



## Sheep CRC Conference Proceedings

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<b>Document ID:</b>	SheepCRC_22A_13
<b>Title:</b>	Vitamin E as a dietary supplement improves sheep meat colour stability
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<b>Key words:</b>	sheep; vit E; muscle, colour

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This paper was presented at the Sheep CRC Conference 'Wool Meets Meat' held in Orange, NSW in 2006. The paper should be cited as:

Jose, C.G.; Jacob, R.H.; Pethick, D.W.; Gardner, G.E. (2006) *Vitamin E as a dietary supplement improves sheep meat colour stability* in 'Wool Meets Meat' (Editors P. Cronje, D. Maxwell) Sheep CRC pp 241-242

## Vitamin E as a dietary supplement improves sheep meat colour stability

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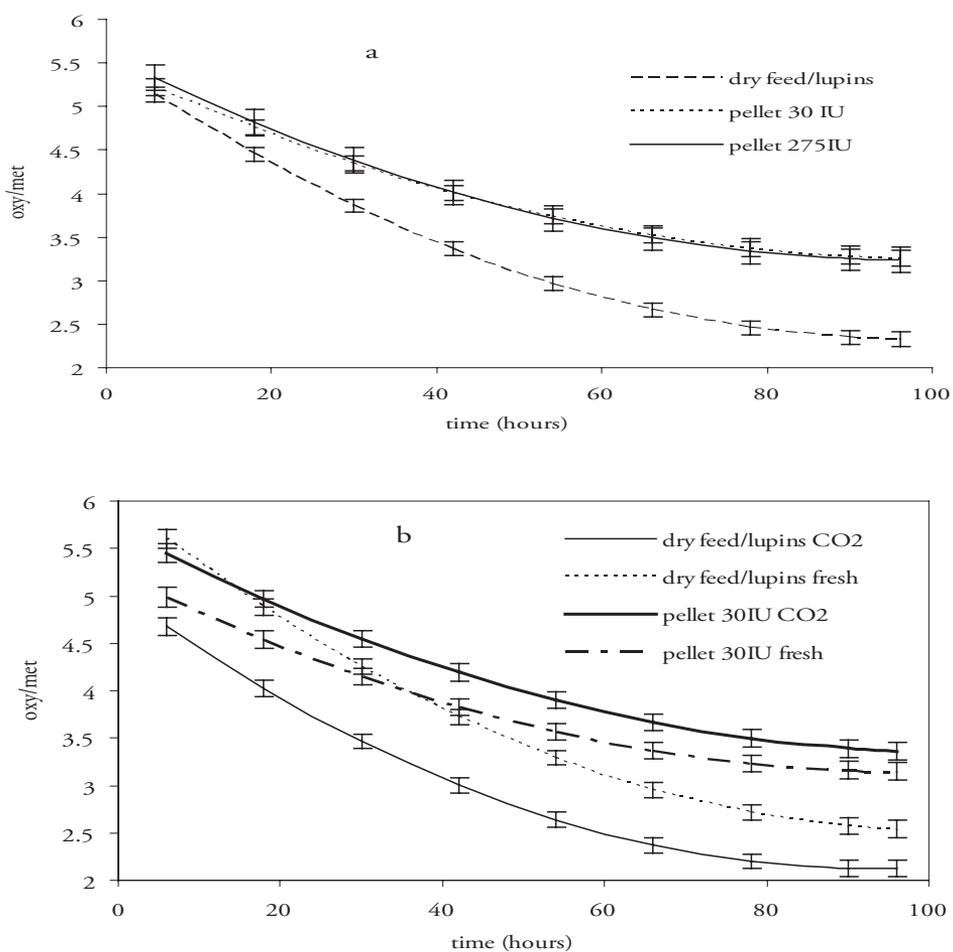
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Increasing retail shelf life from the current benchmark of 48 to 60 hours by stabilising meat colour would yield significant economic benefits to the lamb meat industry. Vitamin E (VitE) has been suggested to improve colour stability (Wulf, et al. 1995) due to its action as an antioxidant. This study investigated the influence of dietary VitE concentration with or without CO<sub>2</sub> packaging on colour stability.

Mixed sex 6–8 month old crossbred lambs with a live weight of 38.0±0.38 kg (mean±sem) grazing a dry annual pasture supplemented with lupin grain at the rate of 600g/hd/day were used for this experiment. An initial group of 10 lambs was slaughtered at a commercial abattoir. After this, 2 replicates of 6 lambs (12 per treatment group) were fed for 56 days on a pellet ration containing either 30 IU/kg or 275 IU/kg of added VitE, then slaughtered at the same abattoir as the first group. All carcasses were halved; one side was packed fresh for 5 days (fresh) and the other in CO<sub>2</sub> for 21 days (CO<sub>2</sub>), both at 2°C. At the end of these periods 5 muscles were dissected from each animal, cut into equal portions and displayed under fluorescent lights at 4°C for 96 hours. Colour measurements were made using a Hunter Lab Mini Scan XE Plus every 12 hours after the meat had been sliced and over wrapped in polyvinyl chloride wrap. Myoglobin oxidation was predicted from the oxy/metmyoglobin ratio calculated from the ratio of light reflectance at 580 and 630 nm (Hunt 1980). Data was analysed using a linear mixed effects model with display time as a covariate, diet and packaging type as fixed effects, and animal as a random term (SAS).

The decrease in the oxy/met ratio over the display period did not differ between the two pellet diets, however the dry feed/lupins diet had a much greater rate of decrease ( $P < 0.05$ ) and reached an unacceptable surface colour (oxy/met ratio = 3.5) about 24 hours earlier (Figure 1a). This may be due to lower VitE levels ( $P < 0.05$ ) in the dry feed/lupin ration resulting in plasma VitE levels of 0.36±0.097, 0.85±0.126, and 2.31±0.126mg/L for the dry feed/lupin, pellet 30IU and pellet 275IU rations respectively. These VitE levels may explain the difference observed between the response of the diets to CO<sub>2</sub> packaging, where the CO<sub>2</sub> treatment increased the oxy/met ratio in the pellet 30IU fed animals, but reduced the ratio in the VitE deficient dry feed/lupin animals (figure 1b). The pellet 275IU treatment (data not shown) did not differ from the pellet 30IU treatment suggesting that VitE supplementation above the 30 IU/kg level leads to no further improvement.

The poor colour stability of the dry feed/lupin compared to the pellet diets suggests VitE may have a threshold level where an animal deficient in VitE will have poor colour stability, this effect is particularly evident under extended CO<sub>2</sub> packaging.



**Fig. 1.** The effect of diet (a) and packaging system (b) on the predicted oxy/met ratio over display time  $\pm$  sem.

Hunt, M., 1980. Meat colour measurements. Reciprocal Meat Conference 33, 41–6.

Wulf, D. M., Morgan, J. B., Sanders, S. K., Tatum, J. D., Smith, G. C. and Williams, S., 1995. Effect of dietary supplementation of vitamin E on storage and caselife properties of lamb retail cuts. *Journal of Animal Science* 73, 399–405.