazard on the individual animal), (3) exposure assessment (estimation of the % of animals in the population exposed to each hazard), and (4) risk characterization, where the risk of each hazard is characterized in terms of both hazard characterization (severity of effect) and exposure assessment (frequency in population). A further description of the risk assessment approach is given in annex II.

The following ten categories of animals were distinguished:

Cattle
1. Juvenile cattle transported from farm to farm (e.g., young calves, 6-8 month old "broutards" from farm to fattening unit)
2. Breeding stock (e.g., heifers)
3. Slaughter animal transported from farm to slaughterhouse (e.g., fattened veal calves, beef cattle)

Pigs (main focus on slaughter pigs)
4. Piglets transported from farm to farm
5. Slaughter pigs transported from farm to slaughterhouse

Poultry (focussed on chicken)
6. Day-old chicken from farm to farm (future layers or broilers)
7. Slaughter animals transported from farm to slaughterhouse (broilers, laying hens at the end of the laying period) and layers transported from the rearing to the layer farm

Sheep
8. Lamb from farm to farm
9. Slaughter sheep transported from farm to slaughterhouse

Horses
10. Slaughter animals transported from farm to slaughterhouse

For the current risk assessment exercise, the participants were distributed across five groups, one group for each livestock species (i.e., cattle, pigs, poultry, sheep, and horses). Each species group was assigned a chairman and a secretary. Over the two-day workshop, each species group was involved in the risk assessment exercise during a number of group sessions. Group sessions were alternated with plenary sessions to discuss the progress and outcomes (see annex III for the workshop programme).
In each group, scores for hazard characterization and exposure assessment were attributed by consensus among the participants. If no consensus could be reached, or when sufficient information was lacking at the workshop, either no score was given, or the score was marked with a question mark.

3 Results

3.1 Hazard identification and characterization

In order to enhace practical feasibility of the risk assessment exercise, the cattle group considered long-term transports (> 24 hours), the pig group mainly looked at the transport of slaughter pigs, and the poultry group decided to focus on day-old chicks transported from hatchery to farm.

In table 1, the total number of hazards identified, and the total number of hazards characterized in each species group are listed, as well as the total number of hazards which were characterized as serious (score 4) or very serious (score 5). A list with the original descriptions of the hazards identified during the workshop is provided in Annex IV.

Table 1 Total number of hazards identified in each species group, the number of hazards characterized, and the number of hazards characterized as serious or very serious in each species

Species	Hazards identified	Hazards characterized		Hazards characterized as serious or very serious	
	number	number	% of hazards identified	number	% of hazards identified
Horses	54	54	100	21	39
Poultry	12	12	100	5	42
Pigs	29	19	66	10	34
Cattle	46	43	93	29	63
Lambs	20	20	100	13	65
Average	32	30	92	16	49

The number of hazards identified varied between species groups (table 1), although the nature of the hazards identified was highly similar across species (see Annex IV). With the exception of the pig group, participants of different backgrounds and affiliations were confident enough to characterize a large percentage of the total number of hazards identified (between 93 and 100%, see table 1).
In the pig group, only 66% of the total number of hazards identified were characterized at the workshop. A considerable fraction of the total number of hazards identified were characterized as serious or very serious (between 34 and 65%, average 49%, see table 1). This suggests that participants in the risk assessment exercise tended to focus on environmental factors that pose an important risk for animal welfare.

A description of hazards which could not be characterized in terms of the severity of the effect on the animal is provided in table 2.

Table 2 Description of hazards which could not be characterized. Within each species (column), hazards marked with X were not characterized

	Pigs	Cattle
Lack of education[2]	X	
Lack of control	X	X
Insufficient inspection possibilities[2]	X	
Unsuitable design of ramps[1,2,3]	X	
Insufficient head space[1,2,3]	X	
Group size	X	
Insufficient access to feed and water[1,2,3]	X	
Resting with unloading[2]	X	
Resting without unloading	X	
Inappropriate bedding – in combination with temperature[2,3]	X	
Transport time	X	
Lack of exercise during long-term transport		X
Too much noise		X

[1] Hazard was also identified and characterized in the horse group
[2] Hazard was also identified and characterized in the cattle group
[3] Hazard was also identified and characterized in the lamb group

Reviewing the hazards that were characterized as serious or very serious, it turned out that there was a high level of agreement across different species, i.e. similar hazards were mentioned in the different species groups. Hazards consistently characterized as serious or very serious across different species are listed in Table 3. For multiple hazards with similar meanings, a summary description is used. Annex V constitutes the rationale for this summary: it provides a grouping of these hazards into 14 tentative categories, using the original descriptions given by the respective species groups.

Table 3 Summary description of hazards characterized as serious or very serious. Behind each summary description, the species are listed where the particular hazard was mentioned during the risk assessment exercise

Summary description of hazard	Species
Inadequate ventilation, insufficient air velocity	All species
Insufficient air quality	Horses, lambs
Insufficient space allowance	All except chicks
Insufficient head room	Horses, cattle
Slippery floors, inappropriate bedding material (type and/or quality)	Cattle, lambs
Mixing unfamiliar animals, separating familiar animals	Horse, cattle
Unsuitable vehicle design	Horses, pigs
Transport duration[1]	Horses, chicks, lambs[2]
Lack of (appropriate) food and water during long distance transports	All except chicks
Insufficient fasting or inappropriate food prior to transport	Cattle, pigs
Inappropriate, rough or abusive handling	Horses, cattle, pigs
Rough driving, bad driving technique	Horses, cattle
Poor fitness, health status prior to transport	All species
Introduction of pathogens before and during transport	Horses, cattle, lambs
Lack of organization, planning and control	Cattle, lambs
Inappropriate application of resting periods during transport	Pigs, cattle, lambs

[1] Depending on the species, different journey durations were suggested to be hazardous for animal welfare. For horses a journey time of 24 hours was taken as a critical threshold. The welfare of lambs younger than 4 months old was assumed to be threatened beyond a transport duration of 4 hours. In day-old chicks, an extended transport over 50 hours after hatch was considered to be critical.
[2] In the pig group, transport duration was identified as a relevant hazard, but there was no consensus about its characterization (see table 2). The cattle group did not distinguish between different transport durations during the risk assessment exercise itself, but focused on long transports (over 24 hours) only, on the assumption that long distance transports pose a higher risk for animal welfare than short distance ones.

In the horse, cattle and lamb groups, it was explicitly emphasized that the impact of transport duration on the welfare of animals may be profoundly affected by other hazards such as climate, stocking density, etc. For example, unfavourable climate conditions or insufficient space allowance may have a moderate effect on the welfare of livestock during short distance transports, but may results in very serious effects during long distance transports. Thus, in scientific terms, various hazards (environmental factors) may interact with each other.

3.2 Exposure assessment

Early on in the discussion, it was agreed that the categories for exposure assessment that were previously used by EFSA in a risk assessment for the welfare of calves (EFSA, 2006), were not appropriate in the context of the transport of livestock. Table 4 gives an alternative classification for exposure assessment, which was perceived by the participants of the workshop as more realistic. Some participants argued that an incident of 10% may not be seen as rare.

Table 4 Boundaries (%) for the respective categories for exposure assessment

	Category	Boundaries (%)
1	Very rare	< 1%
2	Rare	1 – 10 %
3	Moderately frequent	10 – 30 %
4	Frequent	30 – 60 %
5	Very frequent	> 60 %

In table 5, the total number of hazards where participants of the risk assessment exercise made an exposure assessment are presented. The % of hazards with an exposure assessment (relative to the total number of hazards identified) ranged between 100 and 55%, and was on average lower than the fraction of hazards that were characterized (78 versus 98%, see also table 1). Apparently, participants of the risk assessment exercise were less confident to make an exposure assessment of hazards identified than they were to characterize hazards in terms of the severity of the effect on the animal.

Table 5 Total number of hazards identified in each species group, the number of hazards with an exposure assessment, and the number of hazards with an exposure assessment categorized as frequent or very frequent (score 4-5)

Species	Hazards identified	Hazards with exposure assessment		Hazards with exposure assessment score 4-5	
	number	number	% of hazards identified	number	% of hazards identified
Horses	54	42	78	3	6
Poultry	12	12	100	3	25
Pigs	29	16	55	1	3
Cattle	46	37	80	12	26
Lambs	20	15	75	11	55
Average	32	24	78	6	23

The lowest % of hazards with an exposure assessment was present in the pig group (55%, see table 5). The % of hazards with an exposure assessment categorized as frequent or very frequent ranged between 3% (pig group) and 55% (lamb group), and was 23% on average (see table 5).

The total number of hazards where participants were unable to make an exposure assessment are provided in table 6. In each animal species, the total number of hazards without an exposure assessment is divided into: hazards that were not characterized (no hazard characterization score), hazards characterized as slightly adverse, adverse or moderately serious (scores 1 – 3), and hazards characterized as serious or very serious (score 4 or 5). The pig group was unable to make an exposure assessment in 13 out of 29 hazards identified, which is 45%. Of these 13 hazards, 10 also lacked a hazard characterization (see table 6). By contrast, there were no hazards without an exposure assessment in the poultry group. In the other species groups, the majority of hazards without an exposure assessment were hazards that were characterized as serious or very serious. Out of a total 26 hazards without an exposure assessment in the horse, cattle and lamb group (12 plus 9 plus 5), 15 were characterized as serious of very serious (7 plus 4 plus 4, see table 6).

Table 6 Hazards without an exposure assessment

Species	Hazards without exposure assessment			
	total	non-characterized	hazard characterization score 1-3	hazard characterization score 4-5
Horses	12	0	5	7
Chicks	0	0	0	0
Pigs	13	10	2	1
Cattle	9	2	3	4
Lambs	5	0	1	4

3.3 Risk characterization

According to the EFSA animal welfare risk assessment approach (EFSA, 2006), the final step consists of the so-called risk characterization, where the risk of each hazard is characterized by a score which is obtained by multiplying the hazard characterization score and the exposure assessment score. It is assumed that the higher the risk characterization score, the higher the animal welfare risk of a particular hazard. In the EFSA report on the welfare of intensively kept calves (EFSA, 2006), a threshold of 20 was used to signify major risks (i.e., hazard characterization multiplied by exposure assessment is 4 x 5, or 5 x 4, see Annex II). For the current risk assessment exercise, the following three possible outcomes are considered:

A. hazard characterization score 4-5 & exposure assessment score 4-5
B. hazard characterization score 4-5 & exposure assessment score not (unanimously) assigned
C. hazard characterization score & exposure assessment score not (unanimously) assigned

A fourth possible outcome, i.e. when a hazard characterization score is not (unanimously) assigned and when the corresponding exposure assessment score was either 4 or 5, did not exist. In table 7, those hazards that were characterized as serious or very serious, and that were previously summarized in table 3 , are listed again. For each species, it is indicated which of the three possible outcomes mentioned above (A, B, or C) applies. See also Annex V for background information.

Table 7 Risk characterization of hazards characterized as serious or very serious (score 4-5) in at least two species. Hazards are indicated by an abbreviated description (see table 3 for full descriptions). For each hazard, in each species, a code is given (A, B, or C) corresponding with one of three possible outcomes explained in the text (see also bottom of this Table). No code is given when the corresponding – and within species groups unanimously assigned – exposure assessment score is < 4.

Hazards characterized as serious or very serious in at least two species	Species				
	horses	chicks	pigs	cattle	lambs
Insufficient ventilation / air velocity			B		A
Insufficient air quality					
Insufficient space allowance	B[2]		B	B	A
Insufficient head room			C[3]		
Inappropriate floors / bedding			C	A	B
Inappropriate mixing / separation				A	
Unsuitable vehicle design	A[1]				
Long transport duration	A		C		A
Lack of food and/or water, long transport	A		B	A	B
Inappropriate fasting / food				A	
Inappropriate or abusive handling	B			A	
Rough driving					B
Poor fitness prior to transport	B			B	A
Introduction of pathogens				A	A
Lack of organization			C	B	A
Inappropriate resting			C	B	A

[1] A: hazard characterization score 4-5 & exposure assessment score 4-5
[2] B: hazard characterization score 4-5 & exposure assessment score not (unanimously) assigned
[3] C: hazard characterization score & exposure assessment score not (unanimously) assigned

The hazards mentioned in table 7 include those hazards listed in table 6, final column, i.e. hazards without an exposure assessment but characterized as serious or very serious. Shaded rows in table 7 indicate hazards that may be particularly relevant for risk managers since either the risk characterization score estimated during the risk assessment suggested a major risk (code A), or according to the participants of the current workshop, important information is currently lacking (codes B or C) for several species.

Two hazards identified in the cattle group are not covered in tables 3 and 7. These were: (1) too much noise during transport (neither a hazard characterization assigned nor an exposure assessment made), and (2) the inability to milk lactating cows at the right time of day (hazard characterization score 4, exposure assessment 5).

4 Discussion

The present workshop demonstrated that ad hoc groups consisting of participants from all over the European Union, with different backgrounds and affiliations, were remarkably consistent with regard to the identification of factors that may potentially compromise the welfare of farm animals during transport (i.e., hazard identification). The subsequent characterization of such factors in terms of the severity of the effect on the individual animal (i.e., hazard characterization), proved more difficult in some groups, in particular the pig group. Group composition and group size may have influenced the ability to reach consensus within the ad hoc groups.
The characterization of the hazards was mainly moderately serious, serious, or very serious. This suggests that the participants of the risk assessment exercise primarily considered important hazards.
Hazards characterized as serious or very serious in at least three species included: inadequate ventilation, insufficient space allowance, transport duration, lack of appropriate food and water during transport, incorrect handling during loading, poor fitness prior to transport, introduction of pathogens before and during transport and the inappropriate application of resting periods during transport.

In general, the groups involved in the risk assessment exercise were less confident in the estimation of the prevalence in the population of factors posing a risk for animal (i.e., exposure assessment) than they were to characterize hazards in terms of the severity of the effect on the animal. Lack of reliable information seemed to be a major factor here. Important factors in this respect include, on the one hand, differences within Europe in the rate of transport and in transport conditions across seasons, and on the other, the fact that enforcement of EU-transport regulations is not yet harmonised across the EU. Notably, none of the member states have complete statistics on enforcement during transport of animals. Legislation in the field of animal transport is generally perceived as complicated and not specific enough. It is however, important that legislation is easy to understand and easy to control. Fixed figures might therefore be necessary from a legal and practical point of view.

The fact that various hazards such as stocking density, availability of water or temperature, may significantly interact with the transport duration, raises the question whether the length of transport *per se* represents a principal hazard to animal welfare or whether the quality of the transport in terms of other hazards (such as climate, stocking density, fitness of the animals prior to transport, etc.) is more important. In the first case, it would be necessary to stipulate maximum transport durations in (EU) regulations, whereas in the latter case regulations should focus on defining the conditions (such as special trucks, ventilation equipment, etc.) that are necessary for long distance transports. Correspondingly, it might be worthwhile to perform a separate risk assessment exercise for long and short transports.

Similarly, during the discussion of the risk characterization of hazards during transport of livestock, participants made the observation that the effect of a certain environmental factor on the welfare of the animal (hazard characterization), or the prevalence of a certain problem (exposure assessment), may differ according to the type of animal within the same species. For example, the welfare effects of a slippery or uncomfortable floor could be more severe in dairy cows at the end of their productive life than in young bulls. The prevalence of broken wings could be much higher in spent hens than in broilers. Different weight groups within the same species, or weaned versus un-weaned animals may constitute additional variables within the same species that may significantly affect the risk an animal runs during transport. As a consequence, different types of animals may receive different overall risk characterization scores for the same hazard. The implication of these distinctions would be that a separate risk assessment should be performed for different categories of animals.

The participants generally agreed that it is necessary to install a platform to continue the dialogue and to identify research regarding the incidence of hazards and impact of transport especially on young animals.

5 Conclusions

In conclusion, the participants of the current workshop identified within each of five species groups a number of hazards during the risk assessment exercise that may be particularly relevant for risk managers. These included hazards with a risk characterization score consistent with a major risk (i.e., both hazard characterization score and exposure assessment score 4-5), hazards that were unanimously characterized as serious (hazards characterization score 4-5) but without an exposure assessment score, and hazards where no consensus could be reached on both the hazard characterization and exposure assessment score:

- Insufficient space allowance
- Inappropriate floors and bedding
- Long transport duration
- Lack of food and water during long distance transports
- Poor fitness of animals prior to transport
- Lack of organization, planning and control
- Inappropriate applications of resting periods during transport

These hazards might be used for defining research priorities. As a further step to examine the importance of possible animal welfare hazards during transport, relevant parties other than those that were participating in the present workshop may be asked to consider the same hazards as those that were identified here.

6 Acknowledgement

This workshop is part of a project about transporting farm animals over long distances and belongs to the thematic group Animal welfare. The project is financed by the Dutch Ministry of Agriculture, Nature Management and Food Quality (MLNV). The workshop was initiated and organized by B. Crijns, P. Bours (MLNV), P. Kettlewel (ADAS), A. Nelck (SAVEETRA), J. Tersteeg (Wings), K. van Reenen, H. Reimert, B. Sedoeboen, M. Gerritzen, F. Leenstra and E. Lambooij (ASG-WUR).

Annexes

Annex 1 List with participants

Chairman: Joost Tersteeg – Netherlands (Wing)

Researchers
Antonio Velarde - Spain
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Girma Gebresenbet – Sweden
Sophie Atkinson – Sweden
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Pietro Calà - Italy
Daniele Bernardini - Italy
Leif Christensen – Denmark
Vincent Vandeperre – Belgium
Patrick Chevillon – France
Karen von Hollenben – Germany
Carlos Santos – Portugal
Markku Honkavaara – Finland
Bernadette Earley – Ireland
Joerg Hartung – Germany
Michael Marahrens – Germany
Luc Mirabito – France
Malcolm Mitchell – Scotland
Peter Kettlewell – England
Bert Lambooij - Netherlands
Ferry Leenstra – Netherlands
Kees van Reenen – Netherlands
Marien Gerritzen - Netherlands
Henny Reimert – Netherlands

Government
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Marion Rawlins – United Kingdom
Agneta Norgren – Sweden
Kristina Odén - Sweden
Karlien De Paepe – Belgium
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Mayte Villalba – Spain
Maria Jorge Caldeira Carvalho Antunes Correia – Portugal
Eric van Tilburgh – Belgium
Christine Petit – France
Jiri Dousek – Czech Republic
Simona Nincakova - Czech Republic
Oldrich Valcl – Czech Republic
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Antje Jaensch - Germany
Bridget Hickey – Ireland
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Alberto Herranz – Spain	
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Giuseppe Capodieci – Belgium	(European Livestock and Meat Trading Union)
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Lisbet Hagelund Hansen – Denmark	

Other organizations

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Peter Vingerling – Netherlands	(transitionsociety)
Peter Stevenson – England	(compasion in world farming)
Elisiv Tolo – Norway	(animalia)
Inge Midtveit – Norway	(animalia)

Annex 2 Risk assessment approach to identify of animal welfare risks

1. Steps in the risk assessment approach

The risk assessment approach basically consists of four successive steps:

A. Hazard definition
B. Hazard characterization
C. Exposure assessment
D. Risk characterization

A. Hazard definition

A hazard is any environmental factor that may negatively affect the welfare of an animal. In terms of a risk assessment looking at transport, the underlying assumption is that the welfare of an animal is negatively affected when one of the following animal needs is thwarted or compromised around and/or during transport:

Needs for livestock animals during transport

Need	
(1)	To breath an air with sufficient oxygen and a low content of noxious gases
(2)	To rest
(3)	To avoid fear
(4)	To feed and/or drink
(5)	To have appropriate social contacts with conspecifics, i.e., without social isolation and/or aggression
(6)	To minimize injury and disease
(7)	To groom
(8)	For thermoregulation
(9)	To avoid pain and discomfort

An example of possible hazards and corresponding needs impaired is provided below.

Example of possible hazards and corresponding needs impaired

Hazard	Needs impaired
Insufficient – inadequate ventilation on truck during transport	(1), (8)
Overcrowding during transport	(2), (5)
Rough handling during loading and unloading	(3), (6), (10)

Etc.

B. Hazard characterization

Hazard characterization refers to impact of each hazard on the individual animal. It may be helpful to try to answer the following question: If an individual animal would be confronted with or subjected to the hazard, how serious would that be for its welfare (in terms of behaviour, health, physiology, etc.)? The impact of each hazard is characterized according to a discrete score, ranging from 1 (slight adverse effect) to 5 (very serious adverse effect):

Impact scores of the adverse effects (Hazard characterization) to each individual)

Score	Definition	Explanation
1	Slight adverse effect	Without problems, negligible effect
2	Adverse effect	Problem not severe / not long lasting
3	Moderately serious	Animal experiences discomfort, health problem or pain, but not intense or prolonged
4	Serious	Causing severe problem (discomfort, health problem, pain)
5	Very serious	Causing death

C. Exposure assessment

Exposure assessment refers to the probability (%) or the presence of a hazard in the population. Here, the relevant question to be answered for all individual hazards is: Of all animals that are transported across Europe, how many are actually exposed to the hazard? Exposure assessment is also categorized according to a discrete 5-point scale. During a risk assessment exercise for the welfare of calves (EFSA, 2006), the following boundaries were used for the distinction of the exposure assessment categories:

Impact scores of the adverse effects (Hazard characterization) to each individual, according to the report from 2006 on the welfare or calves

Score	Definition	Probability
1	Very rare	1 – 20% of the animals
2	Rare	21 – 40% of the animals
3	Moderately frequent	41 – 60% of the animals
4	Frequent	61 – 80% of the animals
5	Very frequent	81 – 100% of the animals

However, these boundaries may be different for hazards in relation to transport.

D. Risk characterization

The final step of the risk assessment is the risk characterization, where the risk of each hazard is characterized in terms of the hazard characterization, related to the **severity of the effect**, and the exposure assessment, related to the **frequency or prevalence in the population**. By multiplying the score for hazard characterization with that of the exposure assessment, the qualitative score for risk characterization is obtained for each hazard. For example:

Example of risk characterization of three possible hazards during transport

Hazard	Hazard characterization	Exposure assessment	Risk characterization
Insufficient – inadequate ventilation on truck during transport	5	3	15
Overcrowding during transport	4	1	4
Rough handling during loading and unloading	4	2	8

Etc.

2 Interpreting and using the outcome of a risk assessment exercise

The final outcome allows a risk manager to set priorities, i.e. to identify those hazards with high risk characterization scores. For the final appreciation and qualification of these risk characterization scores, one could, for example, propose that scores of 20 or higher (i.e. hazard characterization x exposure assessment = 4 x 5 or 5 x 4) denote a **major risk**, that scores between 9 and 15 denote a **minor risk**, and that scores equal to or lower than 8 refer to **negligible risks** (EFSA, 2006). See the diagram below:

Risk characterization scores, combining hazard characterization and exposure assessment

Hazard characterization	Exposure assessment				
	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	*10*
3	3	6	*9*	*12*	*15*
4	4	8	*12*	*16*	**20**
5	5	*10*	*15*	**20**	**25**

In **bold** figures: Major risks
In *italics*: Minor risks
Normal font: Negligible risks

In the example above, it was assumed (1) that all participants in the risk assessment reached consensus on the hazard identification as well as the hazard characterization, and (2) that (reliable) estimates for exposure assessment were available. In reality, this may not be the case. Participants with a different background (e.g., from different stakeholders) may disagree on the hazard identification and/or on the hazard characterization. For example, one person may feel that the hazard 'rough handling during the loading of animals on a truck' compromises one of the animal welfare needs, whereas another person may disagree. Correspondingly, one person may characterize the impact of a certain hazard for the animal as 'adverse' (i.e., score 2), whereas another person may characterize the impact of the same hazard as 'serious' (i.e., score 4). Alternatively, there may not be sufficient scientific information available to allow a hazard characterization to be made. With regard to exposure assessment, reliable information may be lacking, or may not have been published in a publicly accessible source yet.

Participants of the risk assessment should be allowed sufficient time for the exchange of information, and for discussing the issues they disagree about. This will enable a more accurate identification of the information that is lacking

In all of these cases, the lack of consensus, or the lack information is also a highly relevant outcome for any risk manager, because it enables the identification of so-called “blank spots”:

- A lack of consensus about hazard identification and /or hazard characterization may point to different views among stakeholders, and different ways of interpreting the same information.
- A lack of scientific information about the consequences of certain hazards for animal welfare (in terms behaviour, health, etc.), may help (1) to prioritize research in the field of animal welfare and transport, and (2) to define the relevant experimental factors that should be studied
- A lack of information about exposure assessment, may result in the conclusion that for certain hazards, comprehensive monitoring or enforcement in practice is necessary.

3. Categories of animals

Hazards may be profoundly different for various species or categories of farm animals. Therefore, prior to the start of the risk assessment, different categories should be defined. Next, a separate risk assessment should be carried out for each category.

Annex 3 Program of the workshop

Location Van der Valk Hotel (Schiphol) Hoofddorp

Thursday 6th March 2008

12.00	**Lunch** Chairman: Joost Tersteeg	
13:00	Welcome Peter de Leeuw, Chief Veterinary Officer	
13:10	Introduction and objectives of the workshop Bert Lambooij	
13:20	EC Regulation 1/2005 overview Peter Kettlewell	
13:50	Views on present transport Transport and trade: NGO's: Research:	 Eddie Harper/ Piet Thijse Bert van de Berg / Peter Stevenson Joerg Hartung / Malcolm Mitchel
15.00	**Break**	
15:20	Risk assessment of welfare during transport Introduction of the methodology: Kees van Reenen Tasks for the groups Group discussion with 10 to 12 participants with a chairman, reporter and secretary: cattle, pigs; sheep/goats; poultry; horses.	
17.00	Presentations of the hazards, comparison and ordering per species by the reporters:	
18.30	**Dinner**	
20.00	Hazard characterization of welfare during transport	
21.00	**Optional → hit the bar or sleep tight → you decide**	

Friday 7th March 2008

09:00	Overview of hazard characterization
09.45	Exposure assessment * White spots, bottle necks and wishes * Strategies Group discussion with 10 to 12 participants with a chairman, reporter and secretary
	Break
11.45	Presentation of strategies
12:30	**Lunch**
13:30	Discussion about the strategies * Recommendations relating the regulation and the research
14.40	**Break**
14.45	Results and discussion
15.00	Closing remarks

Departure

Annex 4 List with hazards identified during the workshop

HAZARDS IDENTIFIED IN CATTLE GROUP

Animal density too high
Animal density too low
Lack of possibility to lie down
Resting time in control post ("cow hotel") too long
Lack of exercise during long-term transport (heifers to Russia)

Mixing different genders
Mixing unfamiliar animals
Separating familiar animals

Loading and unloading
Inappropriate loading and unloading
Multiple loading during the same trip
Inappropriate handling of animals
Lack of experience with human contact (e.g. extensively kept animals)
Reloading after a resting period (> 29 hours)

Inappropriate drinking facilities
Inappropriate feeding of unnweaned calves prior to and during to transport
Insufficient fasting prior to transport
Insufficient water supply

Poor health status prior to transport
Introduction of pathogens before and during transport (calves)
Introduction of pathogens before and during transport (cattle)
Uncleanliness of vehicle (insufficient desinfection)

Temperature and humidity too high without ventilation
Too low temperature in combination with high humidity
Insufficient air velocity in hot conditions (lorry moving)
Insufficient air velocity in hot conditions (stationary lorry)
Lack of mechanical ventilation in cold climate (i.e., closed truck)
Lack of ventilation

Slippery floors in the truck
Uncomfortable Floor
Inappropriate type of bedding material
Inappropriate quality of bedding material
Deck height too low
Deck height too high (bulls only)

Inappropriate driving
Too much noise
Too much vibration
Swaying of vehicle

Bad road conditions
Lack of proper route planning
Lack of organization - including all critical stages and parties involved
Lack of competence of driver
Lack of monitoring during transport by the driver

Technical problem with decks
Lack of control

Inability to milk lactating cows at the right time of the day

HAZARDS IDENTIFIED IN HORSE GROUP

slightly inadequate ventilation
moderately inadequate ventilation
severely inadequate ventilation
air contaminated with exhaust gases
air quality e.g.mild dust level
air quality e.g.moderate dust level
air quality e.g.severe dust level
insufficient space allowed (up to 25%)
insufficient space allowed (over 25% and up to 50%)
Excessive journey time 8hrs (+25%)
Excessive journey time 8hrs (+50%)
Excessive journey time 24hrs (+25%)
Excessive journey time 24hrs (+50%)
long distance + not fed
long distance + not watered
poor handling
abusive handling
extreme unfamilar noise
fear during loading and transport
poor driving technique
very bad driving technique
external factors - e.g. pressure changes from passing vehicles
no good feed or lack of appropriate feed for 8 hours
no good feed or lack of appropriate feed for 16 hours
no good feed or lack of appropriate feed for 24 hours
lack of appropriate drinkers or water for 8 hours
lack of appropriate drinkers or water for 16 hours
lack of appropriate drinkers or water for 24 hours
different tasting water

transport in unfamiliar groups
transport in unfamiliar groups with aggression
weaning and transport on same day
mixing stallions same vehicle
not fit to travel - serious case
groups of different sized horses
unsuitable design e.g. partitions
unsuitable design e.g. ramps
poor maintenance e.g. hole in floor
poor maintenance e.g. sharp projections
slippery Floor

injury from exhaustion leading to a fall
incorrect tethering
dirty vehicles lack of cleansing and disinfection
mixing horses of different immune and pathogen status
unable to groom
Chilling
heat stress
solar gain heat
insufficient headroom

insufficient length of stall to stand in natural position
poor ventilation/heat/stress/water deprivation/overcrowding
inappropriate or no bedding
multiple pick-ups
Unloading and reloading

disparity between drivers' hours and animal hours"

HAZARDS IDENTIFIED IN LAMB GROUP

unfit for travel special unweaned
Transport longer 4 h for < 4 months
cold temperature for goats

lack of water < 4 months for > 4 hours
high temperature / humidity index
Humidity (wet fleece)
not sufficient O2 goats and lamb
noxious gasses from the truck
inproper food + watering device > 4 hours
insufficient resting time of 1 hour + low water intake
wrong (un)loading handling and facilities
wrong handling during resting time

inapropriate bedding
slippery floor in compartment
induce injuries and disease mixed ages or weight groups
shortage of available height
shortage of available space
rough driving
bad road quality

inappropriate planning

HAZARDS IDENTIFIED IN PIG GROUP

lack of water long transport
lack of water short transport
lnaproppriate loading facc
poor ventilation
too long fasting duration (animal preparation
no fasting
rough handling animals
driving performance

lack education
lack of control
inspection possibilities
poor suspension
slippery floors

bad loading ramps
Mixing
high loading density
fitnes / low fitness
Minimal head space
breed halothan pos
Abscence of compartments
group size
feeding drinking access
too low densities
high temp during stops (no velocity)
resting with unloading
resting without unloading
bedding and temperature
lack of bedding
Transport time
low temp

Annex 5 Grouping of similar hazards

(characterized as serious or very serious) across species into 14 tentative categories

CATEGORY OF HAZARDS		ANIMAL SPECIES				
		Horses	**Chicks**	**Pigs**	**Cattle**	**Lambs**
1.	Climate	Severely inadequate ventilation	Poor conditions in transport container	Poor ventilation	Lack of ventilation	
					Temperature and humidity too high without ventilation	High temperature and high humidity
					Lack of mechanical ventilation in cold climate (closed truck)	
				High temperature during stops – no air velocity	Insufficient air velocity in hot conditions (stationary lorry)	
					Insufficient air velocity in hot conditions (lorry moving)	
			Poor conditions in aircraft and waiting area			
2.	Air quality	Severe dust level				Not sufficient oxygen

3.	Space allowance and head room	Insufficient space allowance > 25%		High loading density	Animal density too high	Shortage of available space
		Overcrowding in combination with other factors (poor ventilation, heat, stress, water deprivation)				
		Insufficient head room		*Minimal head space*	Deck height too low	
4.	Transport duration and availability of food and water	Excessive journey time > 24 hours	Extended transport duration > 50 hours after hatch	*Transport duration*		Transport longer than 4 hours in lambs < 4 months old
			Air transport, delays and subsequent transport			
		Long distance transport not fed				
		Long distance transport not watered		Lack of water long transport	Insufficient water supply	Lack of water
		Lack of appropriate drinkers > 24 hours		*Feeding drinking access*	Inappropriate drinking facilities	Lack of appropriate food and watering device, > 4 hours
					Inappropriate feeding of unweaned calves during transport	

5.	Handling	Abusive handling		Rough handling	Inappropriate handling	
					Inappropriate loading and unloading	
					Reloading after a resting period (> 29 hours)	
6.	Driving	Bad driving technique				Rough driving
7.	Mixing	Mixing stallions			Mixing unfamiliar animals	
					Separating familiar animals	
8.	Fitness for travel	Not fit to travel	Poor chick quality	Fitness / low fitness	Poor health status prior to transport	Unfit for travel
9.	Vehicle design	Unsuitable vehicle design (partitions)		Absence of compartments		
		Poor maintenance, e.g. hole in floor				
10.	Floors and bedding				Slippery floor	Slippery floor
					Inappropriate type of bedding material	
					Inappropriate quality of bedding material	
11.	Introduction of pathogens	Mixing horses with different immune and pathogen status			Introduction of pathogens before and during transport (calves)	Mixing different age and weight groups, introduction of disease

12.	Fasting prior to transport		No fasting	Insufficient fasting prior to transport	
				Inappropriate feeding prior to transport in young calves	
13.	Planning, organization and control			Lack of organization	Inappropriate planning
				Lack of competence of driver	
14.	Application of resting periods		*Resting with unloading*	Reloading after a resting period	Insufficient resting time and low water intake
			Resting without unloading		

[1]Hazards in *italics*: no consensus in pig group on both hazard characterization and exposure assessment

References

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