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RESEARCH ARTICLE

Different Effects of Road Transport on Yearling Lambs [1]

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Summary

This study was conducted to determine weight losses, subsequent recovery, and transportation costs in yearling lambs transported for 5, 10 and 24 h. Sixty-three, shorn, male, yearling Akkaraman lambs were used and assigned into 4 groups, namely; control group (un-transported), Group I (transported for 5 h), Group II (transported for 10 h) and Group III (transported for 24 h). Transported lambs (16x3=48 lambs) in groups I, II, and III were loaded on a lorry at a density of 0.35 m^2/head, while control group (15 lambs) were kept with the same density in the barn. After each journey, a slight but not significant live weight loss was observed in the transported lambs compared to lambs in control group (P>0.05). The live weight losses were determined between 3.4%-6.5% in transported lambs and 3.0%-6.2% in control group. Lambs in control group and 5 hour-transported lambs reached pre-transport live weight after 72 h. After 5, 10 and 24 h transportation the difference between total transportation costs of control and transported lambs was calculated as 7.0 US$/head, 12.7 US$/head and 20.2 US$/head, respectively. In conclusion, removal of feed could be explain as the more important reason of live weight losses during road transportation, compared to weight losses due to transportation stress. Additionally, 5, 10 and 24 hours transportation of lambs may suggest that they can be sold for 7 US$/head, 12.7 US$/head and 20.2 US$/head more, respectively.

Keywords: *Cost, Recovery, Transportation, Weight losses, Yearling lamb*

Karayolu ile Taşımanın Toklular Üzerindeki Değişik Etkileri

Özet

Bu çalışma 5, 10 ve 24 saat taşınan toklularda meydana gelen ağırlık kayıplarını, kaybedilen ağırlıkların taşıma sonrası geri kazanımını ve taşıma maliyetlerini belirlemek için yürütülmüştür. Çalışmada, 63 adet, kırkılmış, erkek Akkaraman toklular kullanılmış ve hayvanlar 4 gruba (kontrol; taşınmayan grup, Grup I; 5 saat taşınan, Grup II; 10 saat taşınan ve Grup III; 24 saat taşınan) ayrılmıştır. Grup I, II ve III olarak taşınan hayvanlar (16x3=48 toklu) kamyona 0.35 m^2/baş sıklıkta olacak şekilde yüklenirken, kontrol grubu (15 hayvan) aynı sıklıkta ağılda tutulmuştur. Her taşıma sonrası taşınan hayvanlardaki canlı ağırlık kaybı, kontrol grubuna göre istatistiksel olarak önemli olmamakla birlikte (P>0.05) hafif de olsa daha fazla olarak tespit edilmiştir. Taşınan toklularda canlı ağırlık kayıpları %3.4-%6.5 arasında tespit edilirken, kontrol grubunda %3.0-%6.2 arasında tespit edilmiştir. Kontrol ve 5 saat taşınan gruplardaki hayvanlar taşımadan 72 saat sonra taşıma öncesi canlı ağırlıklarına ulaşmışlardır. Kontrol ile 5, 10 ve 24 saat taşınan gruplar arasında toplam taşıma maliyetleri farkı sırasıyla 7.0 US$/baş, 12.7 US$/baş ve 20.2 US$/baş olarak hesaplanmıştır. Sonuç olarak, karayolu ile yapılan taşımalarda toklularda meydana gelen canlı ağırlık kayıplarını, taşıma stresinden çok hayvanların aç kalmasına bağlamak mümkündür. İlave olarak, tokluların karayolu ile 5, 10 ve 24 saat taşınması, taşıma sonrası hayvan başına sırasıyla 7.0 US$, 12.7 US$ ve 20.2 US$ daha fazla fiyata satılabileceklerse önerilmektedir.

Anahtar sözcükler: *Maliyet, Geri kazanım, Taşıma, Ağırlık kayıpları, Toklu*

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INTRODUCTION

All over the world, slaughtering animals are transported to different distances mostly by road. Every type of transportation (road, railway, ship etc.) causes stress on animals. Besides stress, there are lots of negative effects of transportation such as detriment the welfare of animals, decrease live weight and meat quality, cause injury, increase risk of infectious disease, reduce performance, even deaths on animals [1-5].

The transportation of live animals by road is the most economical form of animal transport, and a large proportion of the problems recording during transport occur on road transport. Comparing to cattle, swine, and poultry there is few article published on lambs and little information available on the response of lambs to different journey times [6].

During the European Union (EU) integration period, Turkish livestock sector will face to EU's animal transportation regulations. Most of the animal transportations are taking place from East part of Turkey to Middle or West regions [7]. Previous studies performed in Turkey reported that, over 50% of the animals were transported more than 8 hours and/or 1.000 kilometers [7-9].

The objective of this study was to determine the weight losses, subsequent recovery rate and evaluate the transportation costs for 5, 10 and 24 h on yearling lambs.

MATERIAL and METHODS

Animals and management

In this study, 63 (shorn, male) yearling Akkaraman lambs (fat-tailed) were used. Prior to study, the animals in a local farm were clinically examined and healthy lambs were purchased. Animals were ear-tagged and weighed to similar initial live weights and assigned into 4 groups consisting of 16 lambs in each treatment group (Group I, II, and III) and 15 lambs in control group. The lambs were acclimatized for 10 days at density of 0.7 m^2/head. Fattening ration consisting of concentrate and hay was fed to lambs supplying the adequate nutrition requirements [10]. Water was supplied ad libitum.

Study design

Before transportation, food and water was provided to all lambs and the animals were weighed. Lambs in treatment groups (I, II, III) were loaded on the lorry at a density of 0.35 m^2/head while lambs in control group were kept at the same density in the barn. Dimensions of the lorry were 7.50 x 2.25 m and the vessel divided into 3 equal parts for each transported group. After the transportation of 5 h, lambs in Group I unloaded from the lorry and a project team immediately weighed them at the same time with control group. After unloading the first group, another project team continued to transportation with the Group II and III. The Group II was transported additional 5 h (total 10 h) after unloading the Group I. The same procedure was applied to second group as indicated above. After unloading the second group, last treatment group (Group III) transported additional 4 h (total 14 h) and unloaded from the lorry for 1 h resting included feeding and watering together with control group. After resting interval, the last treatment group (III) reloaded on the lorry for an additional 9 h transportation (total 24 h including 1 h resting interval).

This study was performed in July 2006. The lowest temperature at night was 11°C while the highest temperature during the day time was 23°C on the transportation day. The journey distance for 5, 10 and 24 h transportations were as 251 km, 505 km and 1171 km respectively. The road transported was flat and smooth.

After transportations for determining the recovery rate, all lambs were kept in the barn for three days and weighed 24 h intervals. Total transportation cost was calculated for each group for providing a decision support to producers.

Statistical analysis

Statistical analysis of data was performed by SPSS 11.0 version for Windows. The differences of live weight losses between treatment and control groups for each journey were determined by independent sample t test. The differences between groups were determined by one way analysis of variance (ANOVA) comparing for subsequent recovery periods. Data were expressed as means ± SEMs. Differences between the treatment groups were considered significant at $P>0.05$.

RESULTS

Live weight losses

After each journey, a slight but not significant live weight losses were determined in the transported lambs compared to control group ($P>0.05$).

Table 1. *Pre and post-transport live weights and losses of yearling lambs transported 5 hours*

Tablo 1. *Beş saat taşınan tokluların taşıma öncesi ve sonrası canlı ağırlıkları ve kayıplar*

Treatment	Live weight (kg)			
	Pre-transport	Post-transport	Losses	P
Control	63.68±1.67	61.77±1.57	1.91±0.12	-
Group I	63.63±1.06	61.45±0.99	2.18±0.14	-

-: *Not significant (P>0.05)*

Table 2. *Pre and post-transport live weights and losses of yearling lambs transported 10 hours*

Tablo 2. *On saat taşınan tokluların taşıma öncesi ve sonrası canlı ağırlıkları ve kayıplar*

Treatment	Live weight (kg)			
	Pre-transport	Post-transport	Losses	P
Control	63.68±1.67	60.46±1.51	3.22±0.18	-
Group II	64.48±0.80	61.06±0.75	3.42±0.15	-

-: *Not significant (P>0.05)*

Table 3. *Pre and post-transport live weights and losses of yearling lambs transported 24 hours*

Tablo 3. *Yirmi dört saat taşınan tokluların taşıma öncesi ve sonrası canlı ağırlıkları ve kayıplar*

Treatment	Live weight (kg)			
	Pre-transport	Post-transport	Losses	P
Control	63.68±1.67	59.75±1.53	3.93±0.25	-
Group III	63.84±0.91	59.68±0.74	4.16±0.22	-

-: *Not significant (P>0.05)*

Live weight recovery

For the recovery period, the results of each weighing showed that, after 72 h from transportation the most live weight recovery rate was observed in control group, which was followed by the lambs in groups I, III, and II *(Table 2)*. Lambs in control group were reached to pre-transport live weight on 48th h, and in Group I reached after 72 h. However, Group II and III did not reach to pre-transport live weight after even 72 h.

Table 4. *Subsequent recovery rates of yearling lambs*

Tablo 4. *Tokluların taşıma sonrası canlı ağırlık geri kazanım oranları*

Live weight recovery after transportation	Losses				
	Control	Group I	Group II	Group III	P
24th h (kg)	62.55±1.70	61.89±0.97	61.87±0.74	62.01±0.71	-
48th h (kg)	63.77±1.76	63.30±0.99	62.61±0.87	62.93±0.76	-
72nh (kg)	64.46±1.79	64.04±1.02	63.54±0.88	63.23±0.86	-
Rec R (%)	101.2	100.6	98.5	99.0	

-: *Not significant (P>0.05),* ***Rec R:*** *Recovery Rate*

Transportation costs

The total cost of transportation in treatment groups including fuel, driver and depreciation costs increased with the increasing transportation length.

Table 5. *Transportation costs according to transport durations in yearling lambs*

Tablo 5. *Toklularda taşıma sürelerine göre taşıma maliyetleri*

Transport Costs (US$/head)	Duration (Hours)					
	Control			Transported Lambs		
	5	10	24	5	10	24
Total Transport Cost	8.2	13.8	16.8	15.2	26.5	37.0
- Cost of live weight losses*	8.2	13.8	16.8	9.3	14.7	17.8
- Fuel Cost	-	-	-	3.5	7.00	16.8
- Driver Cost	-	-	-	0.3	0.6	1.4
- Lorry depreciation	-	-	-	2.1	4.2	1.0

** Producer price of live weight was accepted as 3 US$/kg*

DISCUSSION

The criteria for the stocking density and length of the transportation of slaughtering animals by road for recommended in the legislation of European Union Council [11,12] was taken into account in the present study. The important aim in livestock production is to get maximum income response to minimum cost. From this point of view, live weight loss is very important concern related to animal transportation.

In this study, based on the duration of transportation, different live weight losses were occurred. After 5 h of journey transported lambs were lost 3.4% of their live weight and after 10 and 24 h of journey they were lost 5.3% and 6.5% of their live weight, respectively. In control group, at the same times, animals lost 3.0%, 5.1% and 6.2% of live weight *(Table 1, 2, 3)*. There is no significant difference (P>0.05) between transported and un-transported lambs. The results of this study about live weight losses were similar to most of other researchers [1,13,14]. However, Knowles [6] reported that after 24 h journey the lambs were lost 8-11% of their live weight. This little difference may arise from different stocking densities, road, and transportation conditions.

After the three days of recovery period, a highest recovery rate (1.2%) was determined in control group, which was followed by 5 h transportation (0.6%). After recovery period the longer transported groups (Group II and III) were not regain their live weights completely. The recovery rate of Group III was a little higher than

that of the Group II *(Table 4)*. This result probably related to 1 h resting and feeding interval of Group III. Knowles et al.[15] reported that after 96 h of transportation there was a well-defined recovery of live weight.

Due to more live weight losses and fuel, driver and depreciation costs, the highest total transportation cost was observed in Group III. Similar trend was also determined in control group *(Table 3)*. After 5, 10 and 24 h transportation, the difference between total transportation costs of control and transported lambs was calculated as 7 US$/head (15.2-8.2 US$), 12.7 US$/head (26.5-13.8 US$) and 20.2 US$/head (37.0-16.8 US$), respectively.

In conclusion, removal of feed could be explain as the more important reason of live weight losses compared to weight losses due to transportation stress. Additionally, 5 h of transportation of lambs may suggest that they can be sold for 7 US$/head more. Similar to this, 10 and 24 h of transportation of lambs may suggest that they can be sold for 12.7 US$/head and 20.2 US$/head more, respectively.

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