

The effects of supplemental lipoic acid on body weight and rectal temperature in different breeds of goats

Mohammed MH¹, Mohamed HE^{2*}, Barri MES³, Elsamani F³

¹Veterinary Care; Alnearia; Saudi Arabia

²Department of Physiology, College of Medicine, University of Al Baha, Saudi Arabia

³Department of Biochemistry, College of Health Sciences; Africa International University, Sudan

*Corresponding Authors

Name: Mohamed HE

Email: helkhider@bu.edu.sa

Abstract: The effects of supplemental Lipoic Acid (LA) on body weight, rectal temperature and mineral profile were assessed in relation to stress of transportation in different breeds of Saudi goats. Twenty-four apparently healthy goats (12 from each breed, Aardi and Hejazi) were used in this trail, which was conducted during the months of November and December, when the ambient temperature was about 16–24°C. The experimental goats; aged from 9-12 months, and weighing 33.50 to 40.50 kgs. The conditions of transport for all goats were identical. Half on goats will be treated with lipoic acid (LA) acid prior transportation, and the rest were treated with 10 ml normal saline. Twenty five mgs per ml of Lipoic acid was dissolved as the tromethamol salt and injected intravenously for three consecutive days prior transportation. Goats were transported for 12 hours, and blood samples were collected on prior transportation; 0 hr of arrival, 12 hrs post transportation, and 24 hrs post transportation. Transportation resulted in body weight loss and increase in rectal temperature in both breeds, with Aardi being less affected compared to Hejazi. Supplemental LA could prove effective in ameliorating these effects. Future studies should use different doses and at different time of the year, for instance during summer.

Keywords: Transportation; Goats; Body weight; rectal temperature

INTRODUCTION

Goats are important animal in Saudi Arabia, and mainly used for meat production. Pre-slaughter stress (transportation) is a must animal production practices, with proven alteration in blood metabolites, and with negative impact meat quality and animal welfare [1]. The possible impact on such stress on body weight loss and body temperature is evident. Different antioxidants proved effects in the melioration of the bad effects of transportation, for instance the use of ascorbic acid in racing horses. Lipoic acid, an antioxidant helps during exercise stress in horses [2]. However, to the best of our knowledge, no studies are available regarding its use, as potential antioxidant in stress conditions of farm animals. The objective of this study was to see whether supplemental LA in transportation-stressed different breeds of Saudi goats, in an attempt to help to improve goat welfare and productivity under harsh condition.

MATERIALS AND METHODS

Twenty-four apparently healthy goats (12 from each breed, Aardi and Hejazi) were used in this trail, which was conducted during the months of November and December, when the ambient temperature was about 16–24°C. The experimental goats; aged from 9-12 months, and weighing 33.50 to 40.50 kgs. The conditions of transport for all goats were identical. Half on goats will be treated with lipoic acid (LA) acid prior

transportation, and the rest were treated with 10 ml normal saline. Twenty five mgs per ml of Lipoic acid was dissolved as the tromethamol salt and injected intravenously for three consecutive days prior transportation. Goats were transported for 12 hours, and blood samples were collected on prior transportation; 0 hr of arrival, 12 hrs post transportation, and 24 hrs post transportation. The experimental protocol consisted of a two-way repeated measure analysis of variance (ANOVA) to determine the effects of sampling time, the difference between treatments, and the interaction between time and treatment.

RESULTS AND DISCUSSION

The main aim of this study was to assess the effects of transportation with or without LA supplementation on body weight and rectal temperature in different breeds of Saudi goats. Several scientific attempts have been carried out to ameliorate the stress of transportation. Studies are focusing on identifying beneficial supplements to reduce the negative impact of transportation stress on blood metabolites, for instance, the administration of Stresomix premix@ [3]; ascorbic acid to goats [4,5]. Our interest here is on the use of free radical scavengers, LA, with proven effects as a replacement of vitamin C and E in body fluids.

The current study indicated a clear breed-related difference in terms of body weight loss post

transportation, with loss was greater in Hejazi than in Aardi goats (Table 1). The weight loss was affected by the supplemental LA. Similar trend of effects of transportation was reported in goats [6], pigs and cattle [7].

Table 2 shows that rectal temperature increased with the advancement of time post-transportation, with LA reduce further increase. Similar

data were obtained in Malaysian oats [8]. In another study, using Saudi Arabian Aardi goats, rectal temperature increased significantly post transportation [9].

In conclusion, lipoic acid supplementation reduced the loss in body weight and minimizes the increase in rectal temperature in the two examined breed of goats.

Table-1: The effects of transportation stress on live weight (kg) in different breeds of Saudi goats

Time of sampling	Aardi		Hejazi		Significant		
	Saline	LA	Saline	LA	RSD	Treatment	Breed
Prior transportation	35.80	35.80	36.89	36.89	1.00	NS	NS
0.5 hr post arrival	34.90	35.70	35.60	36.01	0.89	*	*
12 hrs post arrival	34.00	35.60	34.00	35.00	0.78	*	*
24hrs post arrival	33.90	35.60	33.00	35.60	0.90	*	*

NS; not significant, LA; Lipoic acid; RSD, Residual Standard Deviation; * P < 0.05

Table-2: The effects of transportation stress on rectal temperature (°C) in different breeds of Saudi goats pretreated lipoic acid (LA)

Time of sampling	Aardi		Hejazi		Significant		
	Saline	LA	Saline	LA	RSD	Treatment	Breed
Prior transportation	38.5	38.5	38.0	37.6	0.6	NS	*
0.5 hr post arrival	39.0	38.6	40.0	38.3	0.7	*	*
12 hrs post arrival	39.6	38.1	40.1	39.0	0.6	*	*
24hrs post arrival	38.5	38.0	39.0	38.0	0.5	*	*

NS; not significant, LA; Lipoic acid; RSD, Residual Standard Deviation; * P < 0.05

REFERENCES

- Chulayo AY, Muchenje V; The effects of pre-slaughter stress and season on the activity of plasma creatine kinase and mutton quality from different sheep breeds slaughtered at a smallholder abattoir. *Asian-Australian Journal of Animal Sciences*, 2013; 26(12): 1762-1772.
- Kinnunen S, Oksala N, Hyppa S, Sen CK, Radak Z, Laaksonen DE, Szabo B, Jakus J, Atalay M; Apha-lipoic acid modulates thiol antioxidant defenses and attenuates exercise-induced oxidative stress in standardbred trotters. *Free Radic. Res.*, 2009; 43(8): 697-705.
- Amore B, Ravikanth K, Maini S, Rekhe DS; Haematological profile and growth performance of goat under transportation stress. *Veterinary World*, 2009; 2(5): 195-198.
- Nwunuji TP, Mayowa PO, Yusoff SM, Bejo SK, Salisi S, Moh EA; The ameliorative effect of ascorbic acid on the oxidative status, live weight and recovery rate in road transport stressed goats in a hot humid tropical environment. *Animal Science Journal*, 2014; 85(5): 611-616.
- Minka NS, Ayon JO; Assessment of thermal load on transported goats administered with ascorbic acid during the hot-dry conditions. *Int J Biometeorol*, 2012; 56(2): 333-341.
- Kannan G, Terrill TH, Kouakou B, Galipalli S; Blood metabolite changes and live weight loss following brown seaweed extract supplementation in goats subjected to stress. *Small Rumin. Res.*, 2007; 73(1-3): 228-234.
- Eniolorunda OO, Fashina OE, Aro OO; Adaptive physiological response to load time stress during transportation of cattle in Nigeria. *Arch. Zootec*, 2009; 58(222): 223-230.
- Zulkifli I, Bahyuddin N, Wai CY, Farjam AS, Sazili AQ, Rajion MA, Goh YM;

-
- Physiological responses in goats subjected to road transportation under the hot, humid tropical conditions. *Int. J. Agric. Biol*, 2010; 12(6): 840-844.
9. El-Badawi MA, Mohamed HE, Abudabos AM, Alhidary A, Al-Hassan MJ; The effects of transportation on antioxidative biomarkers, rectal and skin temperatures in Aardi goats. *Indian Journal of Animal Research*, 2013; 47(5): 392-396.
 10. Mudron P, Kovác G, Bartko P, Choma J, Zezula I; The effect of vitamin E on cortisol and lactate levels and on the acid-base equilibrium in calves exposed to transportation stress. *Vet Med (Praha)*, 1996; 41(3):71-6.
 11. Ralston S, Stives M; Supplementation of ascorbic acid in weanling horses following prolonged transportation. *Animals*, 2012; 2:184-194.