PERFORMANCE AND MEAT QUALITY OF WATER-RESTRICTED XHOSA GOATS SUPPLEMENTED WITH VITAMIN C

O. F. Akinmoladun[1,2*], F. Fon[3], C. Mpendulo[1], and O. Okoh[4],

[1]*Department of Livestock and Pasture Science, University of Fort Hare, Alice, South Africa*,
[2]*Animal and Environmental Biology, Adekunle Ajasin University, Akungba-Akoko, Nigeria*,
[3]*Agriculture, University of Zululand, Kwadlangezwa*,
[4]*Applied Chemistry, University of Fort Hare, Alice, South Africa*, *201821379@ufh.ac.za

I. OBJECTIVES

The continuous shortfall in rainfall patterns especially in the dry zones of the world could result in pre- slaughter stress (due to limited water intake [WI]) as well as affect the meat quality of animals. This study evaluated the effect of water restriction periods with or without single and/or multiple vitamin C (VC) supplementations on performance and meat quality of Xhosa goats.

II. MATERIALS AND METHODS

Goats (42) were distributed into 7 treatment groups in a completely randomized design: without water restriction (GI, control), water restrictions of 70% (GII) and 50% (GIII) of *ad libitum* WI, water restrictions of 70% (GIV) and 50% (GV) of *ad libitum* WI plus 3 g VC daily, and water restrictions of 70% (GVI) and 50% (GVII) of *ad libitum* WI plus 3 g VC and an extra 5 g VC given every 8 d. VC was administered *per os*. Animal adaptation was for 14 d and 75 d for data collection. Water restriction percentages were calculated based on daily *ad libitum* intake of the control group after rebating loss due to evaporation. Water restriction-70% and water restriction-50% groups did receive drinking water daily at a level of 70% and 50% of the total WI recorded in the 100%-water group, respectively. The efficiency of water use was determined by finding the ratio of WI to dry matter intake (WI:DMI). At the end of the trial, slaughtering was done following standard procedures. pH was measured in the *Longissimus lumbo- rum*) muscle between the 12th and 13th ribs, 45 min and 24 h post-slaughter. Four pieces (2 cm thick) were carefully cut from the *Longissimus lumborum* muscle of the carcass and randomly assigned for color, drip loss, cooking loss, and Warner-Bratzler Shear force determination. Meat color (lightness, *L**; redness, *a**; and yellowness, *b**) was measured after 24 h of slaughter from the *longissimus* muscle. Data obtained were analyzed using the generalized linear model of SAS (SAS Institute Inc., Cary, NC).

III. RESULTS

The depression in final weight due to water restriction was lessened following VC supplementation. The DMI decreased ($P < 0.05$) in response to water restriction levels and rose in the VC-treated groups. The WI decreased ($P < 0.05$) as the percentage of *ad libitum* water given decreased. The WI:DMI decreased ($P < 0.05$) with an increase in levels of water restriction. Regardless of VC concentration and/or supplementation, all the water- restricted groups had decreased *L** (lightness) ($P = 0.0002$) and *b** (yellowness) ($P = 0.0048$). However, the water-restricted treated groups tended to increase ($P = 0.0058$) *a** (redness) values compared to the water-restricted untreated and control groups. The drip loss, C*, pH_{45min}, and pH_{24h} were not affected ($P > 0.05$) by levels of water restriction and VC supplementation. Regardless of VC supplementation, cooking loss and shear force significantly increased ($P < 0.05$) with water restriction levels.

IV. CONCLUSION

This study demonstrates that the decreased body weight due to suboptimal WI could be lessened with daily VC supplementation. Supplementation of VC did improve meat redness (*a**), which is important to consumers when making purchasing choices. Multiple VC failed to additively improve on the positive outcomes from a single VC dosage. Despite the limited WI, the increase in meat shear force did not exceed the medium tenderness range (26.40–33.31 N/cm^2).

Keywords: goat, meat quality, performance, vitamin C, water restriction