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Swedish University of Agricultural Sciences
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EU-förordningens inverkan på grisars välfärd under transport

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Sammanfattning

Varje år transporteras 225 miljoner grisar inom Europeiska Unionen (EU) för slakt, gödning och avel. Detta resulterar i sämre välfärd då djuren utsätts för en rad olika stressfaktorer i fordonet under lastning, färd och avlastning. Djurvälfärd kan definieras som hur bra ett djur kan anpassa sig till sin omgivning och under transport har grisar ofta väldigt svårt att anpassa sig till den förändliga miljön. En ökad oro för djurens välfärd resulterade i att den Europeiska Unionen skapade en förordning som har speciella direktiv för att förbättra djurvälfärden under transport. Litteraturstudien fokuserar på EU-förordningen och grisars välfärd under transport. ”Dead on arrival”, olämpliga för transport, uttorkning, hälta, allvarlig skador och utmattning användes för evaluera grisarnas välfärd under transport. Förekomsten av dessa välfärdsfaktorer var högre åren 2005/2006 och lägre år 2009. Därför visar EU-förordningen 1/2005 att grisarnas välfärd har ökat inom vissa områden. Den största utmaningen för framtiden är att alla medlemsländerna i EU ska följa förordningen då detta inte är en verklighet idag. Men mer framsteg kan göras och det finns ett behov av förbättra EU-förordningen för att grisarnas välfärd ska bli optimal.

Abstract

Each year 225 million pigs are transported within the European Union (EU) for slaughter, fattening and breeding. This results in poor animal welfare due to the fact that animals are exposed to several numbers of stress factors in the vehicle during loading, transit and unloading. Animal welfare can be defined as how well the animal attempts to cope with its environment and during transport there is often severe difficulty for the pigs to cope properly. There is a growing societal concern for animal welfare. This resulted in that the European Union enacted a law called the EU-regulation with certain directives of how to improve the welfare of the animals during transport. The literature review focuses on EU-regulation and pigs’ welfare during transport. Dead on arrival, unfit for transport, dehydration, lameness, severe injury and exhaustion were used to evaluate welfare of pigs during transport. The incidences of these welfare indicators were higher in 2005/2006 and lower in 2009. Therefore, the impact of EU-regulation 1/2005 shows that the welfare of pigs has been improved, at least in some aspects. The biggest challenge in the future is for all the member states in the EU to comply to the Regulation as this is not a reality today. More progress can be done in the future and there is a need for the Regulation to improve in order to be totally satisfactory regarding the welfare of the pigs.

Introduction

Thousands of animals are daily transported across Europe for slaughter, fattening and breeding. Transport of animals within the European Union (EU) has increased in recent decades. Each year about 365 million farm animals are transported in the EU (only within the former 15 member countries). This includes 225 million pigs, 45 million cattle, 95 million sheep and 300 000 horses. About 67 % are transported by trucks to abattoirs (Gebresenbet, 2003). Currently the EU member states have increased to 28 countries and the number of transported animals most likely has increased by certain percent. Poultry alone stand for 96 billion journeys within the European Union each year (Broom, 2008).

In general, transport is a stressful moment for the animals (Knowles & Warriss, 2000) and European Food Safety Authority (EFSA, 2004) suggests that transport should be avoided when possible and transport time ought to be as short as possible. Transport alone is not a single defined stressor, thus transport causes change in the entire environment for the animal (Appelby, 2008).

Animals are exposed to unfamiliar surroundings that may cause stress and eventually affect the welfare of the animals (Corson & Anderson, 2008). When the animals are removed from familiar areas they encounter new materials, smells, sights, sounds and vibrations. They will be handled by new people and mixed with unfamiliar animals. Change in air temperature and air movement as well as restricted space, feed and water will all increase the level of stress. This often results in that all of the Five Freedoms will be compromised. The fact that many different stressors affect the physiology of the animal in a very similar way means that physiology measurements can be used as an indicator of welfare during transport (Appelby, 2008). Interaction with unknown animals and vehicle design are stressors during transport. Especially during loading and unloading the animals are under physical and psychological stress, and it can be assessed to endocrine responses (Fazio et al., 2008). The handler has an essential influence on animal welfare when handling and transporting livestock. The attitude of the handler towards the animal may vary from one person to another and this will influence how stressful the animal will become. One person doing a job may cause high stress levels in an animal and another person doing the same job may cause much less levels of stress. This depends upon if the handler hits or pokes the animal. Lack of knowledge by the handler about animal welfare may lead him to become insensitive to the animals' level of stress or pain. Correct training of staff can lower the stress levels and eventually lead to improving animal welfare (Broom, 1998).

Stressful situations will lead to normal behaviour changes that differ in pattern and frequency (Broom, 2007). To attack this problem there will be need for a vehicle of higher standard; good ventilation, well-designed ramps and a standing space that minimizes the risk of injury or death (Broom, 2008). The most obvious indicators of poor welfare during transport are changes in the behaviour which show that some aspects of the situation are aversive. The animal may stop moving forward, freeze, back off, run away, vocalize or show other behaviour (Grandin 1980, 1982 &1989).

There is an EU-regulation for transporting animals and it is of interest to examine the impact it has upon animal welfare and how the Regulation is put into practice. The objective of this study is to investigate to what level the Regulation has influenced pigs' welfare during transport. The study will be achieved through literature review. There will be emphasis on defining animal welfare and stress and how that affects pigs during transport. Furthermore, to what extent the Regulation has improved the welfare for the animals.

Animal welfare

To improve and increase knowledge about animal welfare there needs to be a well-defined concept of what it really means, in order to be used in scientific measurements, legal document and in public statements (Passantino, 2006). Furthermore, Passantino (2006)

defines the welfare of an animal by its mental and physiological states as well as how the animal attempts to cope with its environment. This includes to what extent the animal fails to cope and the level of difficulty in coping. The term the "Five freedoms", (a) Freedom from hunger and thirst, (b) Freedom from discomfort, (c) Freedom from pain, injury and disease, (d) Freedom to express normal behaviour and (e) Freedom from fear and distress, has also been implied and they are more ideal states rather than standards for satisfactory welfare (FAWC, 2013).

However, people do not have the same definitions or concept of what animal welfare is (Tannenbaum, 1995). A list of factors that is regarded as important as shown in Figure 1 can be one definition of animal welfare. The first factor of animal welfare may concern health and fitness, meaning problems such as injury and disease are the most important challenges. Second, animals' preferences and feelings like pleasure and suffering may be a concern in animal welfare. The third aspect may be the animals' ability to express their normal behaviour, for example by living in natural conditions (Appelby, 2008).

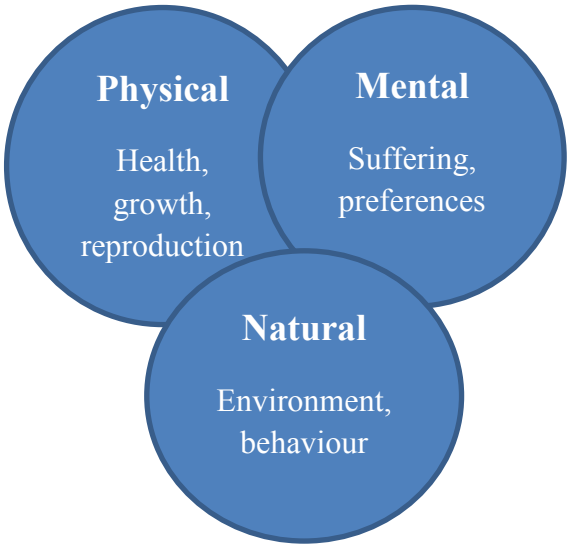

Figure 1. The three concepts of animal welfare with special emphasize on physical, mental and natural aspects (Appelby, 1999).

It is important to note that there are differences between animal species. Because the conclusion of welfare varies in this issue there is probably a need for more complex definitions of welfare in other more complex animals (Appelby, 1999). Yet, this issue can be set aside here, as the main focus is welfare concerning farm animals.

Stress during transport

Stress can be defined as an environmental effect on an individual animal which overtakes its control system and reduces its fitness or seems likely to do so (Broom, 2001a; Broom, 2007).

Different physiological states and how it affects injury and disease are all dependent of the level of stress; today stress is often viewed as a negative physiological state (Appelby, 2008). Moberg (2000) has written that stress is a broad issue that has no clear definition and unlike diseases it has no defined prognosis. He defines stress as: "It is the biological response elicited when an individual perceives a threat to its homeostasis. The threat is the "stressor". When the stress response truly threatens the animal's well-being, then the animal experiences "distress"." Moberg (1999) also explains how stress relates to biological functioning and how the animal welfare is affected by the links between the physical and mental aspect: "A stress response begins with the central nervous system perceiving a potential threat to homeostasis. Whether or not the stimulus is actually a threat is not important; it is only the perception of a threat that is critical".

Stress can be presumed from behaviour but can also be assessed from physiological measurements, such as heart rate, blood cell counts and compounds like glucocorticoids (stress hormones) (Terlouw et al., 1997). Cell counts can indicate in which state the immune system is in and the body function can be measured using heart rate monitors (Appelby, 2008).

Transport includes the procedure where animals are loaded into the vehicle, transit to the destination and later on unloading. These situations will expose the animal to a number of stressor mentioned earlier. The level of handling methods during these procedures will ease or worsen the stressful situation as well as the facilities of getting the animals on to and out of the truck. Furthermore, the subsequent queuing and operations at the abattoirs will affect the level of stress (Aradom, 2012).

According to Hall & Bradshaw (1988) loading and unloading of animals during transport is the most stressful part. At loading and during the first hours of transport there are psychological changes in animals that will show signs of stress. Thereafter the stress slowly declines as the animal becomes more accustomed to their new environment (Knowles et al., 1995; Broom et al., 1996).

An animal's behaviour is a good indicator if it is in a stressful state. When the animal is eating, drinking, excreting, moving, breathing and responding to stimuli this will often be a sign of a normal behaviour and that the welfare is satisfied (Appelby, 2008). On the contrary, behaviour like vocalization, fighting, falling and panting are indicators of stress. Pigs for example, have a normal behaviour of wanting to lie down and in a vehicle with narrow spaces this behaviour cannot be expressed, leading to a higher stress level[1]. Pigs are also are sensitive to high temperature and that is often the cause of death during transport (Warris & Brown, 1994).

The EU-regulation

Since 1977 the European Union has had a Regulation, called the first Directive, regarding animal welfare during transport. The rules are intended to let the market organisations become

[1] Samuel Aradom Messmer, Department of Energy & Technology, personal meeting on March 28 2014 .

more effective and make the trade of live animals easier, while the protection of the animals and the animal welfare is at an acceptable level (European Commission, 2011).

Animal welfare concern has increased in society to express ethical concerns regarding the treatment of animals (Duncan & Fraser, 1997). Furthermore, consumers are concerned for animal welfare because it may affect product safety and quality (EC, 2002). Therefore the societal concern has resulted in the EC treaty and EU-regulation. A European Union law was enacted which now defines animals as "sentient creatures" and they should no longer be regarded as agriculture products (EU treaty, 1997).

The EU-regulation regarding protection of animals during transport was last updated by Council Regulation (EC) No 1/2005 (European Commission, 2011) and has replaced *Council Directive 91/628/EEC*. These directives state that the animals must be unloaded, fed, watered and rested for at least 24 hours before continuing travel. For long-transporting the journey must be divided up through staging points (Control Posts, CP) along the way. A general rule for maximum transporting time of livestock was set to 8 hours. Furthermore, loading densities was defined for the most commonly livestock species such as cattle, pigs, poultry, horses, sheep and goats (Passantino, 2006).

The protection of animal welfare during transport is currently based on a new regulation since January 2007. In the case of pigs, after a certain period of transport by road (up to 24 hours) the animals must be unloaded for 24 hours in approved locations. During the 24 hours on the truck the pigs must have access to water at all times. After 14 hours of travelling the pigs must be given a rest period of at least one hour to be given water and necessary feed, after the rest period the transport may continue (but not exceed 24 hours). Space allowance for pigs are defined by their weight, a 15-25 kg pig must have a space area of 0,13 m². A pig that weighs 50 kg is required to have 0,35 m² and for a pig that weighs 100 kg the space allowance should be 0,51 m². A pig that weighs under 10 kg is not allowed to be transported, unless if accompanied by its mother (Council Regulation, 2005).

Vehicles designed for long transport must fulfil certain technical requirements. Ventilation during transport is very important and according to the Regulation (1/2005) the truck shall be designed, constructed and maintained in such way (at any time during the journey, whether the means of transport is stationary or moving) that the temperature should be within 5º C to 30º C,for all animals, with a +/- 5 ^{o} C tolerance, depending on the outside temperature. Transport vehicles must be fitted with a temperature monitoring system and be able to record such data by sensors that are located in the vehicle. A warning system must be installed in order to alert the driver when the temperature in the vehicle reaches the maximum or the minimum limit.

For all transport by road a person planning a long journey shall prepare, stamp and sign all pages of the journey log. The journey log shall comprise planning, place of departure, place of destination, declaration by transporter and specimen anomaly report. As from 1 January 2007 all means of transport by road must be equipped with the appropriate satellite Navigation System, allowing for recording and providing information equivalent to those mentioned in the journey log (Council Regulation, 2005).

The aspects of what must be improved with the Regulation can be summarized below:

- Better facilitating checks and proper follow-up of violations by more specific procedures. Uniform procedures should be established in order to increase checks through which applicable penalties can be handed down when current legislation is violated. The penalties must be effective and adequate so they are implemented and put in to practice.
- Re-evaluate the directives on a scientific basic, highlighting the most important aspects.
- Ban transport of very young animals and have clear definitions for animals that are unfit for transport.
- Increase the comfort and safety of the animals with better developed equipment.
- Stricter training and education for the people that handle the animals. Neglect and harming the animals originate from lack of knowledge. To address this issue the Scientific Committee on Animal Health and Welfare (SCAHAW) required a certificate issued after completing an approved course.
- Put more responsibility on, not only the transport companies, but also other stakeholders such as farmers, traders and slaughterhouses. This would result in all parties involved in animal transport being forced to conform to regulations concerning animal welfare.
- Highlight more accurately how the operations regarding supervising of animal transport should be addressed by the competent authorities and increase the cooperation between them.
- Imply instruments such as a journey log after every transport (Passantino, 2006).

When pigs are transported for long hours (> 8 h) often from one to another EU country, their welfare is protected by the EU regulation. Therefore it is necessary to evaluate the regulation in respect to the welfare of pigs.

The impact of regulation on the flow of pigs within the EU

As shown in Table 1 these are some examples of the flow of piglets for fattening from one country to another and they are ranked by size of trade. Denmark and the Netherlands export a large number of piglets to Germany and have a very significant part in the total number of transported piglets for fattening. As Germany receives a lot of piglets from different countries they also export piglets, mostly to Spain, for continuing fattening.

From	To	Number of transported piglets
Germany	Spain	193 000
	the Netherlands	54 000
	France	50 000
	Poland	44 000
	Italy	38 000
Denmark	Germany	2 535 000
	Italy	56 000
	Poland	36 000
The Netherlands	Germany	1 803 000
	Spain	675 000
	Belgium	311 000
	Italy	217 000
	Romania	58 000

Table 1. Number of transported piglets under 50 kg for fattening (Eurostat, 2006)

From 2005 till 2008 the number of pigs travelling more than 24 hours increased from 344 000 to 1 065 000 pigs, and 2009 it decreased to 916 000. Italy, Spain, Romania and Russia are the main importing countries and stand for 80 % of the import in Europe in 2008 and 2009. The main exporting countries are Germany, Denmark and The Netherlands. In total the export of pigs increased from 57 % in year 2007 to 83 % in year 2009 (European Commission, 2010).

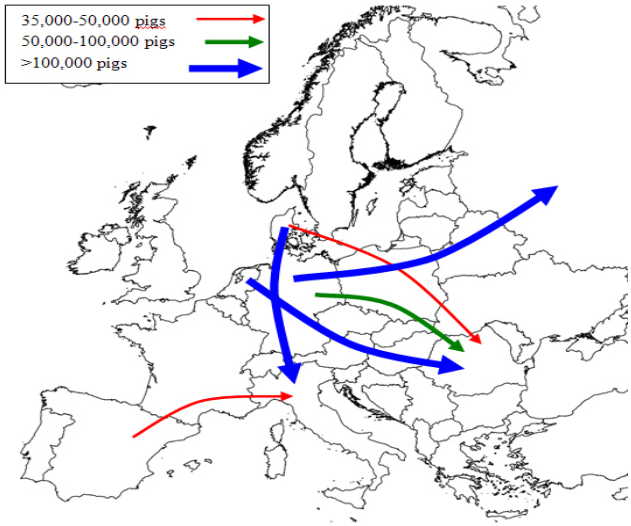

Figure 2. Movements of live pigs travelling more than 24 hours in 2009 (Traces, 2009).

Figure 2 illustrates the main movements of pigs travelling more than 24 hours presented in the year 2009. The arrows indicate origin and destination countries and number of transported pigs.

Regarding the flow of live animals the main conclusions are that the transport of pigs has increased since 2005 and they are mainly transported from North West Europe to Spain, Italy, Romania and Russia (European Commission, 2010).

The impact of regulation on pigs' welfare during transport

Concerning the welfare of pigs during transport the study states that the percentage of pigs dead on arrival and/or unfit for transport was successively decreased from 1,5 % (in 2005 and 2006) to 1% in 2009 (Baultussen & Gebrensbet, 2011).

Table 2. Incidence of lameness, severe injury (wounds, broken bones etc.), bruises, dehydration and exhaustion in percentage (Baultussen & Gebrensbet, 2011)

Pigs		
	%	
Welfare indicators	**2006**	**2009**
Lameness	1,72	1,06
Severe injury	1,44	1,06
Bruises	1,94	1,41
Dehydration	1,69	1,08
Exhaustion	1,56	1,25

Welfare indicators like lameness, severe injury, bruises, dehydration and exhaustion are presented in percentage during 2006 and 2009. In 2006 all these indicators were higher as compared with 2009. Therefore the percentage of pigs with incidence of lameness, injuries, bruises, dehydration and exhaustion decreased from 2006 to 2009 as indicated in Table 2.

European Food Safety Authority (EFSA, 2010) made scientific opinions about the Regulation to ensure that it was updated on the latest scientific evidence. The conclusions that EFSA stated were that the present Regulation was not in line with the latest scientific knowledge. There were specific areas that needed to be updated and improved. During good transporting conditions for animals (stocking density, straw, feed, water and ventilation were fulfilled), the animal welfare was more affected by the driving quality and not so much on the transport time (EFSA, 2010). Furthermore, the opinion mentioned that the space allowance should be recalculated using a formula that takes the animals size in comparison to their weight. Additionally the opinion of EFSA recommended defining specific requirement of the legalisation, such as height of the compartment in road vehicles (European Commission, 2011).

Discussion

Impact of the Regulation on welfare

When behaviours such as dead on arrival, unfit for transport on arrival, lameness, injury, dehydration and exhaustion are used as welfare indicators their incidences measured in percentage were different during 2006 and 2009. All the indicators were in the range of 1.44 –

1.94 in 2006. But in 2009 the indicators decreased and varied between 1.0 and 1.41.

Pigs are sensitive to high temperatures because they are poorly adapted to loose heat unless allowed to wallow, a behavior which is not possible during transport (Lambooij, & Engel, 1991). Sällvik et al., (2004) also reported that, the number of pigs which showed panting increased when the temperatures of transport vehicle exceeded 25 ^{0}C. During transport pigs are sensitive to high temperature and according to Lambooij and van Putten (1993) small rises from the normal pig body temperature of 39–42 degrees proved to be fatal, so adequate ventilation on transport vehicles and the weather of the day must be taken into consideration. Continuous ventilation of pigs transport vehicle whether it is stationary or moving is a significant achievement because it removes excess heat and maintain the temperature within the given level. In the period 2005 and 2009 dead or mortality (on arrival) of pigs has declined from 1.5 % to 1 % respectively. This declined of mortality is significant improvement in welfare respect and it is achieved most likely due to the continuous ventilation.

The implement of the navigation system in 2007, data has shown that more than 40 % of the transport companies have installed the system. However, 60 % to 70 % of the companies stated that the navigation system did not improve route planning or journey logs (Baultussen & Gebrensbet, 2011). As more companies will install the system and be familiar with it the aim of the navigation system can be improved. By planning and recording data with the help of a journey log the transports can be more efficient and increase the animal welfare. By doing this the overview of the transports may improve and data can show what must be improved and what was in line with the directives.

According to the Regulation, pigs may be transported for a maximum period of 24 hours. During the journey, they must have continuous access to water. Dehydration has declined from 1.69 to 1.08 (Table 2) during the given years. Continuous water supply on board especially during hot seasons of the year has positive impact on welfare. This can be the main reason for the decline of dehydration. Therefore the Regulation has significant impact on the improvement of pigs' welfare under long transport condition.

During loading, transit and unloading the vehicle and the driver will affect the factor that causes stress and difficulty of coping to the environment. Factors like unfit for transportation, lameness, injury, bruises and exhaustion can all be influenced in a positive or negative way depending on how the vehicle is driven and how the handler treats the pigs. It is favourable if the driver drives smoothly and on roads which are well developed (Broom, 1998). Furthermore, when the handler loads and unloads the pigs can make them less stressful by acting in a calm way, not shouting or poking.

According to the European Commission report (2011) scientist, abattoirs and animal welfare groups did agree on that the Regulation had improved the animal welfare. Nevertheless, many competent authorities did not believe that the Regulation showed any signs of an improvement or positive affect on the animal welfare (European Commission, 2011).

Different opinions from stakeholders make it hard to draw a conclusion about how the Regulation actually has made an impact on pigs' welfare during transport. What can be said is that in some areas there seem to be some improvements and in other areas there seem to be none. For example, as stricter training obligations for the handlers (which was introduced by the Regulation) seem to have a positive effect on the animal welfare, this can be a subject of focus and an area where more progress can be made (Passantino, 2006). It is possible that lameness, injury and bruises are related to handling and driving quality, therefore training is very important. This can be one of the answers for reduced welfare indicators from 2006 to 2009 as seen in Table 2. Bruises can also occur from fighting inside the vehicle and better handling of the pigs will most likely lead to a decrease of injury and stress.

There is a big difference in how the European countries apply the directives of the Regulation and this issue must be assessed. The degree of enforcements and penalties has been very varied (European Commission, 2011). The difference may cause the Regulation to be ineffective and have no influence on the improvement of pigs' welfare. Though, there has been a slight improvement in animal welfare. Lower levels of stress have been noticed, especially during long-distance transport (Baultussen & Gebrensbet, 2011).

Impact of the Regulation on transport distance and number of animals

Piglets were transported from origin countries to other European countries for the purpose of fattening. When they reach the slaughter weight they may also be transported to another country for slaughter. Even between 2005 and 2009 the number transported pigs and distance didn't show any decrease. Instead the total export of pigs increased from (2007) 57% to (2009) 83%. According to the Regulation pigs can be transported for maximum 24 hours and must be unloaded and rest for 24 hours before any other journey. In the Regulation there is no transport distance limitation. Therefore the Regulation has no influence on the number of transported pigs and the distance travelled.

Differences' in compliance of the Regulation

There is a need for the countries to conform the directives in order to establish cooperation between the EU-member countries. Transport of pigs to the nearest abattoir will many times cross borders in Europe as small abattoirs within the own country are closing down (Corson, S & Anderson, L, 2008). To approach this problem there need to be effective penalties for member states that do not conform to the directives given and reward the member states that properly follow the rules. This will help the EU to not accept a compromise of pigs' welfare during transport. Passantino (2006) mentions that there is a need for better follow-up on violations and increase the facility checks as this has an effect on the welfare for the pigs and are one of the main challenges with the Regulation. However, there is still a great concern about pig transport as the animal welfare problems still persists (European Commission, 2011). These problems seem to be highly related to compliance and conformity to directive requirements by handlers according to the European Commission report (2011). Other challenges may be varied compliance by the EU member states and the infrastructure as the road conditions are very poor in some states.

The overall summary is that animal transport has been improved due to better vehicles and better handling of the pigs. As the animal flow in Europe has increased and will probably continue to do so. The concern of pigs' welfare during transport is highly current today and even more in the future. The compliance by the member states of the Regulations is the major problem today and it must assed in order to improve the welfare of the animals. Today we have more knowledge about the animal's physiology and how transports affect them. That leads to a positive effect of an effective legislation as long as they are conformed and proper penalties for those who do not follow the rules. As more people question the welfare of animals during transport and the public attitude to good animal welfare is growing there is a need for compliance with the Regulation. The growing and positive public attitude can put pressure on the politicians to follow up on the directives and keep them in line with updated science and information to improve and implement the Regulation.

Conclusions

Many more people today argue that there should be a more effective legislation due to the fact that animal welfare during transport is many times ignored and neglected. Through the Regulation this subject has been issued and improvements have been made. However, there is still more to do and many factors that still can be improved. The major challenge for the future is for all the member states in the European Union to comply with the Regulation. In order to do so there must be effective penalties and better follow up when the directives are violated. Transport of pigs in the EU has a big impact on their welfare. Many factors during loading transit and unloading will increase the level of stress and often have a negative effect on the pigs' well-being. Transport time, space allowance, ventilation and temperature are factors that will have an impact on the welfare of the pigs. The Regulation was implemented to improve pigs' welfare during transport and ease the stress. The main conclusion is that the Regulation has influenced the pigs' welfare in a positive way, though the implement of the directives in the countries must improve in order for the Regulation to be more satisfactory.

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