

Optimum local anaesthetic administration techniques for analgesia of antlers

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Abstract

In the National Velveting Standards Body (NVSB) “Velvet Harvest Programme” manual the description and compliance standards for the administration of local anaesthetic (LA) to produce analgesia of the velvet antler pedicle for velvet removal are non-specific. A ring block is recommended but any variety of nerve block and/or ring block is permitted. The manual recommends an “appropriate” dose for a ring block without specifying a dose rate. Independent observations found that as little as 5 ml of 2% lignocaine hydrochloride per pedicle has been used in practice. For regional blocks, a recommendation of 5 ml per site is given. Audits of the velveting scheme have shown incomplete analgesia in some cases. Wilson *et al.* (1999a) tested three dose rates for a ring block and four for nerve block techniques in spikers. The “high” dose ring block (1.25 ml/cm pedicle circumference) was superior to all other methods. That study also suggested that the required wait time of four minutes could be reduced to two or possibly one minute. Before standards in the “Velvet Harvest Programme” manual (revised version 1998) could be altered, the NVSB required that those observations would need verification in adult stags. This paper presents results of a study of behavioural responses after a “high” and “low” dose ring block and a “high” and “low” site nerve block for the antlers of adult stags.

In the first experiment, 50 red deer stags two years of age and older on a commercial deer farm had antlers assigned to one of four treatments ($n = 25$ antlers per treatment). They were given 2% lignocaine hydrochloride as follows: “high” dose ring block (1 ml/cm pedicle circumference), “low” dose ring block (0.4 ml/cm pedicle circumference), “high” regional and “low” regional nerve blocks (Wilson *et al.* 1999a) including auriculopalpebral nerve block. Physical restraint was used. An electrical stimulation test was applied at 1 minute intervals after LA administration, and behavioural responses recorded. When no response was observed a test sawcut was applied and if no response occurred, the antler was removed. Twenty-four of 25 antlers given the “high” dose ring block and 21 of 25 antlers given the “high” regional block could be removed at 2 minutes. At least one animal still responded 4 minutes after all but the “high” dose ring block treatment. Differences between “high” and “low” ring block, and “high” and “low” nerve block groups were statistically significant ($p < 0.05$) at some time intervals.

In a second experiment, two sets of five first cut and 25 regrowth antlers were cut 1 and 2 minutes, respectively, after administration of a “high” dose ring block. After 1 minute, 6 of the 30 deer responded and after 2 minutes, 1 of 30 responded ($p = 0.051$).

These results, when combined with earlier observations of Wilson *et al.* (1999a,b), demonstrate that the most reliable method for local anaesthesia of the antler is the “high” dose ring block. Data also showed the wait time to removal can be reduced to 2 minutes without additional welfare cost to the animal, provided the contingency plan as described by the “Velvet Removal Programme” is implemented i.e. that if there is any response, cutting ceases, and a further wait time is allowed and/or additional analgesic administered.

The authors propose that compliance standards in the “Velvet Removal Programme” be modified to prescribe that the “high” dose ring block be the only approved LA technique and that the wait time be reduced to 2 minutes. This would have a positive effect on the wellbeing of stags during velvet antler removal.

Key words. deer, velvet antler, antler removal, local anaesthetic, ring block, regional block

Introduction

A previous paper (Wilson *et al* 1999a) reviewed the specifications in the National Velvetting Standards Body (NVSB) Velvet Removal Programme Training Manual (1998). That paper proposed that inclusion of more specific compliance standards into the Velvet Removal Programme manual would improve the reliability and repeatability of analgesia which is evaluated at annual veterinary supervisory visits and audits. This would reduce the net welfare cost of velvet antler removal currently defined by audits of the Velvetting Scheme. A subsequent paper (Wilson *et al* 1999b), described the effectiveness of seven techniques for achieving analgesia using 2% lignocaine hydrochloride in 1-year-old stags. Those data demonstrated that a high dose ring block (1.25 ml/cm pedicle circumference) was the most reliable method for achievement of analgesia. They also showed that the wait time could be reduced to two, and possibly one, minute if that technique was used. Regional blocks were less effective than the high dose ring block, although the high site regional block including the auriculopalpebral nerve was reasonably effective when a longer wait period was applied.

These data were presented to the NVSB along with the recommendation that only a high dose ring block be permitted and that the wait time be reduced to 1-2 minutes. The latter would encourage farmers to use physical rather than chemical restraint because of improved time efficiency. After deliberating, the NVSB proposed that further data be collected on various techniques for local anaesthetic administration in adult deer, before more specific compliance standards could be incorporated into the Velvet Removal Programme manual. A significant consideration was that under the terms of the National Animal Welfare Advisory Committee "Code of Recommendations and Minimum Standards for the Removal of Antlers from Stags", the Chief Veterinary Officer is required to approve techniques for analgesia. If restrictions were to be applied they would need appropriate scientific evaluation.

This paper presents data on the effectiveness of various local anaesthetic administration techniques in adult stags. It then amalgamates data from adult and 1-year-old stags, and proposes a series of specific recommendations limiting the techniques permitted for local anaesthetic administration for analgesia of the antler for the purpose of velvet antler removal.

Materials and Methods

The materials and methods used in this study are described in detail by Wilson *et al.* (2000)

This study was conducted on a Manawatu Commercial red deer farm comprising 60 stags 2 years of age and older. Stags were managed on pasture and were subjected to normal farming practices throughout the study. The research methodology used was similar to that described by Wilson *et al* (1999b).

In Experiment 1, an electrical stimulus was used to test analgesia before the antler was cut. Antlers from 50 red deer stags 2 years of age and older were allocated to 4 local anaesthetic (2% lignocaine hydrochloride) treatment groups ($n = 25/\text{group}$) as follows: a "high" dose ring block (1 ml/cm pedicle circumference), a "low" dose ring block (0.4 ml/cm pedicle circumference) and "high" and "low" site regional nerve blocks both including the auriculopalpebral nerve (5 ml per site). An electrical stimulus (Wilson *et al*, 1999b) was applied before administration of local anaesthetic, and 1 minute afterwards, and again at 2, 3 or 4 minutes after application, depending on whether analgesia had been demonstrated by lack of behavioural response. When no response was observed most deer were subjected to a test of non-specific reaction to the sawing process, by holding a piece of wood against the antler, and applying a saw cut to it. Animal responses were recorded. A saw cut was then applied to the lateral part of the antler to test for analgesia. Then, if no response was observed the antler was removed. If the animal responded to the test cut, a further wait time was applied, or if 4 minutes were reached, more analgesic was administered, before antler removal.

In Experiment 2, 10 first cut and 50 regrowth antlers were given either a “high” dose ring block as above and tested as above with a saw-cut before antler removal after 1 minute ($n = 30$) or 2 minutes ($n = 30$). If no response occurred, the antler was removed. If a response occurred, further 1-minute wait periods were applied. The antler was removed if no response occurred.

Chi-squared or Fischer Exact tests were used as appropriate to analyse differences in numbers of deer responding at each time interval.

Results

Full details of results are published elsewhere (Wilson *et al.* 2000). The number of deer responding to electrical stimulation and cutting of antler at each time interval after local anaesthetic administration is presented in Table I.

After 2 minutes the antler was removed from 24 and 21 of the 25 “high” ring and “high” regional block groups had velvet antler removed, respectively, compared with 20 and 15 of the 25 “low” ring and “low” nerve blocks, respectively. The effects of the “high” and “low” dose ring blocks were significantly different after 3 minutes ($p=0.05$), and the “high” and “low” nerve blocks were significantly different ($p<0.01$) after 1 minute. In all but the “high” dose ring block group, at least one stag required further local anaesthetic administration after 4 minutes.

The cutting of wood held against the antler resulted in behavioural responses in 4.8% of stags.

In Experiment 2, 24 of 30 antlers were cut 1 minute after a high dose ring block, whereas 29 of 30 were cut 2 minutes after LA administration ($p=0.051$).

Discussion

The treatments chosen for this study were “high” and “low” dose ring blocks and “high” and “low” site regional blocks with the auriculopalpebral nerve block included, to provide a range for comparison, based on observations of Wilson *et al.* (1999b). The dose rate chosen for the “high” ring block was 1 ml per centimetre pedicle circumference compared with 1.2 ml average for the previous study (Wilson *et al.*, 1999b), while the lower dose rate of 0.4 ml/cm circumference was the same as for the previous study. This range was chosen because anecdotal information suggested this equated to the extremes of LA usage in practice. Pedicle circumference ranged from 13 to 23 cm, giving a LA volume range from 5.5 - 23 ml/antler.

These results show that, in general terms, the effectiveness of various analgesia administration techniques in adult deer was similar to that demonstrated in yearling deer. Thus, a high dose ring block (1 ml/cm pedicle circumference) is effective in producing analgesia sufficient for velvet antler removal in approximately 97% of stags of any age after a 2-minute wait period, when results of this and the previous study (Wilson *et al.*, 1999b) were combined.

These data suggest that the alternative technique of a high site regional block, including the auriculopalpebral nerve site was almost as effective provided a wait time of 4 minutes was applied.

This study also confirmed that a proportion (4.8%) of deer responded to a wood cut test (Wilson *et al.*, 2000) which examined the possibility that some movements by the stag during velvet antler cutting may be associated to stimuli other than pain. This is an important observation to the Velvet Harvesting Programme audit and assessments, since if the criteria for non-achievement of analgesia is behavioural response of the stag, thus it may be expected that the audit or assessments would never show a 100% compliance, regardless of the effectiveness of the analgesic technique, because of non-specific movements. Combining data from this and the previous observations (Wilson *et al.*, 1999b) suggests between 3-5% of stags may respond non-specifically.

Table I. Number of deer responding to electrical stimulation and cutting of antler at each time interval after local anaesthetic administration (n = 25/group).

Treatment	No. responding to electrical stimulation				Cutting antler					
	1 min	2 min	3 min	4 min	1 min	2 min	3 min	4 min	> 4 min	
					No cut responding*	No cut responding*	No cut responding*	No cut responding*	No cut**	
1 "High" dose ring block	7	1	0	0	18	1	6	0	1	0
2 "Low" dose ring block	10	5	5	4	15	1	5	0	1	0
3 "High" nerve block	7	4	2	1	18	1	3	0	2	1
4 "Low" nerve block	16	9	7	7	9	4	6	0	2	3

* Not cut at that time A further 1 minute wait time applied ** Cut after additional LA administration

The authors believe that the consistency of patterns between this and the previous study provides reasonable evidence upon which recommendations for the most appropriate local anaesthetic administration technique can be made for all ages of stags. These recommendations are:

- That the dose rate for 2% lignocaine hydrochloride be specified as a minimum of 1 ml/cm pedicle circumference if a ring block is to be applied and 5 ml per individual injection site if a regional block is to be applied,
- That where a ring block is applied, the number of injections should equal or exceed the pedicle circumference (cm) divided by the length of the needle used (cm),
- That the techniques approved by the Chief Veterinary Officer upon the recommendation of the NVSB for incorporation into the Velvet Removal Programme manual be
 - a “high” dose ring block with a minimum wait period of 2 minutes
 - a “high” regional nerve block site with auriculopalpebral nerve block with a minimum wait time of 4 minutes,
- That the evaluation criteria for achievement of analgesia be modified to take into account a 3-5% rate of non-specific reactions to the antler removal process.

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