NIX® a* VALUE IS ASSOCIATED WITH CONSUMER MEAT COLOUR SCORES

M.T. Corlett[1,2], D.W. Pethick[1, 2], R.H. Jacob[3], K.R. Kelman[1], G.E. Gardner[1, 2]

[1]Murdoch University, School of Veterinary and Life Sciences, Murdoch WA 6150 Australia

[2]Australian Cooperative Research Centre for Sheep Industry Innovation, Australia

[3]Department of Agriculture and Food WA, 3 Baron Hay-Court, South Perth WA 6151, Australia

*Corresponding author email: m.corlett@murdoch.edu.au

Abstract – This study tested the association between retail colour as measured by Nix® *a and consumer perceptions of the red/brown colour of lamb meat. Lamb loin and topside meat was aged for 30 days before being sliced, overwrapped with oxygen permeable clingwrap and placed under simulated retail display conditions for 4 days. Nix® *a** scores were fitted to Nix® reading time and consumer survey times to generate the variable Pred Nix *a** with sampling error removed. Pred Nix *a** accounted for a maximum of 20% on day 4 indicating there was a weak association between Pred Nix *a** and consumer colour scores of lamb meat.**

Key Words – Lamb, color, redness

I. INTRODUCTION

Meat colour is an important attribute affecting the purchasing decision of consumers [1]. Lamb meat changes from red to brown after approximately 48 hours of retail display when in overwrap packaging. Brown coloured meat is undesirable to consumers, representing lost revenue to the lamb industry [1, 2]. Previous work with a trained panel has shown that consumer perception of lamb meat colour was associated with the *a** score, a measure of redness using a BYK Gardner Chromameter [3]. However, the measurement of meat colour depends on the optical geometry of the instrument used due to the translucency of meat [4]. The Nix® (Nix Sensor Ltd, Canada) is a relatively new colorimeter which is portable, has a small aperture (15mm) size and is lower in cost compared to the BYK Gardner Chromameter. However, the association between Nix® *a** and consumer perception of meat colour has not been tested. We hypothesised that Nix® *a** will be associated with colour perception of lamb meat by consumers under retail display.

II. MATERIALS AND METHODS

Male and female Terminal sired lambs (n = 80) from the Meat & Livestock Australia genetic Resource flock, Katanning, Western Australia were used in this study. Loin (M. l*ongissimus lumborum*) and topside (M. *semimembranosus*) samples were collected from the carcasses 24 hours post-slaughter. Samples were cut 50 mm in length, 50 mm in width and 30 mm in depth, vacuum packed, and then stored at 2°C for either 33 or 35 days. Samples were then sliced and overwrapped with oxygen-permeable polyvinyl chloride film (15µm thickness, oxygen transmission rate of 35650-46500 cc/m^2/24h). Untrained consumers (n = 294) were randomly allocated to view and score 24 meat samples on a red to brown scale (100-0). Each sample was viewed and scored by 10 consumers each day, for four days under conditions designed to simulate retail display. As Nix *a** and consumer scoring was performed at different times throughout the day, Nix® *a** scores were fitted against reading time enabling the prediction of Nix® *a** (Pred Nix *a**) at times exactly corresponding to consumer survey times. This also smooths the effect of sampling error in Nix® *a** readings. Consumer red to brown scores was analysed using a general linear model in SAS (SAS Version 9.1, SAS Institute Cary, NC, USA) with fixed effects for meat cut (loin or topside), aging period (33 or 35 days), days exposed (1-4 days), and sex of animal (male and female), with Pred Nix *a** scores included as a covariate.

III. RESULTS AND DISCUSSION

In agreement with our hypothesis there was a significant (P<0.05) association between Pred Nix® *a** and consumer colour scores. The Pred Nix *a** model accounted for 8% of the variation in consumer responses on day 1, 21% on day 2, 14% on day 3, and 20% on day 4 (Fig. 1) of retail display. This effect of time on the amount of variation accounted for could be due to the oxidation process that causes meat appear increasingly brown over time. At the beginning of the retail display period very few meat samples would have been brown in colour. Therefore, consumers may have assigned a lower score (brown) to meat that was neither red nor brown but purple due to delayed blooming. The low values could also be due to consumers perceiving the surface colour whereas and the colorimeter may be detecting a colour deeper than the bloom layer [5]. Channon *et al* (2005) found that *a** was moderately high associated with 50.7% (P<0.05) of the colour score given on a number scale (1-5) [3]. Whereas, our study found that on a continuous line the Pred Nix *a** was weakly associated to consumer colour scores with a maximum of 20% on day 4. This difference could be due to the different sampling method and colour measuring instrument. Whilst this association was relatively weak due to the variability in the data (Fig. 1), an association present. An alternative instrument with a larger aperture size may strengthen this association, representing an opportunity for further research.

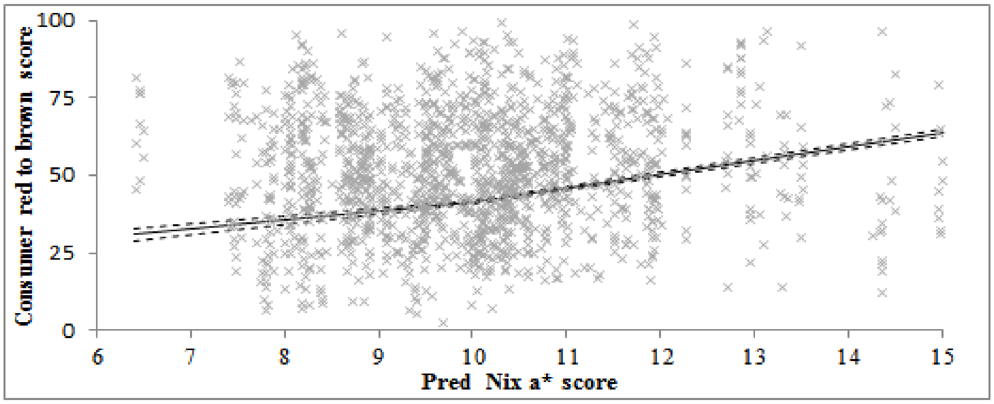

Fig 1: The association between Pred Nix *a** and consumer red to brown (100 – 0) scores on day 4. The lines represent the predicted means for consumer red to brown scores (±s.e.) and icons (◊) are the residuals from the prediction line.

IV. CONCLUSION

This study indicates that Nix® *a** scores were weakly associated with consumer red/brown scores, yet increasing with retail display time. In comparison, Channon *et al* (2005) found a moderately high correlation between consumer colour scores and the BYK Gardner Chromameter [3]. The reasons behind this difference requires further examinations to further improve the association between instrumental colour measures and consumer opinions of meat colour before use in the commercial setting. Nevertheless, with further refinement of technology the current lamb industry losses could be minimised as fewer lamb products will be discounted or minced after 48 hours of retail display. Instead, an ideal instrument could measure the surface colour of meat on display and determine whether discounting could be avoided if the meat remains an appealing red colour to consumers.

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