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**MANAGEMENT OF ANIMAL TRANSPORT WITH
SPECIAL ATTENTION TO ANIMAL WELFARE**

**ZARZĄDZANIE TRANSPORTEM ZWIERZĄT
ZE SZCZEGÓLNYM UWZGLĘDNIENIEM
ICH DOBROSTANU**

Abstract: Transport management takes into account a wide range of decisions: from defining a strategic plan to choosing the type and method of transport. The transport of live animals is a specific type of transport due to the type of "load" which is the living organism. For animals, transport, especially over long distances, carries the risk of injury and is undoubtedly a source of stress. Increased interest in the welfare of animals during transport is now an object of interest not only for animal organizations, but also business communities, animal breeders, slaughterhouses and enterprises transporting animals. The article presents and describes the requirements for managing the transport of slaughter animals, taking into account animal welfare.

Keywords: management, transport management, animal transport, animal welfare

Streszczenie: Zarządzanie transportem uwzględnia szeroką gamę decyzji: od określenia planu strategicznego po wybór rodzaju i sposobu przewozu. Transport żywych zwierząt jest specyficznym rodzajem przewozu ze względu na rodzaj „ładunku”, jakim jest żywy organizm. Dla zwierząt przewóz, zwłaszcza na dalekie odległości, niesie ze sobą ryzyko urazów i jest niewątpliwie źródłem stresu. Zwiększone zainteresowanie dobrostanem zwierząt podczas transportu to obecnie obiekt zainteresowań nie tylko obrońców zwierząt i organizacji prozwierzęcych, ale również środowisk biznesowych, hodowców zwierząt, rzeźni i przedsiębiorstw transportujących zwierzęta. W artykule przedstawiono i opisano wymagania dotyczące zarządzania transportem zwierząt rzeźnych, biorąc pod uwagę ich dobrostan.

Słowa kluczowe: zarządzanie, zarządzanie transportem, transport zwierząt, dobrostan zwierząt

Introduction

Transport of animals due to their specificity is very strict for carriers. Animals are a very demanding „load” because as a result of poor handling at the loading, transport and unloading stages, injuries and even death can occur¹.

The management of slaughter animals transport is one of the most difficult transport tasks in the agribusiness sector. In the general opinion of specialists, consumers and animal organizations, such transport should be organized in accordance with the principles of high welfare and applicable law. However, despite the use of modern solutions, transporting animals to the slaughterhouse causes many negative effects².

¹ B. Kuziebska, J. Trębicka, K. Pieniak-Lendzion, *Logistyka transportu w rolnictwie*, „Administracja i Zarządzanie” 2016, No. 109, p. 168.

² K. Tereszkiwicz, P. Molenda, K. Pokrywka, B. Bułafa, D. Kusz, *Transport drobiu rzeźnego*, „Autobusy” 2013, No. 3, p. 1555.

1. Transport management

Management plays a key role in transport, which is closely linked to other sectors of the economy. Effective transport management makes it possible to identify existing transport problems and to postulate solutions that can benefit the entire company. It is largely determined by the tactical and strategic skills of managers³. Transport management should be preceded by a thorough analysis of their own transport needs, as well as an analysis of the offers of external companies that offer services in this area. In addition, the ability to use methods and tools of qualitative and quantitative analysis is necessary. Due to the fact that transport costs constitute a significant part of enterprises' expenditure on distribution, transport has gained great importance in formulating the strategy of companies' functioning. Optimization of transport costs has become an important element in reducing the total costs of enterprises⁴, all the more that the basis for accurate economic decisions is constituted by the information on the level of individual cost components⁵. As a result, companies face transport decisions and choose between the following options⁶:

- ordering transport operations to a foreign transport and forwarding company,
- performing transport activities on one's own.
- a combination of the above two options.

According to the definition: „management of a transport or forwarding company can be defined as a logical sequence of activities that make up the process of creating a comprehensive concept of projects in the company and in the layout of its market partners, and the process of implementing this concept in appropriately shaped organizational forms, using appropriate management and control instruments. The management is implemented in a systematic way in the process of activity planning, organization and employment, management and controlling with the intention of achieving a common goal”⁷.

From the legal point of view, it is the responsibility of each road transport operator to appoint a manager, also known as a transport manager. This person has a task to manage continuously the supply chain and fleet and has a direct impact on

³ J.J. Coyle, E.J. Bardi, C.J. Langley Jr., *Zarządzanie logistyczne*, PWE, Warszawa 2002, p. 450.

⁴ See A. Jarocka, *Analiza kosztów transportu w przedsiębiorstwie produkcyjnym*, „Economy and Management” 2010, No.4, p. 60-61; A. Brzozowska, I. Herbuś, *Management of transport process international enterprises. The literature review*, „Advanced Logistic Systems. Theory and Practice” 2010, Vol. 4, p. 41-52.

⁵ J. Chluska, B. Czuba-Kulisińska, *Kosztowe aspekty ulepszania środków trwałych*, [in:] S. Kowalska, J. Rubik (ed.), *Zarządzanie kosztami przedsiębiorstwa w kontekście społecznej odpowiedzialności biznesu*, Wydawnictwo Wydziału Zarządzania Politechniki Częstochowskiej, Częstochowa 2016, p. 161; See A. Harris, R. Hoek, *Zarządzanie logistyką*, PWE, Warszawa 2010, p.107-142.

⁶ Ibidem, p. 61.

⁷ D. Starkowski, K. Bieńczyk, W. Zwierzycki, *Samochodowy transport krajowy i międzynarodowy. Compendium wiedzy praktycznej*, Systherm D. Gazińska sp.j., Poznań 2011, p. 6.

the functioning of the transport department⁸. Figure 1 shows the definition of road transport manager.

The legal conditions that must be met by a person managing road transport are as follows⁹:

- place of residence in the Community,
- good reputation,
- actual and continuous management of this company's transport operations,
- professional competences,
- actual relationship with the enterprise, e.g. a white-collar worker, director, owner or holder of shares in the enterprise, entrepreneur (natural person).

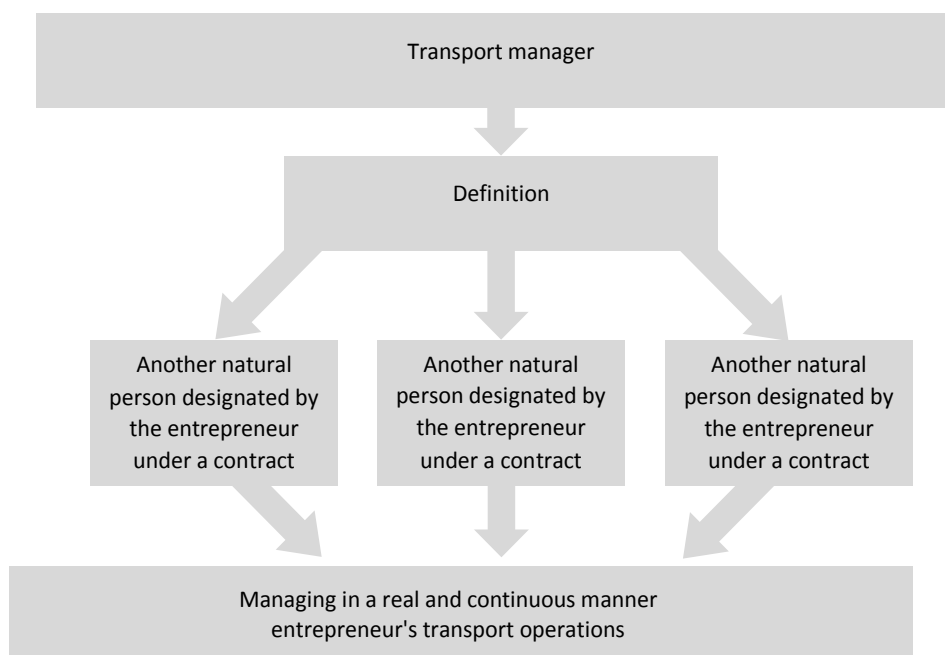


Figure 1. Definition of transport manager

Rysunek 1. Definicja zarządzającego transportem

Source: D. Starkowski, K. Bieńczak, W. Zwierzycki, *Samochodowy transport krajowy i międzynarodowy. Kompendium wiedzy praktycznej*, Systherm D. Gazińska sp.j., Poznań 2011, p. 6.

⁸ Ibidem; see: Z. Łukasik, S. Olszańska, *Optimalizacja zarządzania flotą transportową jako istotny element dyspozycji środkami transportu*, „Logistyka” 2015, No. 4, p.4586-4591; see: A. Bujak, K. Topolska, *Zwiększenie efektywności procesu transportowego poprzez eliminację słabych punktów procesu zarządzania w przedsiębiorstwie transportowym*, „Logistyka” 2014, No. 6, p. 13156-13163.

⁹ Ibidem, p. 8.

The transport manager should be familiar with the characteristics of the other functional areas of the enterprise and the enterprise as a whole so that the appropriate transport management strategy can be applied¹⁰. There are five transport management strategies¹¹:

- reducing the number of carriers - by reducing the number of carriers, the person ordering the load increases the volume of transport and the income per carrier, as a result, the probability of receiving attractive transport rates and a satisfactory level of service increases. In a situation where the shipper entrusts its cargo to a limited number of carriers, it gains validity. In contrast, carriers that have less bargaining power are more likely to negotiate.

- negotiations with carriers - the person managing the transport must have such negotiating skills to guarantee the level of service desired by the company at the lowest possible cost.

- concluding contracts with carriers - signing the contract ensures that the person ordering the load eliminates uncertainty about transport rates and services performed by public carriers.

- consolidation of shipments - the amount of cargo entrusted to the carrier is associated with the transport rate. By consolidating shipments, the transport manager can benefit from lower freight rates for larger deliveries.

- monitoring the quality of service - through the quality of transport service, a company can gain a competitive advantage on the market. In a situation where a company provides its customers with products regularly, undamaged and in a timely manner, it contributes to reducing the inventory of these customers.

2. Preservation of animal welfare during transport

The carrier and the sender are responsible for planning the transport so that the animals do not suffer damage during transport. The transport company and the carrier may accept animals only if the veterinarian has issued an animal health certificate and other necessary documents, including a certificate that the animals are suitable for transport. In addition, the „sender” of animals designates an escort who will be present during the transport of animals and to whom he provides guidelines for the supervision of animals and their care during transport¹².

¹⁰ See J.J. Coyle, E.J. Bardi, C.J. Langley Jr., *Zarządzanie...*, p. 451; M. Szajt, *Innowacje organizacyjne w małych i dużych przedsiębiorstwach transportowych*, [in:] J. Mróz (ed.), *Produkcja i zarządzanie w hutnictwie*, Wydawnictwo Wydziału Inżynierii Procesowej, Materiałowej i Fizyki Stosowanej Politechniki Częstochowskiej, Częstochowa 2009, p. 239-242.

¹¹ Ibidem, p. 451-456.

¹² <http://poradnikprzewoźnika.pl/2015/transport-zwierzat-jakie-warunki-nalezy-spelnic/> [access: 21.07.2017].

The European Union has imposed many provisions regarding the humane and safe transport of animals. Livestock transport should not only be fast, but using a suitable means of transport adapted to transport animals. According to M. Gawrowski, animal transport is an important time to confront animal needs, technical equipment and organizational skills. However in this set-up, animal welfare should come first¹³. As numerous inspections and press reports show, ensuring animal welfare during transport is extremely difficult to meet. In addition to irregularities in ensuring animal welfare, numerous reports and investigations of animal organizations¹⁴ have noted a number of weaknesses in compliance with procedures related to the organization of transport and required technical standards¹⁵. The reasons for this can be seen in market conditions and the producers' focus on maximum profit.

Road transport is most often used to move animals between the place where they are raised and the slaughterhouse. Means of transport, which are described in more detail in the further part of this work, intended for the transport of animals for slaughter must meet certain technical requirements, as well as ensure a safe and humane process of handling animals¹⁶.

Animals are transported in a means of transport that is easy to clean and disinfection, it must also be protected against faeces and litter getting out¹⁷.

Design requirements for means of transport carrying slaughter animals include¹⁸:

- loading and unloading animals,
- ensuring animal safety in the cargo area,
- maintaining environmental comfort,
- feeding and watering animals,
- access to animal services,
- cleaning and disinsection,
- collecting and unloading animal faeces

These requirements were described in detail in the further work.

When loading or unloading animals, it is prohibited to¹⁹:

- kick and hit animals,
- apply pressure to any part of the animal's body in a way that causes suffering and pain,

¹³ M. Gawrowski, *Specjalistyczny transport bydła*, opublikowano 1.2013, <http://www.portalhodowcy.pl/hodowca-bydla-archiwum/146-hodowca-bydla-1-2013/1466-specjalistyczny-transport-bydla> [access: 21.07.2017].

¹⁴ <http://www.otwarteklatki.pl/szukajace-sledztwo-zywe-zwierzeta-transporcie/>; <https://www.ciwf.pl/aktualnosci/2016/02/tragiczne-warunki-transportu-zwierzat-do-turcji> [access: 21.07.2017].

¹⁵ Z. Ślpek, J. Frączek, S. Francik, S. Francik, B. Cieślowski, N. Pedryc, *Wymagania projektowe dla pojazdów przeznaczonych do transportu zwierząt*, „Logistyka” 2015, No. 4, p. 6124.

¹⁶ M. Cierach, N. Idaszewska, *Transport samochodowy zwierząt rzeźnych*, „Inżynieria Przetwórstwa Spożywczego” 2014, No. 9, p. 21.

¹⁷ B. Kuziębska, J. Trębicka, K. Pieniak-Lendzion, *Logistyka...*, p. 169.

¹⁸ Z. Ślpek, J. Frączek, S. Francik, S. Francik, B. Cieślowski, N. Pedryc, *Wymagania...*, p. 6126.

¹⁹ Ł. Smaga, *Ochrona humanitarna zwierząt*, Agencja Wydawniczo-edytorska EkoPress, Białystok 2010, p. 214.

- suspend animals using mechanical means,
- lift or pull animals by their hair, tail, legs, horns, ears and head in a way that causes suffering and pain,
- use drovers or other sharp tools,
- deliberately block the passage of animals led or directed to any place where they are served,
- it is also prohibited to use electric drovers when possible. In justified cases, they may be used only for adult cattle and adult pigs that do not want to move and only if they have free space in front of them. The pulses must not last more than one second and applied to the muscles of the back of the body. The pulses cannot be used again if the animal does not respond.

If the animals must be tied up during transport, the harnesses and ropes must allow the animals to lie down and eat and drink in a manner that eliminates the risk of injury or suffocation and allows release if necessary²⁰.

In Poland, semi-trailer sets, i.e. a road tractor and a semi-trailer, and trailer sets, i.e. a car with a trailer, are most often used to transport slaughter animals. The large semi-trailers are equipped with many decks, which enables the transport of large numbers of animals and guarantees favorable transport economics. Three-deck means of transport are used for transporting pigs, and two-deck for transporting cattle²¹. Poultry are transported in disposable or reusable containers²².

The vehicle with which the animals are to be transported must allow air to flow, protect the animals against atmospheric conditions and protect the animals from falling out or escaping²³.

When transporting animals, the following conditions must be met²⁴:

- the animal must be able to be transported and healthy, and the transport conditions should provide the least stress possible,
- animals should be divided by species, sex and size,
- adults should be separated from young individuals, except for females traveling with young,
- adult males must be separated from females, breeding boars or stallions must be absolutely separated from each other, because during transport conflicts and fights may arise between them,
- to facilitate the entire transport process, you can familiarize them with the enclosure and activities performed in it,
- if planning to transport several groups of animals, one can bring them together earlier to establish a social structure within the group,

²⁰ Ibidem, p. 215.

²¹ M. Cierach, N. Idaszewska, *Transport...*, p. 21.

²² B. Kuźmowska, J. Trębicka, K. Pieniak-Lendzion, *Logistyka...*, p. 169.

²³ Ibidem, p. 168.

²⁴ <http://poradnikprzewoznika.pl/2013/transport-zwierzat/> [access: 23.07.2017].

– during long transport, adequate rest periods should be provided, and access to feed and water.

It is forbidden to transport²⁵:

- animals that are unable to move independently and have severe open wounds,
- females that gave birth last week or females before delivery,
- new born mammals, if the umbilical wound has not healed,
- animals with antlers in velvet²⁶,
- pigs younger than 3 weeks,
- lambs younger than 1 day,
- calves younger than 10 days over a distance of 100 km or more,
- dogs and cats younger than 8 weeks, unless accompanied by their mother,
- non-driven horses, in the case of long journeys,
- in long-term transport, if the animals are not accompanied by mother, solipeds up to 4 months old, calves up to 14 days old, or pigs up to 10 kg.

Slightly injured or sick animals are considered transportable if the transport does not cause them additional suffering. If in doubt, the vet decides. The animal's ability to transport is qualified not only at its commencement, but also during transport. If the animal has been injured or fell ill during transport, it must receive immediate assistance and be separated from other animals. A sick or injured animal must receive appropriate veterinary treatment or be killed in a manner that does not cause additional suffering. Sedation is also forbidden unless it is necessary to ensure animal welfare. These measures must be administered under veterinary supervision. The fact that an animal is transported to a slaughterhouse cannot be any excuse for transporting an animal that is sick or injured²⁷.

The welfare of slaughter animals during transport can be analyzed in terms of the subjective feelings of animals or in terms of their biological functioning, which can be measured by physiological indicators such as heart rate or number of breaths. Disturbance of optimal living conditions of animals during transport leads to disturbance of physiological indicators²⁸. A very important element affecting animal welfare in transport is the selection of appropriate personnel dealing with animals. The person responsible for transporting animals should have appropriate competences and training in working with animals. Such training is conducted by an entity authorized by decision of a district veterinarian²⁹. The training includes administrative and technical issues of legislation regarding the protection of animals during transport. These are among others³⁰:

²⁵ Ibidem.

²⁶ Velvet is an epidermis covering growing antlers, which eventually dies and is abraded by the animal.

²⁷ Ł. Smaga, *Ochrona...*, p. 214.

²⁸ K. Tereszkievicz, K. Choroszy, *Wpływ obrotu przedubojowego na dobrostan tuczników i jakoś wieprzowiny*, „Przegląd Hodowlany” 2015, No. 1, p. 14.

²⁹ Act of 21 August 1997..., op. cit.

³⁰ Ł. Smaga, *Ochrona...*, p. 215.

- knowledge of regulations,
- knowledge of animal physiology - their nutritional needs, behavior, stress responses,
- knowledge of practical aspects of taming animals,
- safety issues for personnel involved in taming animals,
- the impact of driving on animal welfare and meat quality,
- animal intervention care.

In 2009, an international panel of experts gathered in Madrid as part of the EconWelfare project compiled a list of the most important aspects of animal welfare, including transport, as shown in Table 1.

Table 1. The most important aspects of animal welfare during transport, including cattle, pigs and poultry according to an international expert program

Tabela 1. Najważniejsze aspekty dobrostanu zwierząt podczas transportu w podziale na bydło, trzodę chlewną i drób według międzynarodowego programu ekspertów

Cattle: Dairy, meat cows, calves	Pigs: Sows with piglets, fattening pigs	Poultry: Laying hens and broiler chickens
<ul style="list-style-type: none"> ◦ watering animals before transport ◦ turning down floor for animal transport vehicles ◦ appropriately inclined footbridges to allow access to the transporting vehicle ◦ Education and training of people working in animal transport 	<ul style="list-style-type: none"> ◦ Separation of animals from different production groups ◦ Suitably sloping footbridges to allow entry and exit of the transport vehicle ◦ Education and training of people working in animal transport 	<p>Education and training of people working in animal transport</p>

Source: own study based on: A. Malak-Rawlikowska, M. Gębska, Postrzeganie dobrostanu zwierząt przez uczestników łańcucha żywnościowego w wybranych krajach Unii Europejskiej i w Polsce, „Roczniki Nauk Rolniczych” 2010, series 4, p. 138.

2.1. Compliance with cattle welfare during transport

For cattle, transport is one of the strongest stressors. The occurrence of stress among transported cattle is determined by the following factors³¹:

³¹ M. Gaworski, *Specjalistyczny...*; B. Sionek, W. Przybylski, *Wpływ czynników środowiskowych na poziom glikogenu w mięśniach zwierząt rzeźnych*, „Żywność. Nauka. Technologia. Jakość” 2015, No. 1, p. 41.

- rearrangement of cattle and separation of fed individuals,
- increase in muscle tone that appears to maintain balance during transport,
- changing the feeding system,
- no water,
- foreign smells,
- change in microclimate, ventilation system,
- new surroundings,
- contact with strangers,
- noise and shocks during transport.

Transport, even in the most favorable conditions, is extremely stressful for cattle, which can lead to weight loss, disease, congestion, muscle damage and even death³².

Transport in accordance with applicable welfare standards and principles should not contribute to the injury and suffering of the animal. Cattle may develop infections or clinical diseases, which may include³³:

- transport fever - bacterial infection caused by fatigue,
- transport erythema - the animal's skin turns red due to contact with urine.

It occurs as a result of a poor droppings treatment system - if the litter is of inadequate quality or is not sufficient,

- transport tetany - a disorder caused by a lack of food or water.

In the case of cattle transport, it is also important to equip the destination to which the animals are transported. First of all, it is important when transporting cattle over long distances and when the climate zone changes. Animals are then more exposed to stress and anxiety. The destination should therefore be prepared in such a way that it resembles the one where the animals were previously kept. This is difficult to do, but such circumstances help animals. It is also important to provide animals with feed that is qualitatively better than the requirements foresee. During transport, each animal should have a surface that guarantees free access to the feed and water, as well as lying and standing in its natural position. Where animals are transported over greater distances, it must be possible to milk cows every twelve hours³⁴. Loading and unloading cattle should be well planned so that there are no delays. The design of loading ramps should prevent injuries and limit the excitation of animals during movement. The cattle should move in one direction, without hurry and risk of injury or trampling each other³⁵. All types of cattle passage corridors should be safe for them, including non-slip floors, side protection, no sharp edges. When cattle are moved and the road is clear in front of the animals, chasing devices can be used, but electric drovers should be avoided. Knowledge about animal behavior is very important because fear can cause panic, reluctance to move and turn back³⁶.

³² P. Domaradzki, M. Florek, A. Litwińczuk, *Czynniki kształtujące jakość mięsa wołowego*, „Wiadomości Zootechniczne” 2016, No. 2, p. 163.

³³ M. Gaworski, *Specjalistyczny...*, op. cit.

³⁴ Ibidem.

³⁵ R. Kupczyński, *Wpływ postępowania przedubojowego na jakość wołowiny* (published 11.01.2016), <https://www.agrofakt.pl/jakosc-wolowiny/> [access: 24.07.2017].

³⁶ Ibidem.

2.2. Compliance with pig welfare during transport

Pigs are particularly sensitive to inappropriate environmental stimuli associated with their transport. It is associated with the characteristic species features, among which one can distinguish³⁷:

- the circulatory system properties,
- a thick layer of subcutaneous fat and a lack of sweat glands make these animals sensitive to thermal stress.

The above-mentioned features make it difficult for pigs to successfully adapt to the transport process and each transport carries the occurrence of both transport stress and social stress. Social stress arises from the behavior of other individuals belonging to the same species. Its causes are most often competition within the hierarchy and conflict of a territorial nature³⁸. The symptoms of transport stress in pigs include³⁹:

- cardiac and vascular arrhythmia,
- increased body temperature,
- fast breathing,
- red bruising of skin around the ears, limbs and lower abdomen,
- limb stiffness and stillness,
- vocalization, i.e. making sounds.

During pig transport, the following signs of fear can be seen and anxiety⁴⁰:

- emission of characteristic sounds. Vocalization caused by pain signals a threat to other individuals,
- change in body position signals thermal stress,
- drooling
- signs of fatigue,
- shaking,
- lethargy,
- signs of motion sickness in pigs,
- improper handling during transport also causes signs of panic, i.e. extreme fear for life.

The negative effects of transport on pigs cause⁴¹:

- falls,
- weight loss,
- skin damage and injuries,
- muscle contusion,
- wounds.

³⁷ K. Tereszkievicz, K. Choroszy, *Wpływ...*, p. 13.

³⁸ Ibidem.

³⁹ Ibidem.

⁴⁰ Ibidem, p. 14.

⁴¹ K. Tereszkievicz, P. Molenda, K. Pokrywka, *Aktualne problemy w transporcie tuczników*, „Logistyka” 2011, No. 3, p. 2793.

Injuries caused during pig transport can be caused by aggression, animal fights, improper car construction, or excessive density of individuals. The high density of transport increases the aggression between lying animals and those looking for a place to rest. In turn, lack of rest intensifies attempts to dominate and when there is confrontation between animals, the number of injuries increases. On the other hand, low compaction can also lead to the risk of injury associated with animals losing balance while travelling⁴².

The lack of signs of atypical forms of pig behavior does not always mean their high welfare. These animals may have adaptive mechanisms or are unable to manifest them. For this reason, pig welfare should not be measured in transport with only a behavioral indicator⁴³.

Factors that affect negatively the welfare of pigs during transport and thus contribute to quantitative and qualitative losses:⁴⁴

- genetic factors, including race, susceptibility to stress, gender,
- external environment factors such as noise, vibrations, transport conditions and time, weather conditions,
- social environment factors, including interaction between animals and interaction between staff and animals.

2.3. Compliance with poultry welfare during transport

Preparation of poultry for transport begins at the place of their rearing and consists in carrying out the so-called fasting. This is related to the improvement of the hygienic standard of bird slaughter. The deprivation of access to feed and water is between 8 and 12 hours⁴⁵. Then the poultry is manually caught and put into transport containers⁴⁶. Hand-catching of birds or using mechanical devices for this purpose has been the subject of discussion for many years. Mostly, the staff handle poultry very carelessly, which leads to injury⁴⁷. During the capture operation and loading, numerous leg injuries occur, in particular dislocations, mainly hip dislocations. Statistics show that these injuries affect up to 25% of birds transported to the slaughterhouse. Moving birds head down is also a very big source of stress for them⁴⁸.

The number of birds loaded into containers or transport containers must match with loading standards, which takes into account body weight, age and species⁴⁹.

⁴² D. Temple, E. Mainau, X. Manteca, *Ekonomiczne skutki stresu u trzody chlewnej spowodowanego transportem drogowym*, „Farm Animal Welfare Education Centre, Publikacja nt. Dobrostanu Zwierząt Hodowlanych” 2015, No. 9, p. 2.

⁴³ K. Tereszkiwicz, K. Choroszy, *Wpływ...*, p. 14.

⁴⁴ K. Tereszkiwicz, P. Molenda, K. Pokrywka, *Aktualne...*, p. 2794.

⁴⁵ K. Tereszkiwicz, P. Molenda, K. Pokrywka, B. Buwała, D. Kusz, *Transport...*, p. 1556.

⁴⁶ Ibidem, p. 1557.

⁴⁷ S. Wężyk, R. Gilewski, *Dobrostan kurcząt w transporcie do ubojni*, „Ogólnopolski Informator Drobniarski” 2015, No. 5, p. 10.

⁴⁸ K. Tereszkiwicz, P. Molenda, K. Pokrywka, B. Buwała, D. Kusz, *Transport...*, p. 1557.

⁴⁹ Ibidem.

Stress factors to which birds are exposed during transport are⁵⁰:

- catching and placing in tight transport cages,
- changing living space and surroundings,
- unsuitable temperature,
- unfavorable microclimate,
- vibrations and movements in the vehicle,
- strike, tremors,
- lack of food and water,
- noise,
- disruption of the social balance of the flock.

Stress in poultry can have various consequences: from small discomfort to death. The death of poultry in transport occurs as a result of a reduction in their welfare⁵¹. Transport from the place of rearing to the slaughterhouse is also the most common cause of economic losses arising from bird deaths. Birds die during transport mainly due to⁵²:

- acute stress reaction,
- suffocation,
- trampling,
- cardiac arrest.

Another common occurrence in the transport of slaughter poultry is weight loss. It is associated with the excretory and catabolic processes of animals. Catabolic processes result from the activation of the body's spare energy components resulting from a lack of access to food and water. It has been proven that the weight loss of poultry in the first two hours of transport is 0.75% and in each subsequent hour of transport 0.30%⁵³.

The duration of poultry transport to the slaughterhouse is very important as it also affects the quality of the meat. This transport should not be longer than two hours and should be a maximum of six hours from leaving the farm to the slaughterhouse. Birds should not feel tired after transportation and therefore, whenever possible, transportation should be done carefully and without shocks⁵⁴. Stress to which birds are exposed during their transport to the slaughterhouse depends on the conditions of transport and service. The less humane the way animals are handled and the worse the transport conditions, the more they are exposed to stress and the lower their welfare level. Unfortunately, even in the best organized transport of

⁵⁰ J. Doktor, *Wpływ postępowania przedubojowego na jakość tuszki i mięsa kurcząt rzeźnych*, „Wiadomości Zootechniczne” 2007, No. 3, p. 26; K. Tereszkiwicz, P. Molenda, K. Pokrywka, B. Buwała, D. Kusz, *Transport...*, p. 1558.

⁵¹ Ibidem.

⁵² K. Tereszkiwicz, P. Molenda, K. Pokrywka, B. Buwała, D. Kusz, *Transport...*, p. 1559.

⁵³ Ibidem, p. 1560.

⁵⁴ J. Doktor, *Wpływ...*, p. 27.

poultry it is impossible to reduce bird stress to a minimum⁵⁵. To minimize the risk of death in poultry and increase their welfare during transport one should⁵⁶:

- observe the animal loading density,
- ensure safe and humane transport by a properly adapted vehicle,
- reduce the time in transport containers to a minimum
- minimize loading and unloading stress,
- in summer, birds should be protected from heat, in winter from the frost.

For each animal, transport, even in the most friendly conditions, is a great effort resulting, among others, from maintaining its natural body position. For this reason they must be rested during breaks in transport. In road transport, the journey time for domestic solipeds and for domestic cattle, pigs, sheep and goats may not exceed eight hours. Can be extended only in case when the transport vehicle meets the requirements for long-term animal transport. And so, for horses and pigs, it can be twenty-four hours, and for other animals, fourteen hours. During transport, animals should be watered every twelve hours and fed every twenty-four⁵⁷.

The report „On the future of animals husbandry”, developed by the German Ministry of Agriculture, describes the public's attitude towards maintaining animal welfare during transport and slaughter⁵⁸: „The consumer would like animals to be kept in natural conditions / systems and to be humane. Transport and slaughter are also often a matter of social concern. Despite this, consumers usually do not focus on the specific aspects of raising, maintaining, transporting and slaughtering animals...”

Conclusions

Transport management is a challenge for many companies. Especially when it comes to animal transport, this process can be very complicated. When managing animal transport, the most important thing is having a specialized fleet for transporting a given animal species, loading animals, unloading animals, route planning, management and proper training of employees and drivers to work with animals.

There is also a strong need to educate the public about caring for animal welfare during transport and slaughter. Just like shaping the awareness of producers, people involved in the management of transport and slaughter of animals it affects animal welfare and often is more important than tightening standards⁵⁹.

⁵⁵ Ibidem, p. 28.

⁵⁶ Ibidem.

⁵⁷ Ł. Smaga, *Ochrona...*, p. 216.

⁵⁸ A. Malak-Rawlikowska, M. Gębska, *Postrzeganie dobrostanu zwierząt przez uczestników łańcucha żywnościowego w wybranych krajach Unii Europejskiej i w Polsce*, „Roczniki Nauk Rolniczych” 2010, series 4, p. 142.

⁵⁹ Ibidem, p. 147.

During the transport of slaughter animals, knowledge of animal behavior plays an extremely important role. Due to the special „load” that is animals, the course of this transport is strictly regulated by law. The transport of animals can be organized only by entities that meet statutory requirements, which are subject to control at the national and European Union level⁶⁰.

To minimize the extreme stress associated with changing environments and the means of transport in animals, care should be taken to maintain an appropriate level of animal welfare, as it also contributes to the quality of animal products.

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⁶⁰ A. Kokocińska, T. Kaleta, *Znaczenie etiologii w naukach o dobrostanie zwierząt*, „Roczniki Naukowe Polskiego Towarzystwa Zootechnicznego” 2016, No. 12, p. 58.

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