

Selenium Supplementation Increases Wool Growth and Reduces Faecal Egg Counts of Merino Weaners in a Selenium Deficient Area

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Gastrointestinal parasite infections are a major cause of production losses in sheep in Australia (Sackett et al 2006). The control of gastrointestinal parasites needs to adopt a more strategic approach that involves the integrated employment of control measures that will reduce the reliance on anthelmintics and that will slow the development of anthelmintic resistance. Little attention has been placed on the influence of trace elements on the susceptibility of the host to parasite infection. The role of selenium is of particular relevance as a number of areas across Australia have been identified as selenium deficient areas. Sheep that graze in these areas are more susceptible to diseases and infection due to immunodeficiencies. A gap exists in the role of selenium in helping sheep to resist to parasite infection. The aim of the present study was to investigate the influence of selenium supplementation on the impact of gastrointestinal parasites and production performances in weaned Merino sheep reared in a selenium deficient area.

At weaning, 208 Merino wethers were assigned to two groups: control (CTRL) and treatment (SEL). The treatment group was injected with 0.5 ml of Deposel, a slow release selenium injection. Liveweights (LW), blood and faecal samples were taken at 6 weeks intervals over a 24 week period. Plasma was separated by centrifugation and stored at -80 C. Commercial kit was used for the determination of glutathione peroxidase (GSH-Px) activity (Cayman, Glutathione Peroxidase Assay Kit, Sapphire, NSW, Australia). The faecal samples were collected directly from the rectum of individual sheep and faecal egg counts (FEC) were counted within 24 hours of collection using the modified McMaster method. At the end of the trial the animals were shorn and greasy fleece weight (GFW) and fibre diameter (FD) measurements were taken. The SEL group had significantly higher ($P<0.01$) LW compared to the CTRL group at weeks 6, 12, 18 and 24. There was a significant difference ($P<0.05$) in GFW between the SEL and CTRL group, 2.93kg and 2.75kg, respectively. The mean FD for the SEL group was not significantly different from that of the CTRL group with mean FD values of $15.9 \pm 0.11 \mu\text{m}$ for SEL group and $15.6 \pm 0.09 \mu\text{m}$ for CTRL group. A significant effect of the interaction between time of sampling and treatment ($P<0.001$) was noted with the SEL Group presenting lower FEC values on Weeks 6, 12 and 24 than the CTRL group. As expected, the SEL group had significantly ($P<0.001$) higher plasma GSH-Px activity compared to the CTRL group.

The SEL group had elevated levels of GSH-Px over the 24 week trial period while GSH-Px activity in the control group remained low; this indicates that Deposel treatment was able to successfully increase selenium status in Merino weaners. Selenium supplemented sheep had lower FEC than the unsupplemented counterparts, which suggests the selenium status of sheep may influence the rate of acquisition of resistance to parasitic infection. Since selenium plays such an important role in antioxidant defence and immune function it was expected that the SEL group would present significantly lower FEC. A negative correlation between FEC and GSH-Px was noted at Week 24 ($P<0.001$; $r=0.41$) suggesting that an increase in GSH-Px activity may reduce parasitic infection. However as the correlation was not very strong it is likely that selenium status is not the only factor responsible for the development of resistance to gastrointestinal parasites in Merino weaners. Selenium supplementation had a positive influence on GFW without significantly increasing FD; this is extremely important for fine wool producers since price penalties are received for a higher FD. It is expected that GFW would increase with increased LW as seen in this study. Indeed LW was positively correlated ($P<0.001$; $r = 0.59$) with GFW. In conclusion, selenium supplementation in weaned Merino sheep reared in a selenium deficient area could increase the LW and GFW of the young sheep while perhaps reducing the level of parasitic infection. Further research is still required to determine the potential of selenium supplementation as an integrated management programs in the control of gastrointestinal parasitism.

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Sackett D., Holmes P., Abbott K, Jephcott S. and Barber M. (2006). Meat and Livestock Australia Ltd. Sydney, Australia.

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