final report

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Numnuts for cattle: Proof of concept study

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Method

Animal work was carried out at Moredun Research Institute, Midlothian, Scotland, during August 2015.

Forty eight entire Holstein Friesian male weaned calves approximately 13 weeks of age (min 11 weeks, max 17 weeks on 17th August) were bought-in from regional dairy farms in early August 2015 and group housed in large straw-bedded, 12 metre X 4 metre pens. Space allowance was as per Home Office requirements. They were fed hay ad libitum and a coarse mix cereal calf ration twice daily. Access to drinking water was continuous.

During an approximately 2-week acclimatisation period they were accustomed to wearing a coloured collar and a coloured tail bandage for identification purposes.

Calves were weighed approximately 10 days before the start of the experiment and randomly assigned to one of three groups although groups were balanced for bodyweight. On the day of weighing the average weight was 91Kg (median 94 Kg) and the range was 45 to 130 Kg. Two calves were found to each have only one descended testicle and both of these animals were assigned to the Handled Control group.

There were sixteen calves in each treatment group (Handled Controls, Band with no analgesia, Band with 10 ml Lignocaine 2% centrally injected between the two spermatic cords proximal to the band) which accounts for the total of 48 calves. However, the Handled Control calves were re-used throughout the experiment to make up a 4th treatment group (Band + 2 LA) where a band was applied and 5ml of 2% lignocaine injected carefully into each spermatic cord proximal to the band. The two cryptorchid calves were excluded, so n = 14 in this group.

The local anaesthetic used was 2% Lignocaine without adrenaline (Lignocaine 20, Troy Laboratories) produced in Australia and dispatched by our partners there to maintain pharmaceutical consistency. Partially used bottles were discarded after approximately 24 hours.

On the day of treatment, 4 calves (one from each of the 4 treatment groups although this was not possible for the first two batches treated as the Handled Controls had first to be used in this role before subsequently populating the Band + 2LA group, and towards the close of the experiment there would be no Handled Controls left) were identified by their ear tags and moved into the Treatment pen which was between the housing pen and the pen set up for filming (Release pen; 6 metres X 4 metres). Both of these pens were also straw-bedded. The ‘acclimatisation’ collars and tail bandage were removed and the appropriate colour – coded neck collar (KVIKK) and tail bandage (non-adhesive, stretchy ‘Vetwrap’) were put on (colour was randomly chosen and not indicative of treatment) so that the calf would be easily identified on film. Care was taken not to apply the tail bandage tightly. These animals were then left while the same preparatory procedures were applied to a second group of 4 calves on the other side of the passageway where there was a similar accommodation pen, treatment pen, Release pen (filming) set-up.

The 4 calves in the first treatment pen were then observed for signs of irritation or annoyance from the tail bandage or collar. No adjustments were ever necessary. One calf was then restrained, a halter applied and the calf was then cast using Reuff’s method. Once recumbent, additional ropes were attached to the pelvic limbs

by hitches and the limbs abducted and restrained. Handled controls were released after handling of the scrotum. Calves in the other treatment groups had the treatment administered and were then released. The four calves were released individually on completion of the treatment into the Release pen for filming of behaviour.

Calves to be castrated had a standard band (LG-Bands) applied to the neck of the scrotum after ensuring that both testes were present in the scrotum, using a standard tri-pronged applicator (LG-Bander). The applicator tool and bands used were appropriate for the weight range of the calves as per the manufacturer's recommendations. Both had been sent by CSIRO colleagues experienced in their use.

Calves which were to receive analgesic treatment were then injected immediately proximal to the band (i.e. on the body side between the band and the abdomen, with 10 ml of 2% Lignocaine using a 10 ml syringe and a 20 gauge 1" needle.

Calves in the Band LA group had the entire volume injected centrally in the neck of the scrotum. The needle angle of attack was as far as possible at right angles to the scrotal neck in its normal orientation, parallel to the long axis of the body. The needle was inserted up to the hilt in an attempt to ensure the site of deposition of the local anaesthetic was neither too shallow nor too deep but in the middle of an imaginary cross-section of the scrotal neck.

Calves in the Band + 2LA group had 5ml LA injected into each spermatic cord. Each cord was trapped between thumb and forefinger against the lateral limits of the scrotal neck, thus immobilising it for injection. Care was taken to try to ensure the lignocaine was deposited accurately in the lumen of the cord.

After treatment and release into the dedicated behaviour recording pen, the behaviour of the calves was digitally recorded by HD cameras situated in elevated positions at each corner of the pen. The entire pen was in the field of view of each camera. Behaviour was recorded for a minimum of 3 hours but sometimes longer. The recording pens were screened off from the central passageway in order to minimise any effect of the presence of research staff during checks and procedures. Research staff left the building once both treated groups were in their respective recording pens.

At the end of each day's filming the bands were cut off the calves as per Home Office Inspectors request in order to reduce any prolonged pain or discomfort.

This footage was downloaded to an external hard drive post trial, and delivered to CSIRO, Armidale for Behavioural analysis. Due to a technical malfunction, although 62 calves were treated during animal trials, video footage was only available for 46 calves (Table 1).

Table 1: Treatments and replicates

Code	Description	Replicates
H	Handled only	10
B	Band	12
B LA	Band plus 10 ml LA injected centrally above the band	12
B + 2 LA	Band plus 5 ml injected very carefully into each cord above the band	12

Analysis and interpretation of the animal behaviours was conducted by CSIRO and reported. This report is embargoed for commercial in confidence reasons and will be reconsidered for publication in May 2018.