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# Hazards and adverse effects for the assessment of animal welfare on farm and during transport

A preliminary table for bulls, veal calves and slaughter pigs

Dr. ir. Kathalijne Visser Ir. Wijbrand Ouweltjes Dr. ir. Hans Spolder



LIVESTOCK RESEARCH  
WAGENINGEN UR

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Dr. ir. Kathalijne Visser  
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Wageningen UR Livestock Research  
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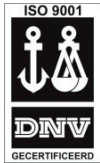
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The ISO 9001 certification by DNV underscores our quality level. All our research commissions are in line with the Terms and Conditions of the Animal Sciences Group. These are filed with the District Court of Zwolle.

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# Preface

The welfare of animals on farm and during transport to the slaughterhouse needs to be warranted by all professionals involved in the process. On farm, animals are exposed to a variety of stressors which may have a short or long duration and hence can negatively affect the welfare of the individual. Transport of farm animals is a critical phase for the welfare of the animals because they are exposed simultaneously to a variety of stressors that may result in high levels of fearfulness and pain, inducing psychological and physical stress, thus compromising their welfare. To assess animal welfare the different components of a risk assessment need to be established. In the current project, a preliminary table of hazards and adverse effects for bulls, veal calves, and slaughter pigs was developed.

Dr. ir. Kathalijne Visser



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# 1 Introduction

## 1.1 Background

The NVWA – BURO (Agency for Risk assessment and Research Programming) carries out risk analyses and risk profiling for all domains of food production, focusing on plant and animal health, animal welfare and food quality and safety. The overall aim of these analyses is to further improve the specific and risk based supervision by the NVWA of the food production process.

Incidents and lack of transparency in some parts of the food production chain caused discussions and commotion about animal welfare and food safety in both society as well as in Parliament. Examples like the 2013 meat adulteration scandal (foods advertised as containing beef were identified to contain undeclared or improperly declared horse meat and other undeclared meats such as pork), welfare and food safety issues regarding imported horse meat urged European authorities to find an EU wide solution.

Following the project "*Analysis of animal welfare risks from unloading until slaughter: red meat livestock species*" the NVWA has asked WUR Livestock Research to list the main hazards and adverse effects to animal welfare for cattle (bulls and veal calves) and for slaughter pigs on the farm and during transport using EFSA reports.

## 1.2 Objectives

This study aims to:

1. provide the NVWA - BURO with a list of animal welfare hazards and their adverse effects for the period from birth to preparing for transport (on the farm) and transport (from unloading until arrival at the destination) for cattle (bulls and veal calves) and slaughter pigs.
2. identify which of the listed hazards can have a(n) (in)direct consequence for food safety when consuming the animals which suffered from the adverse effects.



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## 2 Material and methods

### 2.1 Development of Table for Risk Analysis Animal Welfare

In 2012 the European Food Safety Authority (EFSA) published their scientific opinion: Guidance on Risk Assessment for Animal Welfare (EFSA, 2012). The aim of this Guidance was to provide a harmonised methodology for the assessment of risks for farm animal welfare, together with suggestions about the assessment of benefits for animal welfare. The guidance is intended to be applicable to all types of factors that affect welfare (i.e. housing characteristics, transport conditions, stunning and killing conditions), all types of husbandry systems and all animal categories. Risk assessment has three elements: 1) exposure assessment, 2) consequence characterisation and 3) risk characterisation.

- Ad 1) Exposure assessment should provide a qualitative or quantitative evaluation of the strength, duration, frequency and patterns of exposure for the factors relevant to the exposure scenario(s) developed during the problem formulation.
- Ad 2) Consequence characterisation involves assessing the magnitude (intensity and duration) of the negative and positive consequences for welfare and the probability of their occurrence at the individual level.
- Ad 3) Risk characterisation is the final step of risk assessment and is the qualitative or quantitative estimation of the probability of occurrence and magnitude of negative and positive welfare effects (known or potential) in a given population.

Uncertainty and variability in risk assessment, as well as all assumptions used in problem formulation and risk assessment, need to be clearly expressed. Quality of risk assessment includes the quality of the data input, the relevance of the assumptions and the quality of the final assessment in relation to uncertainty and variability.

In the EFSA reports different terminology is used interchangeable to describe identical steps in the risk assessment. For example factor and hazard identification are used interchangeable (EFSA, 2012). Whereas a factor is defined as 'any aspect of the environment of the animal in relation to housing and management, animal genetic selection, transport and slaughter, which may have the potential to impair or improve their welfare' an hazard is defined as 'a factor with the potential to cause *poor* welfare'.

Reviewing papers on animal welfare risk assessment, especially the papers published before 2012, use different levels of detail in describing for example hazards. Whereas in some studies a hazard is described on a relative abstract level ('driveway design', e.g. Algers, 2009) in other studies the hazards are defined in more detail, for example 'too narrow driveway' (e.g. Dalla Villa, 2009).

For the current project, given the available time, it was decided to focus primarily on recent EFSA opinions and reports and results of ongoing research within the institute (Wageningen UR Livestock Research). The list of references at the end of this report shows which references have been used to develop a table for risk analysis.

For the phase 'on farm' and for the phase 'transport' separate tables have been developed. The tables for risk analysis includes hazards and adverse effects for the different phases on the farm (separate table for veal calves, bulls and slaughter pigs) and for the phase transport.

### 2.2 Evaluation of consequences for food safety

Two internationally recognized experts in food safety were invited to participate in the study. The selection of these two experts was proposed by the NVWA. One meeting was scheduled to brainstorm and discuss possible consequences for food safety for transport and on farm.

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# 3 Results

## 3.1 Table for Risk Analysis Animal Welfare

Solitary based on the literature search and results of ongoing projects within the institute (Wageningen UR Livestock Research) a preliminary table for the risk analysis of animal welfare was developed for the assessing animal welfare on farm and transport. The tables includes the columns 'context', 'hazard description', 'hazard specification', 'adverse effects'. See appendix 1, table 3a, 3b, 3c (on farm, respectively veal calves, bulls and slaughter pigs) and appendix 2, table 4 (transport, all species).

## 3.2 Consequences for food safety

### 3.2.1 Risk related to food safety and animal welfare

Food safety of animal products is an important subject and must be seen in the "farm to fork" chain. Farm management, animal living conditions on primary farms, transporting animals, slaughtering animals and processing of animal products all have e.g. influence on food safety levels. Food safety hazards in the primary phase can be diminished even to a negligible level during processing at the end of the chain e.g. by pasteurization.

Transporting animals from the primary farm to a slaughterhouse is in this project considered for all animal species in the same way. Animals are transported in groups, animals are carrier of microbial food safety pathogens, animals can have contact with other animals and the environment during transport. Of course, the number of animals transported can vary considerably: horses being transported with only a few at a time and pigs being transported in large numbers. If a food pathogen negative animal is transported in a food pathogen negative environment, welfare problems will have no influence on food safety but can have effect on food quality.

Welfare consequences during transport and slaughtering phase are very variable. For food safety, the consequences of stress, contact with animals, contact with environment, open wounds and skin contamination are considered the main risk factors. Wounds are seen as opening of the skin barrier. Fractures, ruptures and bruises are in this risk reflection considered as closed; so no opening of skin. Contact of animals with the environment or with other animals can be seen as infection/contamination moments and stress can influence shedding by and (trans) location of pathogens in the animal. When an animal is infected with a food pathogen it is dependent of the food pathogen what will happen. The food pathogen can enumerate in numbers in the animal and in this way increase the risk for food safety and infection of other animals but it is also possible that the animal just stays infected or even becomes negative again. So time is a risk influencing factor.

Inhalation or ingestion of pathogens is considered in this project as a possible infection route of an animal. But during transport, due to time needed for the animal to become infectious itself, this route is not considered as a route in which an animal can infect another animal

**Table 1**

*Description of possible consequences for food safety for animals being transported, handled, and housed at slaughter plants.*

Possible consequences for food safety	
1	Negligible
2	Increased permeability of intestines enabling already present gut pathogens to cross the barrier
3	Oral infection of a negative animal with food pathogen from another animal (directly or through the environment)
4	Oral infection of a negative animal with food pathogen from another animal (directly or through environment) and the enumeration of food pathogens
5	Opening of skin barrier in addition to and/or as a result of a wound infection
6	Opening of skin barrier in addition to and/or as a result of sepsis with (human) pathogens
7	Translocation of food pathogens within already infected animal to gut system
8	Translocation of food pathogens within already infected animal to gut system and enumeration of pathogens
9	Infection of oropharynx with food pathogens with possible infection of gut system
10	Contamination of the skin with food pathogens from surroundings (from animal itself, other animals or environment)

### 3.2.2 Explanation of specific food safety consequences

During stress situations for animals tight junctions in gut epithelium can open so pathogens can translocate from the gut into different tissues of the animal. As a result, food pathogens can circulate through the animal, possibly leading to contaminated meat during slaughter. It also has been shown that during stress situations animals can start shedding pathogens or increase the number of pathogens shed. This will mainly lead to contamination of the skin, of the infected animal but also to contamination of animals in close proximity, possibly leading to contaminated meat during slaughter. Stress can also influence translocation within the animal of food pathogens e.g. from the tonsils to the gut system. As a consequence, risk levels of a specific pathogen can change. Risks for food safety of a specific animal depending on the animals being infected or contaminated with pathogens. So every circumstance in which negative animals become infected or contaminated is seen as a food safety risk. Therefore, any contact moment is seen as a situation with food safety consequences.

The skin is an important barrier for pathogens to enter the body. Therefore, wounds can be a port d'entrée for food pathogens in an animal. This at first can only be a wound infection but in time can develop to a sepsis and transport of pathogens through the animal. Possible consequences for food safety can be arranged in different scenarios, see table 2.

**Table 2**

*Description of possible scenarios and their consequences for food safety specific for animals being transported and the phase at the slaughter plant. Scenarios are used in the table 4 in the appendix 2.*

Scenario	Animal situation / welfare risk	Possible consequences food safety
<b>A</b>	Stress	2, 7, 8
<b>B</b>	A + Contact with other animal(s)	2, 3, 7, 8, 9, 10
<b>C</b>	B + Animal wounded & contact with other animal(s)	2, 3, 5, 6, 7, 8, 9, 10
<b>D</b>	B + Contact with other animal(s) & longer duration	2, 3, 4, 7, 8, 9, 10
<b>E</b>	D + Animal wounded, contact with other animal(s) & longer duration	2, 3, 4, 5, 6, 7, 8, 9, 10
<b>F</b>	A + Animal wounded & alone	2, 5, 6, 7, 8

The above mentioned scenarios for the possible consequences for food safety have been applied to the phase of 'transport' and are included in table 4 (appendix 2).

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# 4 Discussion and conclusion

## 4.1 Methodology

- Based on the EFSA publications and some additional related reports a preliminary table with hazards and adverse effects was developed for the 'on farm' and 'transport'. However, the EFSA references used show a large variety in methodologies, descriptions and definitions to set up a risk analysis. Based on common sense and the attempt to enable harmonization with other phases in the chain (such as slaughterhouse), the preliminary table as shown in appendix 1 and 2, was developed. It was felt however that, especially for the 'on farm' phase many aspects (context, hazards) are missing, i.e. not reported and/or studied in the recent EFSA references used for this project. It is recommended that especially for the 'on farm' phase discussions with experts would be needed to complete the list with hazards and adverse effects. Moreover, it must be emphasised that the current tables are preliminary and should be subject to improvements in the future.
- The qualification of risks for food safety is seen a very complex process in which multiple factors can influence the final consequences in terms of risks for food safety. This is especially true for the phase 'on farm' where there are numerous different housing, feeding and management systems within species, in addition to different health programmes and chain management characteristics (for example biological rearing versus intensive rearing). Therefore, the experts on food safety that were involved in this project were not convinced that at this moment there was sufficient knowledge on the interaction between all these factors to apply the same method as has been used for the phases 'transport' and 'slaughterhouse' to qualify possible risks for food safety in the phase 'on farm'. It is recommended to set up a working group, with international experts in food safety, of different animal species, covering all different systems and chains, to discuss possibilities for qualifying possible risks for food safety on farm.

## 4.2 Results

- It was assumed that the possible consequences for food safety did not differ between animal species/categories since these were related to the nature of the adverse effect (whether or not skin was open) and the context (whether or not in contact with other animals). Therefore, the possible scenario's in the tables are identical for the animal species/categories considered.
- For the input on the possible consequences for food safety an important distinction was made between wounds on one side and bruises, ruptures and fractures on the other side. Wounds being the only one of these in which the skin is open, and hence extern pathogens can enter the body.

The possible consequences for food safety can be affected greatly by other factors not included in the current project. Obviously, phases after slaughtering can also have an influence on food safety.

<sup>1</sup> Als er een goede verklaring is voor een hogere sterfte en men kan aantonen dat er sprake is van overmacht, dan kan de staatssecretaris besluiten in dat geval een uitzondering toe te staan.

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## 5 Conclusion

Based on the EFSA publications and related reports a preliminary table with hazards and adverse effects was developed for the 'on farm' and 'transport' phases. Additionally, possible consequences for food safety for animals being transported were reported.

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# Acknowledgements

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# Appendix 1 - farm



**Table 3a**

Preliminary table presenting context (situation/place) - hazards (description and specification) - adverse effects for risk analysis of animal welfare **on farm** for **veal calves**. Numbering refers to the excel table associated with the results of this table.

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
1	Housing	inadequate social contact	individually housed	respiratory problems
2	Housing	inadequate social contact	individually housed	dehydration
3	Housing	inadequate social contact	housed with group mates	respiratory problems
4	Housing	inadequate social contact	housed with group mates	dehydration
5	Housing	inadequate social contact	housed with dam	respiratory problems
6	Housing	inadequate social contact	housed with dam	dehydration
7	Housing	inappropriate space per animal	too small ground surface per animal	frustration
8	Housing	inappropriate space per animal	too small ground surface per animal	aggression
9	Housing	inappropriate space per animal	too small ground surface per animal	fatigue
10	Housing	inappropriate space per animal	too small ground surface per animal	bruises
11	Housing	inappropriate space per animal	too small ground surface per animal	wounds
12	Housing	inappropriate space per animal	too small ground surface per animal	fear
13	Housing	inappropriate group size	too large groups	respiratory problems
14	Housing	inappropriate group size	too large groups	fear
15	Housing	inappropriate group size	too large groups	aggression
16	Housing	Inappropriate flooring	slatted flooring (concrete, wood)	discomfort while walking
17	Housing	Inappropriate flooring	slatted flooring (concrete, wood)	bruises
18	Housing	Inappropriate flooring	inadequate for lying (too wet)	fatigue
19	Housing	Inappropriate flooring	inadequate for lying (too wet)	cold stress
20	Housing	inappropriate climate	too low air volume per animal	heat stress
21	Housing	inappropriate climate	too low air velocity	heat stress
22	Housing	inappropriate climate	too humid	heat stress
23	Housing	inappropriate climate	draught	cold stress

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
24	Housing	inappropriate climate	unhealthy air quality (dust, noxious gases)	respiratory problems
25	Feeding management	inappropriate feeding/drinking before weaning	too less colostrum	prone to infections
26	Feeding management	inappropriate feeding/drinking before weaning	too less colostrum	desnutrition
27	Feeding management	inappropriate feeding/drinking before weaning	too less colostrum	respiratory problems
28	Feeding management	inappropriate feeding/drinking before weaning	contaminated colostrum	respiratory problems
29	Feeding management	inappropriate feeding/drinking before weaning	low quality liquid feed	desnutrition
30	Feeding management	inappropriate feeding/drinking before weaning	low amounts of milk	desnutrition
31	Feeding management	inappropriate feeding/drinking before weaning	low amounts of milk	frustration
32	Feeding management	inappropriate feeding/drinking before weaning	too cold milk	digestive problems
33	Feeding management	inappropriate weaning	abrupt	desnutrition
34	Feeding management	inappropriate weaning	too early	desnutrition
35	Feeding management	inappropriate weaning	too early	oral stereotypies
36	Feeding management	inappropriate feeding/drinking after weaning	too high speed	desnutrition
37	Feeding management	inappropriate feeding/drinking after weaning	too less meals and/or too high amounts per meal	metabolism problems
38	Feeding management	inappropriate feeding/drinking after weaning	too less meals and/or too high amounts per meal	dehydration
39	Feeding management	inappropriate feeding/drinking after weaning	restricted water during hot weather and disease	dehydration
40	Feeding management	inappropriate feeding/drinking after weaning	restricted water during hot weather and disease	frustration
41	Feeding management	inappropriate feeding/drinking during fattening	milk (or replacer) accumulation in the rumen	digestive problems
42	Feeding management	inappropriate feeding/drinking during fattening	contaminated feed	digestive problems
43	Feeding management	inappropriate feeding/drinking during fattening	contaminated feed	respiratory problems
44	Feeding management	unbalanced feeding/drinking during fattening	too low ration solid feed/milk replacer (white veal calves)	oral stereotypies

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
45	Feeding management	unbalanced feeding/drinking during fattening	too low ration solid feed/milk replacer (white veal calves)	digestive problems
46	Feeding management	inappropriate feeding/drinking during fattening	restricted iron intake (white veal calves)	anemia
47	Feeding management	inappropriate feeding/drinking during fattening	low quality milk replacer	digestive problems
48	Feeding management	inappropriate feeding/drinking during fattening	insufficient feeding places	desnutrition
49	Feeding management	inappropriate feeding/drinking during fattening	insufficient feeding places	frustration
50	Feeding management	inappropriate feeding/drinking during fattening	insufficient feeding places	aggression
51	Human-animal relationship	inappropriate handling	insufficient skilled and experienced stockpersons	fear of humans
52	Human-animal relationship	inappropriate handling	inappropriate use of devices (e.g. electric shocks), inappropriate positioning in relation to the animal	fear of humans
53	Human-animal relationship	inappropriate handling	inappropriate use of devices (e.g. electric shocks), inappropriate positioning in relation to the animal	physical pain from management procedures
54	Health management	Iron status	iron overload at start of fattening period	?
55	Health management	Iron status	inadequate monitoring of iron status	anemia
56	Health management	inappropriate forming of batches	mixing animals different origin	prone to infections
57	Health management	inappropriate forming of batches	too low weight upon arrival	respiratory problems
58	Health management	inadequate prevention	no dam vaccination against diarrhoea causing agents	prone to infections
59	Health management	inadequate prevention	no dam vaccination against diarrhoea causing agents	dehydration
60	Health management	inappropriate management sick calves	lack of sick bay	continued suffering
61	Health management	inappropriate management sick calves	poor supervision sick bay	continued suffering
62	Health management	insufficient hygiene	poor hygiene buckets, teats, filters	dehydration
63	Health management	insufficient hygiene	poor hygiene buckets, teats, filters	prone to infections
64	Health management	insufficient hygiene	use of waste milk	dehydration
65	Health management	insufficient hygiene	use of waste milk	prone to infections

**Table 3b**

Preliminary table presenting context (situation/place) - hazards (description and specification) - adverse effects for risk analysis of animal welfare **on farm** for **bulls**.  
Numbering refers to the excel table associated with the results of this table.

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
1	Animal characteristics	genetic selection	hypermuscularity	locomotory problems
2	Animal characteristics	undesired behaviour	mounting	bruises
3	Housing	inappropriate social contact	mixing familiar and unfamiliar during	fear
4	Housing	inappropriate social contact	mixing familiar and unfamiliar during	aggression
5	Housing	inappropriate space per animal	too small ground surface per animal	frustration
6	Housing	inappropriate space per animal	too small ground surface per animal	aggression
7	Housing	inappropriate space per animal	too small ground surface per animal	fatigue
8	Housing	inappropriate space per animal	too small ground surface per animal	bruises
9	Housing	inappropriate space per animal	too small ground surface per animal	wounds
10	Housing	inappropriate space per animal	too small ground surface per animal	fear
11	Housing	inappropriate space per animal	too small ground surface per animal	respiratory problems
12	Housing	inappropriate layout	use of bars to prevent mounting	frustration
13	Housing	inappropriate layout	use of bars to prevent mounting	bruises
14	Housing	inappropriate flooring	concrete floors, rubberised floors, bedded floors	locomotory problems
15	Housing	inappropriate flooring	concrete floors, rubberised floors, bedded floors	aggression
16	Housing	inappropriate flooring	concrete floors, rubberised floors, bedded floors	abnormal behaviour
17	Housing	insufficient freedom of movement	tethered	musculoskeletal disorders
18	Housing	insufficient freedom of movement	tethered	frustration (not able to go where wanted)
19	Housing	inappropriate climate	too high THI	heat stress
20	Housing	inappropriate climate	too low ambient temperature	cold stress
21	Housing	inappropriate climate	insufficient ventilation	respiratory problems
22	Housing	inappropriate climate	unhealthy air quality (dust, noxious gases)	respiratory problems
23	Feeding management	unbalanced feeding	high ratio starch/fibre in diet	metabolism problems

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
24	Feeding management	unbalanced feeding	high ratio starch/fibre in diet	digestive problems
25	Feeding management	unbalanced feeding	high ratio starch/fibre in diet	skeletal disorders
26	Feeding management	unbalanced feeding	high ratio starch/fibre in diet	oral stereotypies
27	Feeding management	unbalanced feeding	high ratio starch/fibre in diet	abnormal behaviour (urine drinking)
28	Feeding management	inappropriate quantities	restricted feeding at pasture	desnutrition
29	Feeding management	inappropriate quantities	restricted feeding at pasture	frustration
30	Feeding management	inappropriate quantities	restricted feeding at pasture	aggression
31	Feeding management	inappropriate quantities	over feeding	metabolism problems
32	Feeding management	inappropriate quantities	over feeding	heat stress
33	Feeding management	insufficient nutritious	mineral deficient pastures (Mg, Cu, P)	?
34	Feeding management	inappropriate weaning	abrupt separation	frustration
35	Feeding management	inappropriate weaning	only visual contact	frustration
36	Feeding management	inappropriate feeders	restricted space at feeders	frustration
37	Feeding management	inappropriate feeders	restricted space at feeders	aggression
38	Feeding management	inappropriate feeders	restricted space at feeders	desnutrition
39	Feeding management	insufficient water intake	restricted water intake	dehydration
40	Feeding management	insufficient water intake	restricted water intake	aggression
41	Feeding management	insufficient water intake	restricted water intake	frustration
42	Feeding management	insufficient water intake	insufficient places to drink	dehydration
43	Feeding management	insufficient water intake	insufficient places to drink	aggression
44	Feeding management	insufficient water intake	insufficient places to drink	frustration

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
45	Handling	inappropriate human-animal relationship	insufficient skilled and experienced stockpersons	fear of humans
46	Handling	inappropriate human-animal relationship	inappropriate use of devices (e.g. electric shocks), inappropriate positioning in relation to the animal	fear of humans
47	Handling	inappropriate human-animal relationship	inappropriate use of devices (e.g. electric shocks), inappropriate positioning in relation to the animal	physical pain from management procedures
48	Health management	inadequate prevention	no pasture management	parasitism
49	Health management	inadequate prevention	no planned herd health programme	?
50	Health management	inadequate prevention	no or insufficient vaccination (respiratory virus)	respiratory problems
51	Health management	inadequate diagnosis	delay in BRD diagnosis	respiratory problems
52	Health management	inadequate treatment	failure to treat or cull	continued suffering
53	Management procedures	inadequate pain management	no pain management (disbudding, dehorning, castration, tail tip docking)	pain from management procedures
54	Management procedures	inadequate pain management	local anaesthesia (disbudding, dehorning, castration)	pain from management procedures
55	Management procedures	inadequate pain management	local anaesthesia plus analgesia (disbudding, dehorning, castration)	pain from management procedures

**Table 3c**

Preliminary table presenting context (situation/place) - hazards (description and specification) - adverse effects for risk analysis of animal welfare **on farm** for **slaughter pigs**. Numbering refers to the excel table associated with the results of this table.

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
1	Animal characteristics	genetic selection	conformation	locomotor problems
2	Animal characteristics	genetic selection	conformation	cardiovascular problems
3	Animal characteristics	genetic selection	lean tissue	prone to infections
4	Housing	inappropriate pen design	too low sides/partly open sides neighbouring pens	stress
5	Housing	inappropriate pen design	too low sides/partly open sides neighbouring pens	fatigue
6	Housing	inappropriate pen design	no exploration possibilities	stress
7	Housing	inappropriate pen design	no exploration possibilities	abnormal behaviour
8	Housing	inappropriate pen design	inadequate separation of dunging and lying area	fatigue
9	Housing	inappropriate space per animal	too small ground surface per animal	abnormal behaviour
10	Housing	inappropriate space per animal	too small ground surface per animal	bruises
11	Housing	inappropriate space per animal	too small ground surface per animal	discomfort
12	Housing	inappropriate space per animal	too small ground surface per animal	wounds
13	Housing	inappropriate space per animal	too small ground surface per animal	fatigue
14	Housing	inappropriate space per animal	too small ground surface per animal	frustration
15	Housing	inappropriate space per animal	too small ground surface per animal	locomotory problems
16	Housing	inappropriate space per animal	too small ground surface per animal	stress
17	Housing	inappropriate groups	too large groups	stress
18	Housing	inappropriate groups	too large groups	abnormal behaviour
19	Housing	inappropriate groups	mixing familiar and unfamiliar animals	stress
20	Housing	inappropriate groups	mixing familiar and unfamiliar animals	aggression
21	Housing	inappropriate groups	mixing familiar and unfamiliar animals	locomotory problems
22	Housing	inappropriate groups	mixing familiar and unfamiliar animals	bruises
23	Housing	inappropriate flooring	slatted floor, concrete bare floor	discomfort
24	Housing	inappropriate flooring	slatted floor, concrete bare floor	bruises

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
25	Housing	inappropriate flooring	slatted floor, concrete bare floor	locomotor problems
26	Housing	inappropriate flooring	slatted floor, concrete bare floor	abnormal behaviour
27	Housing	inappropriate flooring	inadequate for lying	fatigue
28	Housing	inappropriate flooring	inadequate for lying	aggression
29	Housing	inappropriate flooring	too slippery	bruises
30	Housing	inappropriate flooring	too slippery	wounds
31	Housing	inappropriate climate	too warm (with or without cooling facilities)	heat stress
32	Housing	inappropriate climate	too warm (with or without cooling facilities)	abnormal behaviour
33	Housing	inappropriate climate	too cold (with or without facilities to keep warm)	cold stress
34	Housing	inappropriate climate	too cold (with or without facilities to keep warm)	abnormal behaviour
35	Housing	inappropriate climate	unhealthy air quality	respiratory problems
36	Housing	inappropriate climate	unhealthy air quality	abnormal behaviour
37	Housing	inappropriate climate	too noisy/loud	fatigue
38	Housing	inappropriate light/dark cycle	low light intensity / too less hours of light per day	abnormal behaviour
39	Housing	inappropriate light/dark cycle	too less hours dark or low light intensity	abnormal behaviour
40	Feeding management	inappropriate weaning	too early (before suckling motivation ceases)	stress
41	Feeding management	inappropriate weaning	too early (before suckling motivation ceases)	frustration
42	Feeding management	inappropriate weaning	too early (before suckling motivation ceases)	desnutrition
43	Feeding management	inappropriate weaning	too early (before suckling motivation ceases)	immune system problems
44	Feeding management	inappropriate weaning	too early (before suckling motivation ceases)	abnormal behaviour
45	Feeding management	insufficient water intake	inappropriate system	dehydration
46	Feeding management	insufficient water intake	inappropriate system	aggression
47	Feeding management	insufficient water intake	poor water quality	digestive problems
48	Feeding management	insufficient feed intake	competition during feeding	stress
49	Feeding management	insufficient feed intake	competition during feeding	frustration
50	Feeding management	insufficient feed intake	competition during feeding	aggression
51	Feeding management	insufficient feed intake	too less food	desnutrition



NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
52	Feeding management	insufficient feed intake	too less food	aggression
53	Feeding management	inadequate feed quality	toxins, antinutrients or microbiological contaminants	enteric problems
54	Feeding management	inadequate feed quality	unbalanced diet (amino acids and micronutrients)	abnormal behaviour
55	Feeding management	inadequate feed quality	unbalanced diet (amino acids and micronutrients)	pathological problems
56	Feeding management	inadequate feed quality	unbalanced diet (amino acids and micronutrients)	desnutrition
57	Feeding management	inadequate feed quality	unbalanced diet (amino acids and micronutrients)	aggression
58	Feeding management	inadequate feed quality	unbalanced diet (lack of fibre/no appropriate foraging material)	aggression
59	Feeding management	inadequate feed quality	unbalanced diet (lack of fibre/no appropriate foraging material)	abnormal behaviour
60	Feeding management	inadequate feed quality	unbalanced diet (lack of fibre/no appropriate foraging material)	digestive problems
61	Human-animal relationship	inappropriate handling	slapping and hitting	fear
62	Human-animal relationship	inappropriate handling	slapping and hitting	stress
63	Human-animal relationship	inappropriate handling	use of electric prod	fear
64	Human-animal relationship	inappropriate handling	use of electric prod	pain
65	Human-animal relationship	inappropriate attitude towards animals	approach while not handling	fear
66	Human-animal relationship	inappropriate attitude towards animals	approach while not handling	stress
67	Health management	inadequate prevention	cleanliness of pens, buildings	infectious diseases
68	Health management	inadequate prevention	poor biosecurity	infectious diseases
69	Health management	inappropriate management sick animals	poor supervision sick animals	?
70	Management procedures	Nose	Nose ringing	fear
71	Management procedures	Nose	Nose ringing	pain from management procedures
72	Management procedures	Nose	Nose ringing	chronic pain
73	Management procedures	Nose	Nose ringing	infections
74	Management procedures	Ears	Ear tagging, ear notching	fear

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS
75	Management procedures	Ears	Ear tagging, ear notching	pain from management procedures
76	Management procedures	Ears	Ear tagging, ear notching	chronic pain
77	Management procedures	Ears	Ear tagging, ear notching	infections
78	Management procedures	Castration	Castration with or without pain treatment	fear
79	Management procedures	Castration	Castration with or without pain treatment	pain from management procedures
80	Management procedures	Castration	Castration with or without pain treatment	chronic pain
81	Management procedures	Castration	Castration with or without pain treatment	infections
82	Management procedures	Teeth	Tooth resection (grinding or clipping)	fear
83	Management procedures	Teeth	Tooth resection (grinding or clipping)	pain from management procedures
84	Management procedures	Teeth	Tooth resection (grinding or clipping)	chronic pain
85	Management procedures	Teeth	Tooth resection (grinding or clipping)	infections
86	Management procedures	Tail	Tail docking	fear
87	Management procedures	Tail	Tail docking	pain from management procedures
88	Management procedures	Tail	Tail docking	chronic pain
89	Management procedures	Tail	Tail docking	infections

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# Appendix 2 - transport

**Table 4**

Preliminary table presenting context (situation/place) - hazards (description and specification) - adverse effects for risk analysis of animal welfare and their possible consequences for food safety for the **transport** of veal calves (CALVES), culled cows (COWS), bulls (BULLS), slaughter pigs (PIGS), meat horses (HORSES), and slaughter lambs (LAMBS). Numbering refers to the excel table associated with the results of this table.

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
1	In preparation pens / control posts	Inappropriate management and handling	no fasting	travel sickness	B	B	B	B	B	B
2	In preparation pens / control posts	Inappropriate management and handling	too long fasting duration	desnutrition	B	B	B	B	B	B
3	In preparation pens / control posts	Inappropriate management and handling	too long fasting duration	frustration	B	B	B	B	B	B
4	In preparation pens / control posts	Inappropriate management and handling	too long fasting duration	aggression	B	B	B	B	B	B
5	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	dehydration	B	B	B	B	B	B
6	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	heat stress	B	B	B	B	B	B
7	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	desnutrition	B	B	B	B	B	B
8	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	frustration	B	B	B	B	B	B
9	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	aggression	B	B	B	B	B	B
10	In preparation pens / control posts	Inappropriate management and handling	inadequate feeding and drinking management (quantities, intervals, durations)	gastro-enteric problems	B	B	B	B	B	B
11	In preparation pens / control posts	Inappropriate management and handling	poor human-animal relationship	fear of humans	B	B	B	B	B	B
12	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	diseases	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
13	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	fear	B	B	B	B	B	B
14	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	fatigue	B	B	B	B	B	B
15	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	heat stress	B	B	B	B	B	B
16	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	cold stress	B	B	B	B	B	B
17	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	dehydration	B	B	B	B	B	B
18	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	desnutrition	B	B	B	B	B	B
19	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	fractures	B	B	B	B	B	B
20	In preparation pens / control posts	Inappropriate management and handling	lack of selection animals unfit for travel ?	ruptures	B	B	B	B	B	B
21	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	fear	B	B	B	B	B	B
22	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	frustration	B	B	B	B	B	B
23	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	bruises	B	B	B	B	B	B
24	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	wounds	C	C	C	C	C	C
25	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	fractures	B	B	B	B	B	B
26	In preparation pens / control posts	Inappropriate management and handling	tethering animals unfamiliar with being tethered	ruptures	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
27	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long)	fatigue	B	B	B	B	B	B
28	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long)	frustration	B	B	B	B	B	B
29	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long)	desnutrition	B	B	B	B	B	B
30	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long)	wounds	C	C	C	C	C	C
31	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long)	respiratory problems	B	B	B	B	B	B
32	In preparation pens / control posts	Inappropriate management and handling	incorrect tethering (too short, too long, strangulation)	suffocation	B	B	B	B	B	B
33	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	fear	B	B	B	B	B	B
34	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	aggression	B	B	B	B	B	B
35	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	bruises	B	B	B	B	B	B
36	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	wounds	C	C	C	C	C	C
37	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	fractures	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
38	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	ruptures	B	B	B	B	B	B
39	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	dehydration	B	B	B	B	B	B
40	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	desnutrition	B	B	B	B	B	B
41	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	heat stress	B	B	B	B	B	B
42	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	cold stress	B	B	B	B	B	B
43	In preparation pens / control posts	Inappropriate management and handling	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	infectious diseases	B	B	B	B	B	B
44	In preparation pens / control posts	Inappropriate management and handling	separating animals familiar with each other	fear	B	B	B	B	B	B
45	In preparation pens / control posts	Inappropriate management and handling	separating animals familiar with each other	bruises	B	B	B	B	B	B
46	In preparation pens / control posts	Inappropriate management and handling	separating animals familiar with each other	wounds	C	C	C	C	C	C
47	In preparation pens / control posts	Inappropriate management and handling	separating animals familiar with each other	fractures	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
48	In preparation pens / control posts	Inappropriate management and handling	separating animals familiar with each other	ruptures	B	B	B	B	B	B
49	In preparation pens / control posts	Inappropriate management and handling	inappropriate milking management lactating animals (no facilities, poor timing, poor skills)	physical pain from management procedures	nvt	B	nvt	nvt	nvt	nvt
50	Loading - driveway and loading bay	Inadequate layout	too long	fatigue	B	B	B	B	B	B
51	Loading - driveway and loading bay	Inadequate layout	too narrow	bruises	B	B	B	B	B	B
52	Loading - driveway and loading bay	Inadequate layout	sharp curves and dead ends	fear	B	B	B	B	B	B
53	Loading - driveway and loading bay	Inadequate layout	blocking zones (lighting, noises, smells)	fear	B	B	B	B	B	B
54	Loading - driveway and loading bay	Inappropriate flooring	too slippery	insufficient foothold	B	B	B	B	B	B
55	Loading - driveway and loading bay	Inappropriate flooring	too slippery	bruises	B	B	B	B	B	B
56	Loading - driveway and loading bay	Inappropriate flooring	too slippery	wounds	C	C	C	C	C	C
57	Loading - driveway and loading bay	Inappropriate flooring	too slippery	fractures	B	B	B	B	B	B
58	Loading - driveway and loading bay	Inappropriate flooring	too slippery	ruptures	B	B	B	B	B	B
59	Loading - driveway and loading bay	Inappropriate flooring	too slippery	fear	B	B	B	B	B	B
60	Loading - driveway and loading bay	Inappropriate flooring	uneven flooring	discomfort while walking	B	B	B	B	B	B
61	Loading - driveway and loading bay	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	bruises	B	B	B	B	B	B



NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
62	Loading - driveway and loading bay	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	wounds	C	C	C	C	C	C
63	Loading - driveway and loading bay	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	fractures	B	B	B	B	B	B
64	Loading - driveway and loading bay	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	fear	B	B	B	B	B	B
65	Loading - driveway and loading bay	Inappropriate design sides and gates	sharp protrusions or edges in sides/gates	bruises	B	B	B	B	B	B
66	Loading - driveway and loading bay	Inappropriate design sides and gates	sharp protrusions or edges in sides/gates	wounds	C	C	C	C	C	C
67	Loading - driveway and loading bay	Inappropriate design sides and gates	sharp protrusions or edges in sides/gates	fractures	B	B	B	B	B	B
68	Loading - driveway and loading bay	Inappropriate design sides and gates	partially open or short/low sides/gates	fear	B	B	B	B	B	B
69	Loading - driveway and loading bay	Inappropriate climate	draught	fear	B	B	B	B	B	B
70	Loading - driveway and loading bay	Inappropriate climate	air too cold	cold stress	B	B	B	B	B	B
71	Loading - driveway and loading bay	Inappropriate climate	air too hot	heat stress	B	B	B	B	B	B
72	Loading - driveway and loading bay	Inappropriate climate	air too humid	heat stress	B	B	B	B	B	B
73	Loading - driveway and loading bay	Inappropriate management and handling	rough operation of gates (noise)	fear	B	B	B	B	B	B
74	Loading - driveway and loading bay	Inappropriate management and handling	highspeed throughput	fear	B	B	B	B	B	B
75	Loading - driveway and loading bay	Inappropriate management and handling	handlers shouting	fear of humans	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
76	Loading - driveway and loading bay	Inappropriate management and handling	handlers hitting, striking, kicking	fear of humans	B	B	B	B	B	B
77	Loading - driveway and loading bay	Inappropriate management and handling	handlers hitting, striking, kicking	physical pain from management procedures	B	B	B	B	B	B
78	Loading - driveway and loading bay	Inappropriate management and handling	handlers hitting, striking, kicking	wounds	C	C	C	C	C	C
79	Loading - driveway and loading bay	Inappropriate management and handling	inappropriate use of devices (e.g. electric shocks adult cows and pigs), inappropriate positioning in relation to the animal	fear of humans	B	B	B	B	B	B
80	Loading - driveway and loading bay	Inappropriate management and handling	inappropriate use of devices (e.g. electric shocks adult cows and pigs), inappropriate positioning in relation to the animal	physical pain from management procedures	B	B	B	B	B	B
81	Loading - driveway and loading bay	Inappropriate management and handling	separating animals familiar with each other	fear	B	B	B	B	B	B
82	Loading - driveway and loading bay	Inappropriate management and handling	separating animals familiar with each other	bruises	B	B	B	B	B	B
83	Loading - driveway and loading bay	Inappropriate management and handling	separating animals familiar with each other	wounds	C	C	C	C	C	C
84	Loading - driveway and loading bay	Inappropriate management and handling	separating animals familiar with each other	fractures	B	B	B	B	B	B
85	Loading - driveway and loading bay	Inappropriate management and handling	separating animals familiar with each other	ruptures	B	B	B	B	B	B
86	Loading - loading ramp	Inadequate layout	too steep, too high steps	insufficient foothold	B	B	B	B	B	B
87	Loading - loading ramp	Inadequate layout	too steep, too high steps	bruises	B	B	B	B	B	B
88	Loading - loading ramp	Inadequate layout	too steep, too high steps	wounds	C	C	C	C	C	C
89	Loading - loading ramp	Inadequate layout	too steep, too high steps	fractures	B	B	B	B	B	B
90	Loading - loading ramp	Inadequate layout	too steep, too high steps	ruptures	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
91	Loading - loading ramp	Inadequate layout	too steep, too high steps	fear	B	B	B	B	B	B
92	Loading - loading ramp	Inadequate layout	too narrow	bruises	B	B	B	B	B	B
93	Loading - loading ramp	Inadequate layout	blocking zones (lighting, noises, smell)	fear	B	B	B	B	B	B
94	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	insufficient foothold	B	B	B	B	B	B
95	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	bruises	B	B	B	B	B	B
96	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	wounds	C	C	C	C	C	C
97	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	fractures	B	B	B	B	B	B
98	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	ruptures	B	B	B	B	B	B
99	Loading - loading ramp	Inappropriate flooring (including lift)	too slippery	fear	B	B	B	B	B	B
100	Loading - loading ramp	Inappropriate flooring (including lift)	gaps, too high steps, potholes, sharp protrusions, missing battens, inappropriate dimensions or distance battens	bruises	B	B	B	B	B	B
101	Loading - loading ramp	Inappropriate flooring (including lift)	gaps, too high steps, potholes, sharp protrusions, missing battens, inappropriate dimensions or distance battens	wounds	C	C	C	C	C	C
102	Loading - loading ramp	Inappropriate flooring (including lift)	gaps, too high steps, potholes, sharp protrusions, missing battens, inappropriate dimensions or distance battens	fractures	B	B	B	B	B	B
103	Loading - loading ramp	Inappropriate flooring (including lift)	gaps, too high steps, potholes, sharp protrusions, missing battens, inappropriate dimensions or distance battens	ruptures	B	B	B	B	B	B
104	Loading - loading ramp	Inappropriate flooring (including lift)	gaps, too high steps, potholes, sharp protrusions, missing battens, inappropriate dimensions or distance battens	fear	B	B	B	B	B	B
105	Loading - loading ramp	Inappropriate flooring (including lift)	uneven flooring	discomfort while walking	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
106	Loading - loading ramp	Inappropriate flooring (including lift)	uneven flooring	bruises	B	B	B	B	B	B
107	Loading - loading ramp	Inappropriate design sides and gates (including lift)	sharp protrusions or edges in sides/gates	bruises	B	B	B	B	B	B
108	Loading - loading ramp	Inappropriate design sides and gates (including lift)	sharp protrusions or edges in sides/gates	wounds	C	C	C	C	C	C
109	Loading - loading ramp	Inappropriate design sides and gates (including lift)	sharp protrusions or edges in sides/gates	fractures	B	B	B	B	B	B
110	Loading - loading ramp	Inappropriate design sides and gates (including lift)	partially open or short/low sides/gates	bruises	B	B	B	B	B	B
111	Loading - loading ramp	Inappropriate design sides and gates (including lift)	partially open or short/low sides/gates	wounds	C	C	C	C	C	C
112	Loading - loading ramp	Inappropriate design sides and gates (including lift)	partially open or short/low sides/gates	fractures	B	B	B	B	B	B
113	Loading - loading ramp	Inappropriate design sides and gates (including lift)	partially open or short/low sides/gates	ruptures	B	B	B	B	B	B
114	Loading - loading ramp	Inappropriate design sides and gates (including lift)	partially open or short/low sides/gates	fear	B	B	B	B	B	B
115	Loading - loading ramp	Inappropriate climate	draught	fear	B	B	B	B	B	B
116	Loading - loading ramp	Inappropriate climate	draught	cold stress	B	B	B	B	B	B
117	Loading - loading ramp	Inappropriate management and handling	rough operation of gates (noise)	fear	B	B	B	B	B	B
118	Loading - loading ramp	Inappropriate management and handling	high speed throughput	fear	B	B	B	B	B	B
119	Loading - loading ramp	Inappropriate management and handling	handlers shouting	fear of humans	B	B	B	B	B	B
120	Loading - loading ramp	Inappropriate management and handling	handlers hitting, striking, kicking	wounds	C	C	C	C	C	C

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
121	Loading - loading ramp	Inappropriate management and handling	handlers hitting, striking, kicking	physical pain from management procedures	B	B	B	B	B	B
122	Loading - loading ramp	Inappropriate management and handling	handlers hitting, striking, kicking	fear of humans	B	B	B	B	B	B
123	Loading - loading ramp	Inappropriate management and handling	inappropriate use of devices (e.g. electric shocks adult cows and pigs), inappropriate positioning in relation to the animal	physical pain from management procedures	B	B	B	B	B	B
124	Loading - loading ramp	Inappropriate management and handling	inappropriate use of devices (e.g. electric shocks adult cows and pigs), inappropriate positioning in relation to the animal	fear of humans	B	B	B	B	B	B
125	Vehicle	Inadequate layout	insufficient partitions	bruises	B	B	B	B	B	B
126	Vehicle	Inadequate layout	insufficient partitions	wounds	C	C	C	C	C	C
127	Vehicle	Inadequate layout	insufficient partitions	fractures	B	B	B	B	B	B
128	Vehicle	Inadequate layout	insufficient partitions	fear	B	B	B	B	B	B
129	Vehicle	Inadequate layout	insufficient partitions	aggression	B	B	B	B	B	B
130	Vehicle	Inadequate layout	insufficient partitions	fatigue	B	B	B	B	B	B
131	Vehicle	Inadequate layout	blocking zones (lighting, noises, smell)	fear	B	B	B	B	B	B
132	Vehicle	Inadequate layout	blocking zones (lighting, noises, smell)	fatigue	B	B	B	B	B	B
133	Vehicle	Inadequate layout	poor suspension of the vehicle	travel sickness	B	B	B	B	B	B
134	Vehicle	Inadequate layout	poor suspension of the vehicle	insufficient foothold	B	B	B	B	B	B
135	Vehicle	Inadequate layout	poor suspension of the vehicle	fatigue	B	B	B	B	B	B
136	Vehicle	Inadequate layout	poor suspension of the vehicle	bruises	B	B	B	B	B	B
137	Vehicle	Inadequate layout	poor suspension of the vehicle	wounds	C	C	C	C	C	C
138	Vehicle	Inadequate layout	poor suspension of the vehicle	fear	B	B	B	B	B	B
139	Vehicle	Inappropriate space per animal	too small ground surface per animal	bruises	B	B	B	B	B	B
140	Vehicle	Inappropriate space per animal	too small ground surface per animal	wounds	C	C	C	C	C	C

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
141	Vehicle	Inappropriate space per animal	too small ground surface per animal	fractures	B	B	B	B	B	B
142	Vehicle	Inappropriate space per animal	too small ground surface per animal	fear	B	B	B	B	B	B
143	Vehicle	Inappropriate space per animal	too small ground surface per animal	aggression	B	B	B	B	B	B
144	Vehicle	Inappropriate space per animal	too small ground surface per animal	fatigue	B	B	B	B	B	B
145	Vehicle	Inappropriate space per animal	too large gournd surface per animal	bruises	B	B	B	B	B	B
146	Vehicle	Inappropriate space per animal	too large gournd surface per animal	wounds	C	C	C	C	C	C
147	Vehicle	Inappropriate space per animal	too large gournd surface per animal	fractures	B	B	B	B	B	B
148	Vehicle	Inappropriate space per animal	too large gournd surface per animal	aggression	B	B	B	B	B	B
149	Vehicle	Inappropriate space per animal	too large gournd surface per animal	fatigue	B	B	B	B	B	B
150	Vehicle	Inappropriate space per animal	compartments too heigh	bruises	B	B	B	B	B	B
151	Vehicle	Inappropriate space per animal	compartments too heigh	wounds	C	C	C	C	C	C
152	Vehicle	Inappropriate space per animal	compartments too heigh	aggression	B	B	B	B	B	B
153	Vehicle	Inappropriate space per animal	compartments too low	bruises	B	B	B	B	B	B
154	Vehicle	Inappropriate space per animal	compartments too low	wounds	C	C	C	C	C	C
155	Vehicle	Inappropriate space per animal	compartments too low	fear	B	B	B	B	B	B
156	Vehicle	Inappropriate space per animal	compartments too low	fatigue	B	B	B	B	B	B
157	Vehicle	Inappropriate flooring	too slippery	insufficient foothold	B	B	B	B	B	B
158	Vehicle	Inappropriate flooring	too slippery	bruises	B	B	B	B	B	B
159	Vehicle	Inappropriate flooring	too slippery	wounds	C	C	C	C	C	C
160	Vehicle	Inappropriate flooring	too slippery	fractures	B	B	B	B	B	B
161	Vehicle	Inappropriate flooring	too slippery	ruptures	B	B	B	B	B	B
162	Vehicle	Inappropriate flooring	too slippery	fear	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
163	Vehicle	Inappropriate flooring	too slippery	fatigue	B	B	B	B	B	B
164	Vehicle	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	bruises	B	B	B	B	B	B
165	Vehicle	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	wounds	C	C	C	C	C	C
166	Vehicle	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	fractures	B	B	B	B	B	B
167	Vehicle	Inappropriate flooring	gaps, too high steps, potholes, sharp protrusions	fear	B	B	B	B	B	B
168	Vehicle	Inappropriate flooring	uneven flooring	bruises	B	B	B	B	B	B
169	Vehicle	Inappropriate flooring	uneven flooring	wounds	C	C	C	C	C	C
170	Vehicle	Inappropriate flooring	uneven flooring	fatigue	B	B	B	B	B	B
171	Vehicle	Inappropriate flooring	lack adequate of bedding (type and quantity)	bruises	B	B	B	B	B	B
172	Vehicle	Inappropriate flooring	lack adequate of bedding (type and quantity)	wounds	C	C	C	C	C	C
173	Vehicle	Inappropriate flooring	lack adequate of bedding (type and quantity)	cold stress	B	B	B	B	B	B
174	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	bruises	B	B	B	B	B	B
175	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	wounds	C	C	C	C	C	C
176	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	fractures	B	B	B	B	B	B
177	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	fear	B	B	B	B	B	B
178	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	aggression	B	B	B	B	B	B
179	Vehicle	Inappropriate design sides, gates, partitions	insufficient flexible partitions, insufficient solid partitions, too low partitions	fatigue	B	B	B	B	B	B
180	Vehicle	Inappropriate design sides, gates, partitions	too high partitions (preventing sufficient airflow)	heat stress	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
181	Vehicle	Inappropriate design sides, gates, partitions	too high partitions (preventing sufficient airflow)	fear	B	B	B	B	B	B
182	Vehicle	Inappropriate design sides, gates, partitions	sharp protrusions, edges or gaps in sides/gates/partitions/roof	bruises	B	B	B	B	B	B
183	Vehicle	Inappropriate design sides, gates, partitions	sharp protrusions, edges or gaps in sides/gates/partitions/roof	wounds	C	C	C	C	C	C
184	Vehicle	Inappropriate design sides, gates, partitions	sharp protrusions, edges or gaps in sides/gates/partitions/roof	fractures	B	B	B	B	B	B
185	Vehicle	Inappropriate climate	no roof, no adequate roof insulation, gaps in the roof	dehydration	B	B	B	B	B	B
186	Vehicle	Inappropriate climate	no roof, no adequate roof insulation, gaps in the roof	heat stress	B	B	B	B	B	B
187	Vehicle	Inappropriate climate	no roof, no adequate roof insulation, gaps in the roof	cold stress	B	B	B	B	B	B
188	Vehicle	Inappropriate climate	no roof, no adequate roof insulation, gaps in the roof	fatigue	B	B	B	B	B	B
189	Vehicle	Inappropriate climate	no roof, no adequate roof insulation, gaps in the roof	respiratory problems	B	B	B	B	B	B
190	Vehicle	Inappropriate climate	draught	fear	B	B	B	B	B	B
191	Vehicle	Inappropriate climate	draught	cold stress	B	B	B	B	B	B
192	Vehicle	Inappropriate climate	inadequate natural ventilation	heat stress	B	B	B	B	B	B
193	Vehicle	Inappropriate climate	inadequate natural ventilation	cold stress	B	B	B	B	B	B
194	Vehicle	Inappropriate climate	inadequate natural ventilation	respiratory problems	B	B	B	B	B	B
195	Vehicle	Inappropriate climate	lack of forced ventilation (EU compliant); including number and placement of devices and sensors	heat stress	B	B	B	B	B	B
196	Vehicle	Inappropriate climate	lack of forced ventilation (EU compliant); including number and placement of devices and sensors	cold stress	B	B	B	B	B	B
197	Vehicle	Inappropriate climate	no alert system for driver	heat stress	B	B	B	B	B	B
198	Vehicle	Inappropriate climate	no alert system for driver	cold stress	B	B	B	B	B	B
199	Vehicle	Inappropriate climate	unhealthy air quality (dust, exhaust gases, noxious gases)	respiratory problems	B	B	B	B	B	B



NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
200	Vehicle	Inappropriate climate	lack of cooling facilities (showers)	heat stress	B	B	B	B	B	B
201	Vehicle	Inadequate drinking facilities	no water, insufficient tank capacity, inadequate flow rate, refilling capacity or insufficient number of water points	dehydration	B	B	B	B	B	B
202	Vehicle	Inadequate drinking facilities	no water, insufficient tank capacity, inadequate flow rate, refilling capacity or insufficient number of water points	heat stress	B	B	B	B	B	B
203	Vehicle	Inadequate drinking facilities	no water, insufficient tank capacity, inadequate flow rate, refilling capacity or insufficient number of water points	frustration	B	B	B	B	B	B
204	Vehicle	Inadequate drinking facilities	no water, insufficient tank capacity, inadequate flow rate, refilling capacity or insufficient number of water points	aggression	B	B	B	B	B	B
205	Vehicle	Inadequate drinking facilities	not adequate layout, height for animal species/subcategories	dehydration	B	B	B	B	B	B
206	Vehicle	Inadequate drinking facilities	not adequate layout, height for animal species/subcategories	heat stress	B	B	B	B	B	B
207	Vehicle	Inadequate drinking facilities	not adequate layout, height for animal species/subcategories	frustration	B	B	B	B	B	B
208	Vehicle	Inadequate drinking facilities	not adequate layout, height for animal species/subcategories	aggression	B	B	B	B	B	B
209	Vehicle	Inadequate drinking facilities	Non-isolated cups/conduits/tank	dehydration	B	B	B	B	B	B
210	Vehicle	Inadequate feeding facilities	no feeding, unfamiliar feedstuff, places to eat, lack of feeding stuff storage	desnutrition	B	B	B	B	B	B
211	Vehicle	Inadequate feeding facilities	no feeding, unfamiliar feedstuff, places to eat, lack of feeding stuff storage	frustration	B	B	B	B	B	B
212	Vehicle	Inadequate feeding facilities	no feeding, unfamiliar feedstuff, places to eat, lack of feeding stuff storage	aggression	B	B	B	B	B	B
213	Vehicle	Inadequate feeding facilities	no feeding, unfamiliar feedstuff, places to eat, lack of feeding stuff storage	desnutrition	B	B	B	B	B	B
214	Vehicle	Inadequate feeding facilities	not adequate feeding devices, height for animal species/subcategories	frustration	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
215	Vehicle	Inadequate feeding facilities	not adequate feeding devices, height for animal species/subcategories	aggression	B	B	B	B	B	B
216	Vehicle	Inadequate feeding facilities	poor quality/contamination (lack of good storage)	desnutrition	B	B	B	B	B	B
217	Vehicle	Inadequate feeding facilities	poor quality/contamination (lack of good storage)	frustration	B	B	B	B	B	B
218	Vehicle	Inadequate feeding facilities	poor quality/contamination (lack of good storage)	aggression	B	B	B	B	B	B
219	Vehicle	Inadequate feeding facilities	poor quality/contamination (lack of good storage)	gastro-enteric problems	B	B	B	B	B	B
220	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	dehydration	B	B	B	B	B	B
221	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	heat stress	B	B	B	B	B	B
222	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	desnutrition	B	B	B	B	B	B
223	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	frustration	B	B	B	B	B	B
224	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	aggression	B	B	B	B	B	B
225	Vehicle	Inappropriate management, handling, driving	inadequate feeding and drinking management (quantities, intervals, durations)	gastro-enteric problems	B	B	B	B	B	B
226	Vehicle	Inappropriate management, handling, driving	insufficient clean and disinfected vehicle	cold stress	B	B	B	B	B	B
227	Vehicle	Inappropriate management, handling, driving	insufficient clean and disinfected vehicle	infectious diseases	B	B	B	B	B	B
228	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	desnutrition	D	D	D	D	D	D
229	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	dehydration	D	D	D	D	D	D

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
230	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	heat stress	D	D	D	D	D	D
231	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	cold stress	D	D	D	D	D	D
232	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	fatigue	D	D	D	D	D	D
233	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	respiratory problems	D	D	D	D	D	D
234	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	aggression	D	D	D	D	D	D
235	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	fear	D	D	D	D	D	D
236	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	bruises	D	D	D	D	D	D
237	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	wounds	E	E	E	E	E	E
238	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	fractures	D	D	D	D	D	D
239	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times, forced stops)	ruptures	D	D	D	D	D	D
240	Vehicle	Inappropriate management, handling, driving	too long transport, extra stops to (un)load animals, delays (lack of planning, traffic, waiting times,	infectious diseases	D	D	D	D	D	D

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
			forced stops)							
241	Vehicle	Inappropriate management, handling, driving	lack of sufficient resting time in the vehicle (number resting periods, duration of resting periods)	desnutrition	B	B	B	B	B	B
242	Vehicle	Inappropriate management, handling, driving	lack of sufficient resting time in the vehicle (number resting periods, duration of resting periods)	dehydration	B	B	B	B	B	B
243	Vehicle	Inappropriate management, handling, driving	lack of sufficient resting time in the vehicle (number resting periods, duration of resting periods)	heat stress	B	B	B	B	B	B
244	Vehicle	Inappropriate management, handling, driving	lack of sufficient resting time in the vehicle (number resting periods, duration of resting periods)	cold stress	B	B	B	B	B	B
245	Vehicle	Inappropriate management, handling, driving	lack of sufficient resting time in the vehicle (number resting periods, duration of resting periods)	fatigue	B	B	B	B	B	B
246	Vehicle	Inappropriate management, handling, driving	bad road conditions	insufficient foothold	B	B	B	B	B	B
247	Vehicle	Inappropriate management, handling, driving	bad road conditions	fatigue	B	B	B	B	B	B
248	Vehicle	Inappropriate management, handling, driving	bad road conditions	bruises	B	B	B	B	B	B
249	Vehicle	Inappropriate management, handling, driving	bad road conditions	wounds	C	C	C	C	C	C
250	Vehicle	Inappropriate management, handling, driving	bad road conditions	fear	B	B	B	B	B	B
251	Vehicle	Inappropriate management, handling, driving	poor driving skills	insufficient foothold	B	B	B	B	B	B
252	Vehicle	Inappropriate management, handling, driving	poor driving skills	fatigue	B	B	B	B	B	B
253	Vehicle	Inappropriate management, handling, driving	poor driving skills	bruises	B	B	B	B	B	B

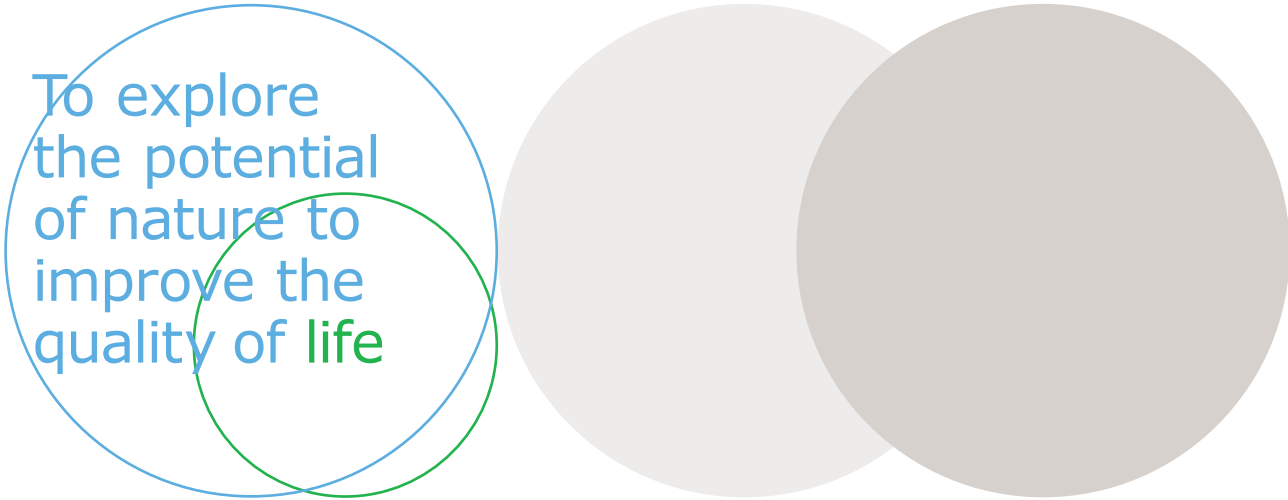
NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
254	Vehicle	Inappropriate management, handling, driving	poor driving skills	wounds	C	C	C	C	C	C
255	Vehicle	Inappropriate management, handling, driving	poor driving skills	fear	B	B	B	B	B	B
256	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	fear	B	B	B	B	B	B
257	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	bruises	B	B	B	B	B	B
258	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	wounds	C	C	C	C	C	C
259	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	fractures	B	B	B	B	B	B
260	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	ruptures	B	B	B	B	B	B
261	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	respiratory problems	B	B	B	B	B	B
262	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	gastro-enteric problems	B	B	B	B	B	B
263	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	fatigue	B	B	B	B	B	B
264	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	dehydration	B	B	B	B	B	B
265	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	heat stress	B	B	B	B	B	B
266	Vehicle	Inappropriate management, handling, driving	lack of emergency plan, lack of inspection windows/doors	cold stress	B	B	B	B	B	B
267	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	fear	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
268	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	frustration	B	B	B	B	B	B
269	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	bruises	B	B	B	B	B	B
270	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	wounds	C	C	C	C	C	C
271	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	fractures	B	B	B	B	B	B
272	Vehicle	Inappropriate management, handling, driving	tethering animals unfamiliar with being tethered	ruptures	B	B	B	B	B	B
273	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	fatigue	B	B	B	B	B	B
274	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	frustration	B	B	B	B	B	B
275	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	desnutrition	B	B	B	B	B	B
276	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	dehydration	B	B	B	B	B	B
277	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	heat stress	B	B	B	B	B	B
278	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	cold stress	B	B	B	B	B	B
279	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	bruises	B	B	B	B	B	B
280	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	wounds	C	C	C	C	C	C
281	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	fractures	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
282	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	ruptures	B	B	B	B	B	B
283	Vehicle	Inappropriate management, handling, driving	incorrect tethering (too short, too long)	respiratory problems	B	B	B	B	B	B
284	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	fear	B	B	B	B	B	B
285	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	aggression	B	B	B	B	B	B
286	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	bruises	B	B	B	B	B	B
287	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	wounds	C	C	C	C	C	C
288	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	fractures	B	B	B	B	B	B
289	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	ruptures	B	B	B	B	B	B
290	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	dehydration	B	B	B	B	B	B

NUMBER	CONTEXT	HAZARD DESCRIPTION	HAZARD SPECIFICATION	ADVERSE EFFECTS	CALVES	COWS	BULLS	PIGS	HORSES	LAMBS
291	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	desnutrition	B	B	B	B	B	B
292	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	heat stress	B	B	B	B	B	B
293	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	cold stress	B	B	B	B	B	B
294	Vehicle	Inappropriate management, handling, driving	mixing animals (familiar/unfamiliar; horned/dehorned; tied/untied; mature/immature; different farms, gender, ages, species, temperaments, size)	infectious diseases	B	B	B	B	B	B
295	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	fear	B	B	B	B	B	B
296	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	frustration	B	B	B	B	B	B
297	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	bruises	B	B	B	B	B	B
298	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	wounds	C	C	C	C	C	C
299	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	fractures	B	B	B	B	B	B
300	Vehicle	Inappropriate management, handling, driving	separating animals familiar with each other	ruptures	B	B	B	B	B	B





To explore  
the potential  
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Together with our clients, we integrate scientific know-how and practical experience to develop livestock concepts for the 21st century. With our expertise on innovative livestock systems, nutrition, welfare, genetics and environmental impact of livestock farming and our state-of-the art research facilities, such as Dairy Campus and Swine Innovation Centre Sterksel, we support our customers to find solutions for current and future challenges.

The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 6,000 members of staff and 9,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the various disciplines are at the heart of the unique Wageningen Approach.

