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JOURNEY TIME AND THE EVOLUTION OF SOME WELFARE INDICATORS IN LAMBS DUE TO BE SLAUGHTERED

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Abstract. Research has been conducted on a number of 62 lambs transported in optimal conditions over different journey lengths (8h, 14h) in view of their slaughter. The research has monitored the effects the journey time has on the welfare of lambs due to be slaughtered.

We have monitored the variation of some physiological (heart rate and weight) and biochemical indicators (the level of plasmatic cortisol, glucose, urea, creatininphosphokinase and plasmatic proteins), as well as behaviour expressed following journey in the slaughter house folds.

The results indicated the fact that lambs responded differently to stress factors during journey according to its length, in comparison to the ones located in the slaughterhouse. The increase in cortisol levels was recorded immediately after the vehicle departed and kept high values after 14h of journey in comparison to the marker lot. The heart rate increased due to loading and unloading onto and off the transportation means. The glucose level recorded an immediate drop following the vehicle departure while uraemia recorded an increase right after departure and kept a constant value after the 14h journey in comparison to the lambs transported over an 8h journey and the marker lot.

The lambs behaviour was different following unloading from the transportation means depending on the journey time and compared to those that waited in the slaughter house folds.

Legal journey time should not be exceeded in the case of lambs destined to slaughtering due to their loss of weight (6-7%) recorded in the slaughterhouse 24h after departure.

INTRODUCTION

Research of vehicle transport impact on sheep welfare stood to attention as a necessity within the European legislation implementation and enforcement (7). During journey time three stress factors impact the animals such as vehicle, engine noise correlated to the vibrations and centrifugal forces, low or high temperatures, inappropriate climate, insufficient fodder and water, etc. Stress starts acting when animals are physically, physiologically and behaviourally pressured as they try to adjust to the new environmental conditions (3, 4).

Research on sheep welfare during transport showed that stress appears due to animals' movement from waiting boxes or folds towards loading areas, the loading/unloading method and transport as such.

Results of research on sheep transport globally and internally indicate that these animals respond differently to stress factors during transport.

Warris et all (6) show in 1989 that during transport sheep deprived of fodder for 24h respond by increases in metabolic plasmatic levels. In 1996, Parott et all (5) showed that sheep are quite able to manage for 48h without fodder and water in high climate temperatures, without a significant change in their physiological indicators.

During our research we noticed that sheep regard vehicle loading and unloading stressful due to the novelty of procedure and their little exposure to it. However they adapt to transport conditions within hours from departure if the road is good, the loading surface and microclimate are appropriate (2). Other results our research has revealed confirmed that sheep deprived of fodder and water for 16h showed dehydration signs, their physiological indicators were modified both during deprivation and immediately after these were fed and watered upon reaching destination (1).

All research results have showed so far that sheep transport is regarded as a moderately high stress factor in comparison to other handling activities, such as wool cutting.

MATERIAL AND METHOD

Research has been conducted on 62 pure breed lambs, randomly selected out of the stock to be transported by specialized vehicles to the slaughterhouse. The journey took place during the day, in springtime. Loading was achieved on handling lanes and onto mobile and fixed landings, while the lambs were carefully handled into the transport means. Until departure the animals were fed and watered. During the journey the appropriate loading surface was secured.

The first lot (A=21) was loaded from a raising farm and the second (B=21) from a collecting farm. The journey time was 8h for the first lot and 14h for the second lot. A marker lot (C=20) was also monitored in the slaughterhouse fold 72h after unloading.

Lambs were identified for each lot and then they were clinically examined and weighed. Each animal was applied an intravenous catheter at the jugular vein level for 16h in order to collect blood samples. Sampling was conducted in vacuum containers 2h before loading, and 2, 8, 14h and 16h after departure (table 1). We monitored the evolution of some physiological indicators (heart rate, animal weight), biochemical (plasmatic proteins, fatty acids, urea and creatinofosfokinaza (CPK) and hormonal indicators (plasmatic cortisol). Analysis of blood samples was performed at the destination point by means of RIA (cortisol), optical test (creatinphosphokinase), Novak cholorometrical method (fatty acids) and urease method (urea). The heart rate was measured by means of a cardiac monitor.

Table 1. Method and operations performed in order to determine welfare indicators in lambs due to be slaughtered

Hour	Journey time /no. of hours	Operation	Lamb location
05,30	2h before loading	Installation of the cardiac monitor, weighing, blood sampling from lots A, B, C	Farm before loading (A, B) slaughterhouse fold (C)
09,30	2h after departure	Monitoring of heart rate, weighing, blood sampling from lots A, B, C	vehicle (A, B) slaughterhouse fold (C)
15,30	8h travelling	Monitoring of heart rate, weighing, blood sampling from lots A, B, C	vehicle (A, B) slaughterhouse fold (C)
21,30	14h travelling	Monitoring of heart rate, weighing, blood sampling from lots A, B, C	vehicle (A, B) slaughterhouse fold (C)
23,30	16h from departure	Monitoring of heart rate, weighing, blood sampling from lots A, B, C	Slaughterhouse fold (A, B, C)

We have also monitored lamb behaviour following their unloading from the vehicle (8h and 14h of journey) and the marker lot, in the slaughter house folds with the help of recording cameras set in the receiving folds.

RESULTS AND DISCUSIONS

The animal transport was carried out in spring, on two different days. The air temperature during journey ranged between 19 and 23^{0}C where as relative humidity (RH) between 56 and 75% for the A lot, while for the B lot the air temperature ranged between 20^{0}C and 23^{0}C where as the RH was 60-75%. The C lot (marker) was not subject to any significant air temperature and RH variations during research (20-25^{0}C, 70-75%).

The research monitored lamb response as an adaptation reaction to transport by measuring some of the lambs' welfare indicators.

The lambs' physical effort resulted form their handling and movement on the loading landing led to an immediate increase of the heart rate up to 159-170 bpm. Following vehicle departure this gradually dropped during journey (fig 1.), going back to almost normal levels in the end due to the lambs' adjusting to the vehicle and the journey itself. We would like to point out the fact that the animals responded immediately to stress factors since they were not used to being handled on the transit lanes and loading manoeuvres.

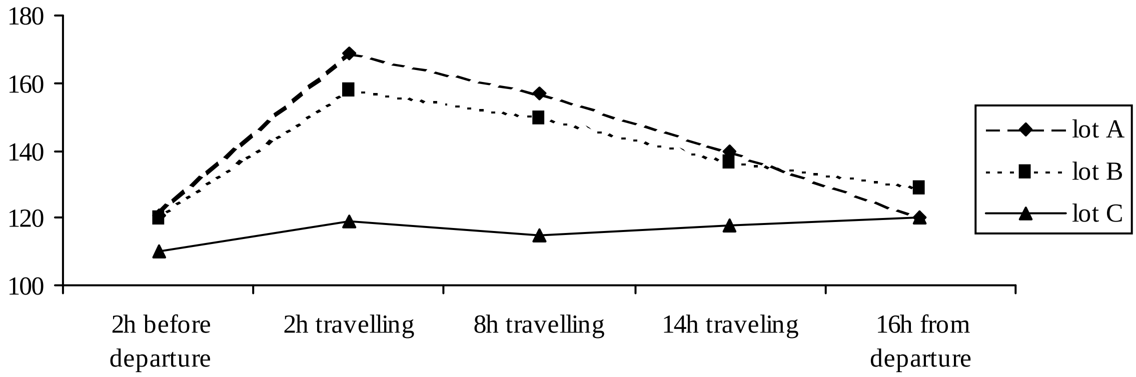

Fig 1. Heart rate level (bpm) in lambs during transport (A, B lot) and in the slaughterhouse (C lot)

The plasmatic cortisol level increased 2h after vehicle departure, which shows that its movement is relatively stressful for lambs, as the increase due to their effort to adapt to transport conditions. The recorded values showed an increase up to 37- 44 µg/l (A and B lot), as opposed to 20,6 µg/l measured before loading. 2h after arrival the plasmatic cortisol level increases to a maximum, and then drops progressively up to a value, which will keep constant (fig 2.). This demonstrates that following lamb adaptation period to the transport conditions this becomes a moderate stress factor as opposed to lambs that were kept in the slaughter house fold and who did not show any variation in the above welfare indicator.

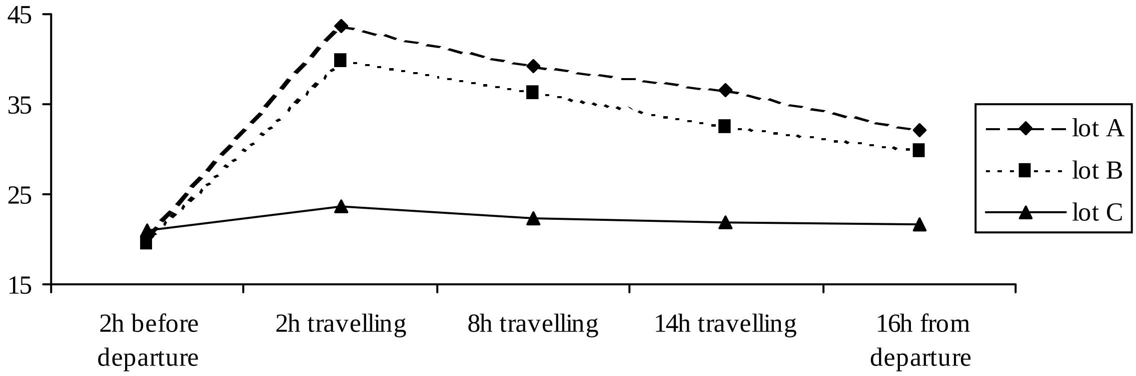

Fig 2. Plasmatic cortisol level (mmol/l) in lambs during transport (A, B lot) and in the slaughterhouse (C lot)

We have also noticed that lambs that were in transport for 14h showed significant acceleration of the proteic catabolic processes due to fodder deprivation, which led in turn to an obvious increase of uraemia as compared to the marker lot and the lambs that were in transport for 8h. Fodder deprivation caused the body to assimilate glucose as energy source while the volatile acids were no longer produced.

The muscular activity measured by the serum creatinphosphokinase level did not show significant changes due to space constraints lambs had during transport.

Loss of weight (fig 3.) was accompanied during journey by an increase in plasmatic and uraemia (fig 4.), which showed that lambs had limited proteic and fat supplies.

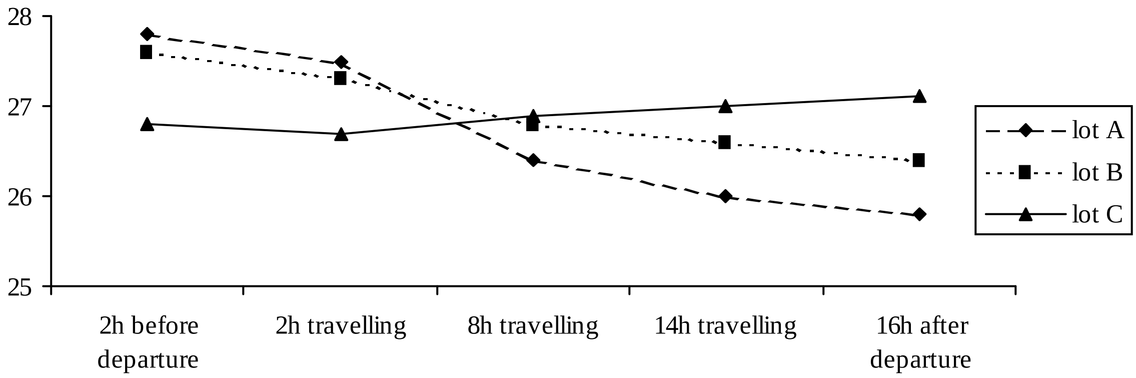

Fig 3. Body weight evolution (kg) in the monitored lambs

Body weight of the lambs transported for 14h dropped by 7,19% and did not go back to initial level even after the lambs were feed, watered and had some rest in the slaughter house folds before slaughtering.

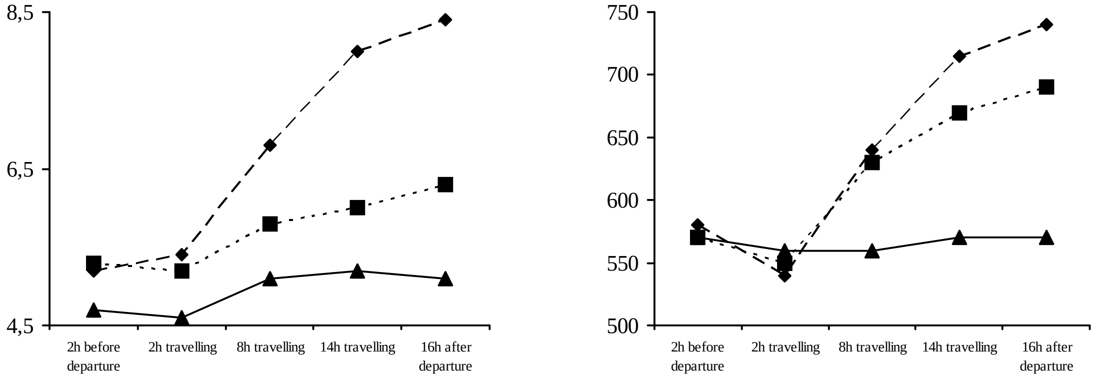

Fig. 4. Uraemia level (mmol/l) and fatty acids (mg/dl) evolution in lambs during transport

Lambs' behaviour (fig 5.) was monitored by video recording cameras upon arrival at the slaughterhouse, both for the animals that travelled for 8h and 14h respectively and the marker lot (16h in the slaughter house fold). Immediately after unloading 45% of the lambs transported for 14h wanted to feed first and only 8% of the lambs watered while only 19% of the animals rested as compared to the marker lot which rested for most of the time (64%).

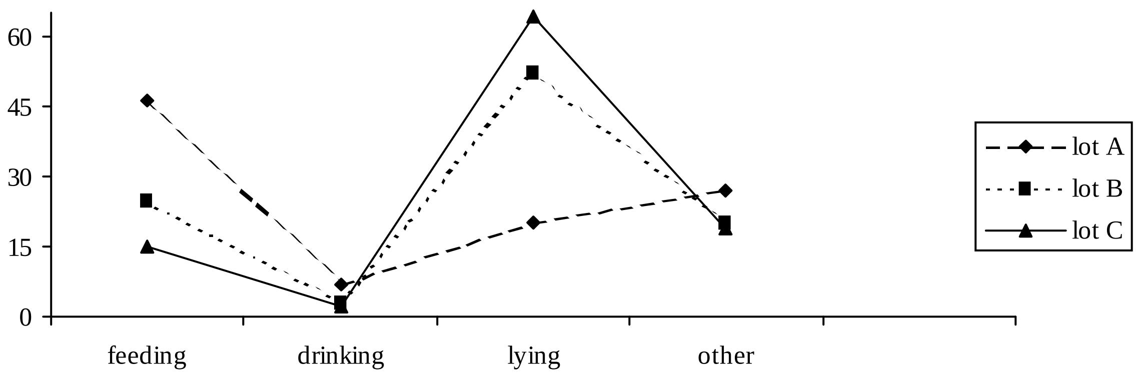

Fig. 5. Lambs' behaviour (%) following unloading from vehicles (A, B lot) and in the slaughterhouse (C lot)

CONCLUSIONS

Welfare of lambs due to be slaughtered was differently impacted during transport depending on the journey time. Consequently, the heart rate showed increases only at loading and unloading times, which leads us to believe that this stress factor can be reduced by animal exposure to handling, movement and landing climbing.

The plasmatic cortisol reaches a maximum value 2h after vehicle departure (44 μg/l), then drops slightly and keeps an almost content value for the remaining journey time. We could conclude that lamb transport is a moderate stress factor.

The level of fatty acids and plasmatic uraemia significantly increased due to lack of fodder and limited metabolic energy resources particularly in lambs that travelled for 14h.

Body weight decreased by aprox 7,19% in comparison to the initial one, due to dehydration in lambs that travelled for 14h without water and also lack of fodder until the unloading moment to the slaughter house folds.

After 14h of fodder, water and free movement deprivation we recommend immediate rest, feeding and watering of lambs destined to be slaughtered so that the physiological welfare indicators should recover their normal values.

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