Effect of a trace mineral injection before joining and lambing on conception rate, marking rate and lamb weights in diverse farms in Victoria

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Optimum trace mineral (TM) status in ruminants is essential for conception rate and the survival of the offspring by preventing oxidative stress and improving immunity (Suttle 2011). The benefits of TM supplementation in the lead up to high demand periods, such as pregnancy and calving, has been demonstrated in cattle (Sales *et al.* 2011, Machado *et al.* 2014). However, scarce data are currently available in sheep. We hypothesise that TM supplementation would increase conception rates of ewes and lamb survival.

This study was conducted in five commercial farms across Victoria, Australia, between September 2018 and November 2019, trace mineral status in ewes was within normal ranges before joining. Ewes (n =1485) were randomly allocated to receive either nil treatment (Control) or two injections of a TM product containing zinc (40 mg/mL), manganese (10 mg/mL), selenium (3 mg/mL), and copper (10 mg/ mL); 1 mL per 50 kg BW (Multimin® plus Copper for Sheep, Virbac (Australia) Pty Ltd) 30 days before the start of joining and 30 days before the start of lambing. Approximately 90 days after joining, pregnancy status and conception rate were determined by ultrasound. Marking rate was determined approximately four weeks after the end of lambing, and lamb weights were determined at weaning (12 weeks after the end of lambing). Data for lamb marking and lamb weaning weights were not available for farms E and D, respectively. Weaning weight data were compared using parametric ANOVA (both within and across all farms) and Spotfire S+ while conception, marking and weaning rates were compared (within and across farms) using the Test Based Method and MedCalc. Significance was defined as $P < 0.05$.

Treatment did not affect conception rate. Across all farms, the average conception rate was 156 ± 11.0 % ($P > 0.05$). Marking rate of treated ewes was 9 % higher than non-treated ewes (95 % Confidence Interval 3 - 21 %). Lambs born to treated ewes were heavier at weaning than lambs born to non-treated ewes (2.31 kg; $P < 0.001$). Overall, there was between 0.75 and 4.27 kg benefit to weaning weight with TM treatment (Table 1).

Table 1. Marking rate and weight at weaning of lambs born to ewes treated with Multimin® plus Copper for Sheep and control ewes

Farm	A	B	C	D	E	ALL
Marking Rate						
Lower 95% CI	9%	10%	-39%	-18%	NA	3%
Point Estimate (Multimin® plus Copper for Sheep - Control)	**17%**	**16%**	**-10%**	**8%**	NA	9%
Upper 95% CI	43%	42%	19%	34%	NA	21%
P-value	0.193	0.236	0.503	0.525	NA	0.144
Weaning Weights						
Lower 95% CI	3.14	-0.30	0.26	NA	0.01	1.43
Point Estimate (Multimin® plus Copper for Sheep - Control)	**4.27**	**0.75**	**1.94**	NA	**0.95**	2.31
Upper 95% CI	5.39	1.80	3.62	NA	1.89	3.18
P-value	<0.001	0.158	0.024	NA	0.047	<0.001

NA; data not available

These results suggest that increasing the TM status in ewes with the use of an injectable TM supplement before joining and lambing can improve lamb survival and lamb weight in some farms. These can be direct consequences of the role of TM on immunity and health by reducing oxidative stress and by enhancing innate and acquired immunity (Hefnawy *et al.* 2008, Suttle 2011, Machado *et al.* 2013). Differences in management and animal husbandry cannot be negated and might explain differences among farms. Importantly, benefits were observed in farms that have not had clinical signs of TM deficiency. These results help to understand TM supplementation for animal health and performance beyond the treatment of deficiencies. Further analysis will be conducted to demonstrate the economic benefits of this method of TM supplementation in sheep.

References

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