

Review Article

Cattle Transportation and Transport Wastage

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Today, animal transport uses sea roads, railways, roads and airways. In livestock businesses, live animal transportation is one of the most important activities of cattle and sheep breeding.

Stress experienced by animals during transport affects animal welfare considerably. Stress in animal transport refers to the behavioral and physical state that animals have shown against threats. Prosperity is associated with the presence and absence of negative feelings in animal transport. Behavioral and physiological responses can be used to determine the response of the animal to the transport. Today there is a similarity between the problems experienced in the past and the rate of animal welfare and mortality.

Live animal transports are an important part of the livestock industry. In recent years, producers, consumers, governments, lawyers, welfare organizations and transporters have been attaching importance to improving the quality of transport by improving transport conditions. In transportation; Studies focusing on transport such as water and nutritional needs, nutrition time, loading density, weather conditions, characteristics of transport vehicle and travel distance are made. The other major problem after transportation is the transport wastage.

Keywords: Ruminant; Transport; Transport Wastage; Welfare**Introduction**

In the world, for the purpose of animal transport, first the sea way, railway and the road and the airway are used. One of the most important activities that affect profitability in cattle breeding is animal transport.

The struggle that animals have given during transport seriously affects animal welfare. Stress refers to behavioral and physical conditions that a living creature perceived as threats to itself. Here, prosperity implies that transplants are carried out painlessly and in a healthy manner. Prosperity is associated with the presence of positive feelings in animals and the absence of negative feelings. Behavioral and physiological values can be used to determine the response of animals to transports. There is a similarity between today's high mortality rate and welfare level with animal transfers made in the past years^[1-4].

In recent years, producers, consumers, governments, lawyers, welfare-based organizations and transport companies are attaching great importance to upgrading quality by improving transport conditions. In transportation; studies focusing on topics such as nutrition needs, loading density, climate conditions, characteristics of transportation vehicles, and driving distance are being studied^[5-7].

Live cattle transports made under adverse conditions cause problems such as death, injury and reduced meat quality in animals, leading to economic losses. It is very important to ensure good welfare conditions during ruminant transports. Adverse conditions before, during and after transport affect animal

welfare, transportation costs and therefore quality of meat after cutting. There are many factors directly affecting animal welfare, including the characteristics of the ramps used for loading cattle, such as the area allocated for animals (m²), the way the animals are transported, the characteristics of the transportation vehicle (suspension system, height, ventilation, etc.). In addition, environmental factors such as climate and road conditions are important^[1,3,8-10].

Animal Transport from Abroad to Turkey

Today, Turkey imports cattle with butchery, breeding and breeding purposes. Imports are usually from countries like Uruguay, France, Australia, Hungary, Austria, Bulgaria and America.

Cattle transports made from these countries are often used for livestock breeding. In live cattle transport, while the sea route lasts 20 - 28 days, it takes 30 - 34 days by road^[11].

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Transport Wastage

The weight loss that occurs during live animal transport is called transfer wastage. Transportation is a physiological condition that is difficult to control until the animals are loaded into the vehicles and started to be unloading^[12].

$$\text{Transport wastage (\%)} = (\text{BWBT} - \text{BWAT})/\text{BWBT} \times 100$$

BWBT=Body weight before transportation

BWAT=Body weight after transportation^[13,14]

Transfer wastage are divided into two. These;

A) Metabolism wastes are the resultant,

B) Tissue wastage seen due to extracellular and intracellular fluid loss in the tissues.

Tissue wastage are a result of long-distance transplants made in unsuitable welfare conditions. The time required to recover the tissue wastage and recover the animal itself (10 - 36 days) is higher compared to the waste wastage (about 12 hours). Slaughter animals must be rested before slaughter so that the quality and quantity of the product can be corrected. Breeding animals will need time to make up for their transfer waste^[9,15-17].

Transport wastage, it is more prevalent in the early hours of shipping^[18,19]. The reason for this is the development of adaptation over time in living things.

Cattle Behavior Specific Features

It is beneficial to know the race-specific behavioral characteristics of raising the quality of prosperity.

In this sense;

- Their vision skills are weak and they cannot perceive the details. So they do not want to go to dim areas.
- Cattle are afraid of sudden movements of nearby objects or creatures.
- They are disturbed by sudden and loud noises.
- Herd instinct is strong and must not be isolated.

Issues to be Considered Before Cattle Transports

Herd management applied to cattle can cause significant problems in animals. In order to reduce these problems, it is important that employees are informed and educated about the vulnerability of animals. Negative behaviors that employees exhibit against animals will cause stress in animals. This is why they need to pay attention to the behavior of employees. One of the factors affecting animal welfare in the transport process is the well planned transport. For the well planning of the animal shipment to be made;

1- Preparation of animals for transports;

It is necessary to ensure that animals are collected in a common area and this process should be adjusted to create as little stress as possible.

2- By choosing the transport time as an estimate, choosing the appropriate vehicle for the duration;

Estimation of transport time is important for the selection of vehicles that have the necessary equipment for transport (watering, barn, feed etc.).

3- Preparation and maintenance of transport vehicle;

Vehicles must be disinfected and checked for the presence of mechanisms.

4- Documents required for transport must be prepared in advance,

5- How many animals will be loaded into the vehicles should be calculated;

The loading density must be calculated and avoided from overloading.

6- Carrying out disease control of the animals to be transported,

7 - Consideration should be given to matters such as the preliminary determination of places where breaks will be taken to meet the needs of the animals^[1].

Loading Density

The loading density can be defined as the area to be separated per animal during transport and can be measured in different ways.

When calculating;

- Area allocated per animal (m²/animal),

- The area allocated according to live weight (m²/100 kg)

- One of the live weight per unit area (kg/m²) can be used.

In the per-animal area method, live weight variation is not considered. Therefore, it is reported that while the loading density is calculated, the area method according to live weight should be used^[9,20].

The loading intensity is influenced by gestational status, transport time, age, live weight, horn existence, ambient temperature and gender factors^[1,9,10,20,21].

The equality value used by the UK Livestock Welfare Council^[22] to calculate the minimum area valid for all animal species is as follows;

$$A = 0.021 W^{0.67}$$

A - Minimum floor area required per animal (m²)

W - Animal weight (kg)

0.021 constant - Ratio of body length to body width

When determining the area allocated per animal, the aggressiveness among individuals or the behavior of animals on each other should be taken into consideration.

Reduced space can cause fighting between bulls. This can lead to reduced animal welfare and the formation of hard and dry carcasses^[9,23,24].

Connecting animals from their places such as their neck and legs to their means of transport can result in death of the animal during transport. Depending on the increase in animal density in the vehicle in a study, It has been found that cortisol, glucose, creatine kinase levels and injuries are increased in animals^[19].

Table 1: The effect on the plasma concentration of the loading density for long-distance transport^[19].

Loading Density	Low n=24	Medium n=24	High n=24
Plasma cortisol (ng/mg)	0,1	0,5	1,1
Plasma glucose (nmol/l)	0,81	0,93	1,12
Plasma creatine kinase (unit/l)	132	234	367

Table 2: Area allocated per cattle during transport according to EU standards^[20,25].

Class	Estimated weight (kg)	Required area (m ² /area)
Small calves	50	0,30 - 0,40
Medium-sized calves	110	0,40 - 0,70
Heavy calves	200	0,70 - 0,95
Medium heavy cows	325	0,95 - 1,30
Heavy cows	550	1,30 - 1,60
Very heavy cows	> 700	> 1,60

Cattle must be placed on the transport vehicle either vertically or parallel to the driving direction. The high animal density in the vehicle makes it difficult for the animals to orient themselves in the direction of driving and causes the stress factors to increase^[1].

Loading and Unloading Ramps:

One of the important factors that cause stress during animal transport is the loading and unloading of animals. Loading conditions, especially loading elements (loading ramp and scaffolding), are among the factors that greatly affect the level of energy and psychological stress the animal spends. To prevent this;

- When loading animals into vehicles, do not use sticks or prod,
- Care must be taken to use doors and locks in such a way as not to disturb animals during loading and unloading,
- Slippery floors, sharp corners or metal constructions should be avoided from such constructions because they can injure animals and cause stress,
- The tilt direction of the ramp should be adjusted (animals prefer to ramp upwards), the ramp should be at the lowest possible slope (max 20°)
- The channel to which the ramp and the animals will travel on the ramp must be made of solid and hard material,
- The channel and the channel section should be wide so that the animals can cross each other without hurting each other,
- If a portable ramp is to be used for loading, the thickness of the material used on the ramp surface must be 20 cm in adult cattle to prevent slippage,
- The ramp and vehicle lid must have been designed for loading / unloading,

Also, if the used ramp is fixed and has a concrete floor, it is recommended that the ramp floor should be 10 cm high and 30 - 45 cm wide^[9,26-28].

Animal Transport Time

This period is defined as the period from when the first animal is loaded, until the last animal is taken down from the vehicle. The stress level of animals that are not accustomed to loading the car is quite high during the first hours after loading. Adaptation develops according to the species and environmental conditions in the later hours of transport. However, the longer the transfer period, the more stress the animals experience. This means that the transfer period should be kept as short as possible^[10,21].

Some animals can cope better with stress than other animals, depending on species, race and yield orientation. In a study

conducted, it was determined that cattle were transported more easily to long distances compared to sheep. In another study, dairy cattle breeds reported that their ability to cope with stress during transport was better than fattening cattle breeds^[9,25,27,29].

In the transport legislation of the European Union^[30,31] it appears that cattle can be transported continuously for a maximum of 14 hours and they must be allowed to rest for at least 1 hour following this transport. During rest, animals were reported to be allowed to transport for another 14 hours after their needs were met. It is also added that if transport conditions are good, it will not have a negative impact on the welfare of 15-hour transported cattle^[32,33].

Effect of Ambient Temperature

The effect of season is important in the transport wastage formed during transport in cattle. Transfer wastage are more common in the summer months than in the spring and autumn months. In one study, reported that the transport of beef cattle in the summer and the autumn months caused more transport wastage than in winter and spring months^[34-36].

Teke (2014) examined the transport of 3874 cattle in a total of 121 transporters at a transport distance of 1800 km in the study of environmental temperature. The transfers were carried out between July and December 2010. The transport wastage were highest in August (8.39 %) and December (7.27 %), lowest in October (2.99 %) and November (1.77 %). The average transfer wastage during these periods was 5.57 %.

Rules concerning ruminant transportation in the european union

The European Union has made legal arrangements for the protection of animals during animal transport with the aim of ensuring that animals are transported in accordance with the conditions of welfare by the decision of 22 December 2004. With the arrangements made, European Union standards have to be applied in marine, land and air transport in animals, and arrangements have been made from the design to the hygiene of the transport vehicles to be used^[1,36].

10-day-old from the small calf, were reported to be transported to a distance less than 100 kilometers. Animals that are not cut from milk should be given a one-hour break after a 9-hour transport. In 2007, expressions were added that vehicles to be used in transports that will last 8 hours or more must have a special watering system and air conditioning system for animals. In longer transports, the animals must be rested; water and feed should be provided where necessary. Feed should be given if the animal will not be cut within 12 hours after transport. Vehicles to be used in animal transport that will last 8 hours or more should have a satellite monitoring system^[17,36,37].

Results

Animal transport must be carried out in accordance with the standards set by the relevant units. Loading density, ramps, transport time, transport vehicle structure factors are crucial for transport. Of course, these factors are mainly based on animal welfare. Welfare plays an important role in transports as well as in all areas of livestock. In transportation, the stress that occurs in animals must be kept at the lowest level. Drivers of transport vehicles should also be trained in these matters. Livestock for

the purpose of profitability will be negatively affected if transport wastage, which are an important factor in transplants, are not taken into consideration. During the transport of animals on transport vehicles, a number of precautions must be taken to ensure that the losses are minimized. These measures are:

- 1- If animals are to be given a different feedstuff in their place of transportation, the animals must be accustomed to this feeding prior to transporting. Feed and water needs should be met a few hours before being placed on the means of transport.
- 2- Objects that are likely to injure animals must be cleaned from places where animals will be loaded into vehicles, where they be unloaded from vehicles, and places to take breaks.
- 3- Parts of the transport vehicle which may damage the animals must be corrected.
- 4- An appropriate loading plan should be made. The most suitable vehicle should be selected for the requirements and conditions, the time to be loaded according to the climate condition should be set.
- 5- During loading and unloading, animals must not be lifted from their feet, ear, tail or throat. The slopes of the ramps should be considered^[38].

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