High dietary vitamin E and selenium improves oxidative status of finisher lambs during heat stress

S.S. Chauhan¹,², P. Celi¹,³, E. N. Ponnampalam¹,⁴, D.L. Hopkins⁵, B.J. Leury¹, and F.R. Dunshea¹

¹ Faculty of Veterinary and Agriculture Sciences, The University of Melbourne, Parkville, VIC 3010, Australia
² Department of Animal Husbandry, H.P. Shimla 171 005, India
³ Faculty of Veterinary Science, University of Sydney, Narellan, NSW 2567, Australia
⁴ Department of Environment & Primary Industries, Werribee, VIC 3030, Australia
⁵ Centre for Red Meat and Sheep Development, PO Box 129, Cowra, NSW 2794, Australia
Presentation Outline

- Introduction
- Experimental Animals
  - Selection, acclimatization and antioxidant supplementation
- Heat stress and lairage
  - Heat treatment, transportation to abattoir and pre-slaughter measurements
- Results
  - Physiological responses
  - Oxidative stress biomarkers
- Conclusions and future research
• Consumer’s decision to buy meat is strongly influenced by meat colour

• Meat discoloration is a oxidative process and is due to conversion of oxymyoglobin to metmyoglobin

• Concentration of antioxidants in the muscle has an influence on meat colour

• Availability of antioxidants in the feed is variable and affected by season

• Heat stress reduces the feed intake and affects post absorptive metabolism

• Heat stress leads to oxidative stress and may compromise meat colour and lipid stability
Imbalance between oxidants and antioxidants

- Excessive production of free radicals
- Deficiency of antioxidants
- Failure of antioxidant system of body

Reactive Oxygen Species (ROS) include: $O_2^-$, $OONO^-$, $OH^-$
Vitamin E and selenium supplementation at supranutritional doses reduce the negative effects of heat stress and may improve the oxidative status of lambs finished under hot conditions.
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Experimental animals

Selection and acclimatization

Antioxidant feeding

Doses of Vit E and Se for control (CON), moderate (MOD), and supranutritional (SUP) diets were 27.6, 130, 227.5 IU/kg DM and 0.16, 0.66, 1.16 mg/kg DM, respectively.
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## Heat stress
Temperature: 28-40°C (0900-1700 hrs)
Relative Humidity: 35-26%
Temperature Humidity Index: 74-86

## Thermoneutral
Temperature: 18-21°C (24 hrs)
Relative Humidity: 35-50%
Temperature Humidity Index: >72
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Supranutritional dose of vitamin E and Se improves feed intake and average daily gain of lambs.
Vitamin E and Se reverses effects of heat stress on respiration rate and rectal temperature of lambs.
Supranutritional dose of vitamin E and Se improves oxidative status of lambs
Lairage helps to normalize the respiration rate and rectal temperature of lambs finished under hot conditions.
Supranutritional dose of vitamin E and Se reduces plasma ROS levels and maintains the BAP of lambs in lairage.
Supranutritional dose of vitamin E and Se reduces plasma AOPP levels of lambs during lairage.
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Conclusions and future research
• High dietary vitamin E and selenium improves the feed intake and average daily gain in lambs finished on pellet feeding

• High dietary vitamin E and selenium improves the oxidative status of lambs finished under hot conditions

• Holding lambs in lairage under TN conditions following finishing under hot conditions, help to normalise their physiological responses
Future research

• Effects of heat stress and high vitamin E and Se supplementation on meat colour stability and shelf life of lamb meat

• Feeding systems to optimize the incorporation of Vitamin E and Se in lamb muscles

• Pasture finishing or grain based pellet finishing with high antioxidant supplementation
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Thanks for your attention