

Improving twin lamb survival in Merino lambs by maternal melatonin supplementation in the second half of pregnancy

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The death of approximately 17 million lambs annually in Australia (Young *et al.* 2014) is a major welfare concern and costs the industry an estimated \$540 million per annum in lost production (Lane *et al.* 2015). The greatest risk factor for neonatal mortality is birthweight. Low birthweight, common in twin lambs, reduces the neonate's thermogenic capacity, thus increasing the risk of mortality from hypothermia (Dwyer and Morgan 2006). Twin lambs are also at far greater risk of intrapartum hypoxia from prolonged or traumatic parturition, leading to impaired neuro-motor activity post-birth (Dwyer 2003). Maternal melatonin supplementation can potentially increase birthweight by improving utero-placental hemodynamics, thereby increasing oxygen and nutrient delivery to the conceptus (Thakor *et al.* 2010). Additionally, melatonin offers neuroprotectant qualities mediated by cerebral antioxidant and anti-inflammatory actions (Aridas *et al.* 2018). We therefore tested the hypothesis that supplementing ewes with melatonin would increase fetal growth and neonatal lamb survival. From day 80 of gestation until parturition twin-bearing Merino ewes were supplemented with either melatonin via subcutaneous 18 mg Regulin® implant (Mel-Imp, $n = 62$); 2 mg gel capsule fed daily (Mel-Fed, $n = 74$) or received no exogenous melatonin (Con, $n = 68$). Ewes were intensively monitored during parturition and a series of measurements were taken from lambs post-partum at 4 and 24 hours (liveweight, rectal temperature, serum IgG), 72 hours, 7 days, marking (6 weeks) and weaning (3 months) (liveweight). Lamb weight did not differ between treatments at any age (each $P > 0.05$). Melatonin supplementation tended to increase the proportion of lambs surviving from birth to weaning: Mel-Fed (85.5%); Mel-Imp (85.9%) and Con (72.9%; $P = 0.078$). Survival of first-born twins did not differ between treatment. Within second-born twins, survival to weaning was higher in Mel-Fed than Con ($P = 0.023$), with a similar trend for greater survival in Mel-Imp than Con ($P = 0.068$) (Figure 1).

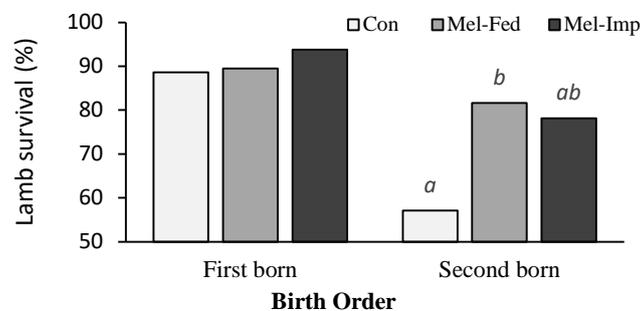


Figure 1. Effect of maternal melatonin supplementation on cumulative twin lamb survival from birth to weaning within birth order (values with different scripts vary significantly).

These early outcomes suggest maternal melatonin supplementation in the second half of pregnancy has the potential to improve weaning rates by reducing the mortality of second born twin lambs. Further larger studies are underway to assess the impact on lamb survival in commercial settings.

References

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