

Pain in response to mulesing Merino lambs can be detected through facial action units, activity and time spent with dam

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Recent studies have shown that pain can be identified in lambs following husbandry procedures through behavioural observations such as posture, gait and the way an animal lies down (Grant 2004, Inglis *et al.* 2019). There is emerging evidence that pain can also be measured using assessments such as facial expression, activity, time spent with dam and time taken for lambs to identify their dam after lamb marking (Grant 2004, McLennan *et al.* 2016). The current study tested the hypothesis that facial action units, activity of lamb and time spent with dam can be used to assess the efficacy of treatments to mitigate pain following mulesing.

Details of the experiment have been described by Inglis *et al.* (2019). Merino lambs ($n = 120$) were allocated to one of six treatments at approximately 8 weeks from the start of lambing when lambs were mulesed; (1) lambs that were not mulesed, or lambs that were mulesed and (2) offered no pain relief, (3) administered meloxicam 15 minutes before mulesing, (4) administered Tri-Solfen®, (5) administered a combination of meloxicam 15 minutes before mulesing and Tri-Solfen® or (6) administered meloxicam at mulesing. Treatments were replicated within four plots. Facial action units were measured at 1- and 5-hours post-mulesing. Ear position (front and side) and orbital tightening was scored as per McLennan *et al.* (2016). A total pain score out of 6 was determined by adding the individual scores for each of the three facial action units. Activity and time spent with dam were measured using activity monitors (Sohi *et al.* 2017). All statistical analyses were performed using GENSTAT. Total facial action units, activity, time spent with dam and time to mother up post-mulesing were analysed using the method of restricted maximum likelihood. The fixed effects were treatment, time of measurement (where applicable), lamb rear type, lamb sex and interactions thereof. Random effects included plot, lamb (nested within plot) and measurement period (where applicable, nested within lamb within plot) along with observer and ewe source.

Lambs that were not mulesed had significantly lower total facial action unit pain scores at 1- and 5-hours post-mulesing compared to lambs that were mulesed without pain relief (Table 1). There were no differences in total facial action unit scores at 1- and 5-hours post-mulesing between lambs mulesed with or without pain relief. Sex and rear type had no effect on total facial action unit scores between treatments. Over the period of 3 to 8 hours post-mulesing, the activity of lambs in the Control group was 70% to 180% higher during each hour compared to the activity of lambs that were mulesed with no pain relief. However, there was no difference in activity between lambs that were mulesed with or without pain relief. Lamb rear type had no effect on the activity of lambs on the day of mulesing. However, the activity of the female lambs was 10% to 45% higher during each hour compared to the activity of the male lambs ($P < 0.001$). Lambs that were not mulesed spent more time with their dam during the first 8 hours post-mulesing compared to lambs that were mulesed with or without pain relief (36 min/h vs 27 min/h; $P < 0.001$). Regardless of treatment, time spent with dam was greater for female lambs compared with males (35 vs 30 min/h; $P < 0.001$) and for singles compared with twins (35 vs 31 min/h; $P < 0.001$).

Table 1. Average total facial action pain scores at 1- and 5-hours post-mulesing for lambs that were not mulesed (Control) and lambs that were mulesed and administered no pain relief (Placebo).

Time post-mulesing (h)	Control	Placebo	P-value	LSD
1	0.73	2.20	<0.01	1.242
5	0.22	1.66	<0.001	1.317

These results demonstrate that facial action units, activity of the lamb and time spent with dam were effective measures of pain in response to mulesing in Merino lambs. However, these measures were not able to detect the differences in pain between lambs administered the combination of meloxicam and Tri-Solfen® compared to lambs mulesed and offered no pain relief that were observed using posture and gait by Inglis *et al.* (2019). These findings highlight that further research is required to provide clear evidence that pain relief options for husbandry procedures such as mulesing provide repeatable and effective pain mitigation for lambs.

References

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Acknowledgements: This work was funded by Boehringer Ingelheim and Murdoch University