

INFLUENCE OF SHORT-DISTANCE TRANSPORTATION ON WELFARE AND MEAT QUALITY OF HORSES WITH DIFFERENT HEALTH STATUS

Nikola Čobanović*, Vesna Božić, Sara Kovačević, Ivan Vičić, Branko Suvajdžić, Nevena Grković, Mirjana Dimitrijević, Dragan Vasilev and Nedjeljko Karabasil

Faculty of Veterinary Medicine, University of Belgrade, Belgrade, Serbia

*Corresponding author email: cobanovic.nikola@vet.bg.ac.rs

I. INTRODUCTION

It has been demonstrated that long transportation could increase susceptibility to infection and triggering the onset of health problems in horses, such as transport pneumonia and gastrointestinal diseases [1–4]. However, there is no study reporting welfare and meat quality outcomes after short-distance transportation of slaughtered horses with different health status. Therefore, the aim of this study was to determine the effects of short transportation on blood metabolites and meat quality of slaughtered horses with and without lung lesions.

II. MATERIALS AND METHODS

The experiment was performed on 115 mixed breed horses (mares) with average carcass weight of approximately 184 kg and about 3 years old originated from same farm. At exsanguination, blood samples were collected and blood lactate and glucose concentrations were determined within 10 minutes. Any signs of lung lesions (pneumonia and pleurisy) were recorded at the slaughterline as present or absent. pH and temperature of *Musculus longissimus dorsi* ($pH_{MLD45min}$; $T_{MLD45min}$; pH_{MLD24h} ; T_{MLD24h}) and *Musculus gracilis* ($pH_{MG45min}$; $T_{MG45min}$; pH_{MG24h} ; T_{MG24h}) were measured 45 minutes and 24 hours postmortem. Instrumental colour, drip loss, thawing loss and cooking loss were measured in *Musculus longissimus dorsi*. Statistical analysis of the results was conducted using software SPSS version 23.00 for Windows. According to the presence of lung lesions, the slaughtered horses were allocated to two groups: (i) the group of slaughtered horses without lung lesions ($n = 70$) and (ii) the group of slaughtered horses with lung lesions ($n = 45$). Student t-test was used to examine the differences between two groups in the blood metabolites and meat quality parameters. Data were described by descriptive statistical parameters as the mean value and pooled standard error of means – SEM. Statistical significance was accepted at $P < 0.05$, while tendencies were accepted at $0.05 < P < 0.10$.

III. RESULTS AND DISCUSSION

The effects of short-distance transportation on the blood metabolites and meat quality parameters of horses with different health status are shown in Table 1. Slaughtered horses having lung lesions had higher tendency towards elevated blood lactate concentration, implying their higher susceptibility to stress and greater fatigue after short transportation. In addition, slaughtered horses showing lung lesions had significantly lower pH value measured 45 minutes in *Musculus longissimus dorsi* and higher cooking loss, indicating lower meat quality.

Table 1 The effects of short-distance transportation on the blood metabolites and meat quality parameters of horses with different health status

| Item | No lung lesions | Lung lesions | SEM | P - value |
|----------------------------|-----------------|--------------|------|-----------|
| Number of horses | 70 | 45 | | |
| <i>Blood metabolites</i> | | | | |
| Lactate (mmol/L) | 8.0 | 10.3 | 1.13 | 0.0634 |
| Glucose (mmol/L) | 5.4 | 5.7 | 0.21 | 0.1267 |
| <i>Meat quality traits</i> | | | | |
| pH _{MLD45min} | 6.7 | 6.6 | 0.04 | 0.0246 |
| T _{MLD45min} | 33.4 | 33.7 | 0.67 | 0.6865 |
| pH _{MLD24h} | 5.7 | 5.7 | 0.04 | 0.3088 |
| T _{MLD24h} | 3.7 | 3.7 | 0.35 | 0.8284 |
| pH _{MG45min} | 6.5 | 6.4 | 0.07 | 0.1226 |
| T _{MG45min} | 35.5 | 3.5 | 0.57 | 0.5824 |
| pH _{MG24h} | 5.7 | 5.7 | 0.04 | 0.4322 |
| T _{MG24h} | 5.7 | 6.6 | 0.84 | 0.2791 |
| Drip loss (%) | 1.9 | 1.9 | 0.20 | 0.8711 |
| Thawing loss (%) | 7.7 | 7.7 | 0.62 | 0.9497 |
| Cooking loss (%) | 24.1 | 26.5 | 0.97 | 0.0191 |
| L* value | 32.2 | 31.6 | 0.52 | 0.2524 |
| a* value | 10.6 | 11.0 | 0.37 | 0.2554 |
| b* value | 6.7 | 6.5 | 0.94 | 0.8274 |

IV. CONCLUSION

The results of this study showed higher sensitivity to stress and lower meat quality traits in slaughtered horses with lung lesions. Further research is necessary to determine the effects of presence and severity of lung lesions in slaughtered horses on biochemical indicators, growth performance and carcass and meat quality and to determine their potential causal effects.

ACKNOWLEDGEMENTS

"The study was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Contract number 451-03-47/2023-01/200143).

REFERENCES

1. Marlin, D., Kettlewell, P., Parkin, T., Kennedy, M., Broom, D., & Wood, J. (2011). Welfare and health of horses transported for slaughter within the European Union Part 1: Methodology and descriptive data. *Equine Veterinary Journal* 43(1): 78-87.
2. Padalino, B., Hall, E., Raidal, S., Celi, P., Knight, P., Jeffcott, L., Muscatello, G. (2015). Health problems and risk factors associated with long haul transport of horses in Australia. *Animals*, 5(4): 1296-1310.
3. Muscat, K. E., Padalino, B., Hartley, C. A., Ficorilli, N., Celi, P., Knight, P., Raidal, S., Gilkerson, J.R., Muscatello, G. (2018). Equine transport and changes in equid herpesvirus' status. *Frontiers in Veterinary Science* 5: 224.
4. Padalino, B., Raidal, S. L., Hall, E., Knight, P., Celi, P., Jeffcott, L., & Muscatello, G. (2016). A survey on transport management practices associated with injuries and health problems in horses. *PLoS one* 11(9): e0162371.