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Vitamin E did not improve retail colour in high intramuscular fat long aged lamb meat

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Brown discolouration of lamb meat on retail display reduces consumer appeal, limiting product shelf life and value. The rate that lamb turns from red to brown increases with high intramuscular fat (IMF) content (Calnan *et al*, 2014), thus genetic selection for IMF to improve eating quality may accelerate lamb browning. Long aging of lamb also accelerates browning (Jose *et al*, 2008), a concern for exported chilled lamb that is cut for display after up to 70 days aging. Dietary vitamin E (α-tocopherol) supplementation reduces the rate of browning in short aged lamb (Jose *et al*, 2008). Thus we hypothesised that high α-tocopherol concentration in lamb *longissimus* would reduce browning during display to a greater extent in long aged and high IMF meat.

Lambs (n=132) were selected from 66 Terminal, Maternal or Merino sires with variation in research breeding values for IMF. Each sire's progeny was allocated at random to one of two treatment groups (n=66) that were fed the same ration with high or low α-tocopherol levels (275 or 30 mg/kg feed) for 8 weeks prior to slaughter at a mean carcass weight of 23 kg (± 0.3 SE). The m. *longissimus* was then sampled for IMF, α-tocopherol and colour measurement. Colour samples were aged anoxically at -1°C for 5 and 70 days before being freshly sliced, wrapped with oxygen-permeable film and placed under simulated retail display for 3 days. Meat redness was then measured 24 hourly using a Hunterlab reflectometer (reflectance at 630/580nm). Redness was analysed using a mixed linear effects model in SAS, with aging period, sire type, dam breed and gender as fixed effects; display time, IMF and α-tocopherol as covariates, and sire and dam as random terms. Non-significant interactions (P>0.05) were removed.

At an IMF of 2.5%, increasing α-tocopherol from 1 to 3mg/kg increased redness (P<0.05) after 72 hours display in 5 and 70 d aged meat by 0.79 and 0.33 units (Fig. 1a). Increasing IMF to 5.5% depressed this effect (P<0.05), with increasing α-tocopherol only increasing redness by 0.69 and 0.16 units (Fig. 1b). In either case α-tocopherol was less effective in 70 d aged meat (P<0.05). Irrespective of α-tocopherol concentration, increasing IMF from 2.5 to 5.5% reduced redness after display by 0.4 units in 5 d aged meat but by only 0.02 units in 70 d aged meat.

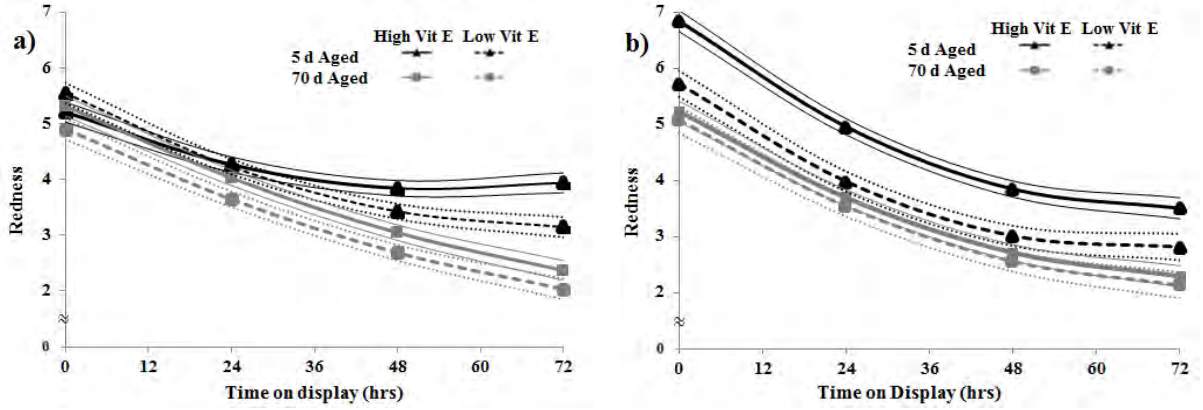

Figure 1. Effect of display time (hrs) on lamb m. *longissimus* redness. Lines represent least square means for each aging period at High (3mg/kg) and Low (1mg/kg) vitamin E in meat with **a)** 2.5% IMF and **b)** 5.5% IMF

Contrary to our hypothesis, vitamin E supplementation reduced browning less in long compared to short aged lamb *longissimus*, and had less impact in high IMF meat. IMF had little impact on browning in long aged meat, in contrast with previous work that attributed the marked negative impact of IMF in short aged lamb to increased lipid peroxidation (Calnan *et al*, 2014). While the mechanisms remain unclear, dietary vitamin E supplementation appears to be of limited use for enhancing the colour during display of long aged lamb meat.

Calnan, H. *et al.* (2014), *Meat Science* 96, p 1049 - 1057
Jose, C. *et al.* (2008) *54th International Congress of Meat Science & Technology* p 149