

Improving welfare of cattle housed in a high-containment facility using behavioural analysis

Joe Garthwaite



| Laila Al-Adwani



| Aimee Bainbridge



The Pirbright Institute, Ash Road, Pirbright, Woking, GU24 0NF UK. Tel: +44 (0)1483 232441. www.pirbright.ac.uk Email: Joseph.garthwaite@pirbright.ac.uk, Laila.al-adwani@pirbright.ac.uk or aimee.bainbridge@apha.gov.uk

Introduction

Animal behaviour is an observable measure of the effects the external environment has on an animal. The relatively non-invasive nature of behavioural analysis minimises the influence of human presence. Appropriate acclimatisation to a novel experience or environment is an important refinement technique adopted by animal research facilities to improve welfare.

Miguel-Pacheco *et al.* (2014)¹ used CCTV to investigate the impact of cattle lameness on eating and milking behaviour. They found lame cattle fed less and volunteered themselves less frequently for milking compared to their able-bodied conspecifics suggesting lameness impacts behaviour and willingness to be milked. Using human observation, Temple Grandin (2010)² demonstrated habituating naïve antelope and bison to restraint crates and regulated procedures (e.g. blood sampling) improved handling and reduced cortisol levels as the animals were overall calmer and less flighty. Through habituation, Grandin was able to improve the animal's welfare during regulated procedures by reducing the overall stress caused by the restraining process.

The Pirbright Institute (TPI) has been trialling the use of behavioural analysis through CCTV usage and human observation to measure cattle acclimatisation to a high-containment SAPO4 facility.

Phase 1: Observation

Objective: To determine the length of time needed for acclimatisation by analysing the voluntary entry rate of cattle into yokes recorded through human observation.

- During phase one, 17 cattle were yoked (see figure 2.) in the morning over 12 days as part of the feeding routine, 7 of those were additionally yoked in the afternoon.
- Feed buckets were placed out, the yokes were opened, and the staff members then waited out of sight for the cattle to enter.
- The cattle were initially allowed six minutes to enter the yokes by themselves. It was then decided this was too long and reduced the time down to three minutes.
- After the time allowed, if they had not entered coaxing them in with the feed bucket was permitted.
- The number of cattle entering voluntarily, being coaxed or refusing to yoke were recorded on the data collection sheet. A comments box was available for any additional information e.g. a full health check, blood sampling, vaccination.

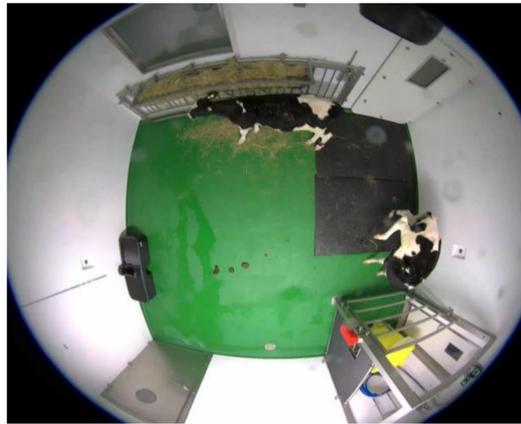


Figure 1. The CCTV camera angle used for video footage



Figure 2. Cattle in the yokes during feeding time

Results

- Between days four and six the number of cattle voluntarily yoking plateaued with a minor decrease seen on day five (figure 3) which is yet unexplained.
- A decrease in voluntary yoking was seen on day three possibly as a result of being health checked and having their feet inspected whilst in the yokes the previous day. They may have not been fully habituated to the yokes and environment at this point.
- No decrease in the number of cattle entering the yokes was observed the day after their first regulated procedure (day eight) suggesting full acclimation.
- Being yoked PM as well as AM did not seem to have a noticeable positive or negative effect on the cattle entering the yokes

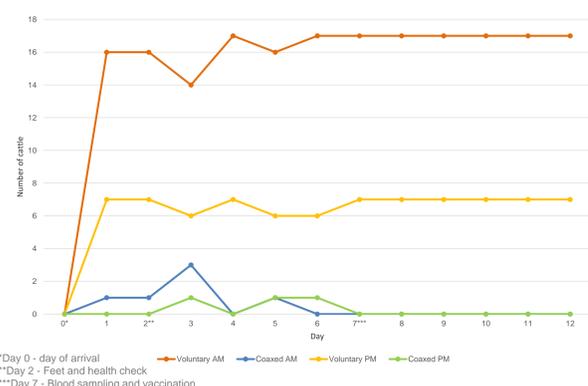


Figure 3. Phase 1: Yoking frequencies of 17 cattle at TPI during the combined AM (N=17) and PM (N=7) yoke over the acclimatisation period from 28/10/2019 - 09/11/2019
*Day 0 - day of arrival
**Day 2 - Feet and health check
***Day 7 - Blood sampling and vaccination

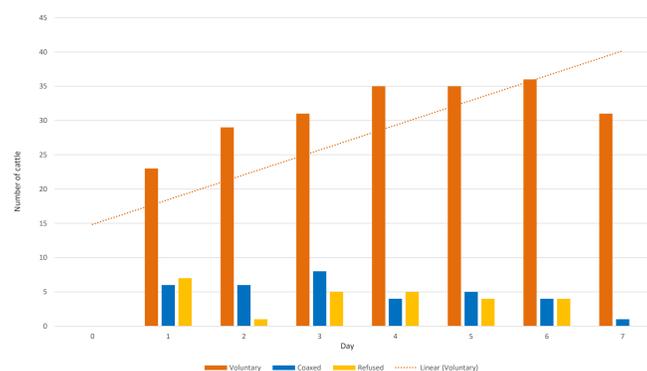


Figure 4. Phase 2: Total number of cattle (N=44) observed entering the yokes during the AM yoke of the acclimatisation period collated from three studies (17/02/2020 - 18/07/2020)

Phase 2: Time Trial

Objective: To determine the length of time needed for acclimatisation by analysing the voluntary entry rate of cattle into yokes recorded through cattle yoking timings.

- During phase two, 44 cattle were yoked (see figure 4.) in the morning over 7 days as part of the feeding routine.
- Feed buckets were placed out, the yokes were opened, and the staff members then waited out of sight for the cattle to enter.
- As a result of phase one, the cattle were allowed three minutes to enter the yokes by themselves.
- After the time allowed, if they had not entered coaxing them in with the feed bucket was permitted.
- The number of cattle entering voluntarily, being coaxed or refusing to yoke were recorded on the aforementioned data collection sheet.
- The CCTV cameras were then consulted and, using Waveview, the amount of time it took each animal from three study groups (study one N=5, study two N=2, study three N=4) to enter the yokes was determined. This was then analysed.

Results

- Through human observation, the cattle voluntarily yoking plateaued on day four (see figure 4). A reduction in numbers can be seen at day six onwards where two were euthanized due to the study ending.
- When analysing the timings, the cattle voluntarily self-yoke the quickest on day six, with a large reduction in time seen between days four and six for both groups one and two (see figure 5).
- The amount of time reduces from day four and continues to do so suggesting around this time they are more comfortable in a novel environment and being yoked.

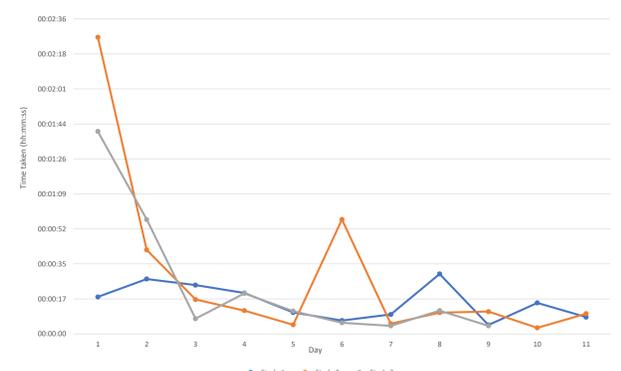


Figure 5. Phase 2: The average amount of time taken per day for cattle (N=11) to self-yoke across three separate studies (17/02/2020 - 18/07/2020)

Conclusions

These pilot studies indicate complete acclimatisation occurs around days four to six yet further study is needed to confirm this. From the data generated, behavioural analysis and CCTV use appear to be very useful in helping determine and further improve the appropriate acclimatisation period for cattle in a high-containment environment. This is essential in aiding refinement to improve both animal welfare and scientific integrity.

Future Studies

Data collected from IceRobotics motion tracking bracelets and additional Noldus collar tracking software will help expand the current locomotion data. Ongoing studies into the use of animal mounted accelerometers and location tracking systems are also being conducted. The present yoking study will also be including more CCTV footage and timings. This will be used to determine how long it takes the cattle to enter the yokes using the premise that stressed cattle will enter slower than those that are fully habituated.

Ethical statement: All legal and ethical aspects were considered when conducting this study, including the use of animals. Those participating in this study consented to take part and were aware of any image recording that took place.

References

1. Miguel-Pacheco, G. G., Kaler, J., Remnant, J., Cheyne, L., Abbott, C., French, A. P., Pridmore, T. P. and Huxley, J. N. (2014) Behavioural changes in dairy cows with lameness in an automatic milking system, *Applied Animal Behaviour Science*, Vol 150, pages 1-8
2. Grandin, T. (2010) Habituating Antelope and Bison to Cooperate With Veterinary Procedures, *Journal of Applied Animal Welfare Science*, vol 3 (3), pages 253-261

