A PRELIMINARY STUDY OF THE EFFECTS OF THE NUMBER OF CONSECUTIVE DAYS OF TRAINING AND DAYS OFF ON FOAL RECALL

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Abstract

It is critically important that early foal handling and training takes into account foals cognitive abilities. The inclusion of days off during horse training programmes has been found to be beneficial. This study aimed to determine how the incorporation of days off during initial training influences foal learning outcomes. Twenty Thoroughbred foals were blocked by age (< or >8weeks) and randomly allocated to either Method A (trained for two consecutive days followed by a rest day, two more training days, rest day, finishing with up to three more consecutive training days) or Method B (trained for four consecutive days, two rest days, finishing with up to three more consecutive training days). Qualified Foal NZ Ltd trainers used negative reinforcement to train foals to 'Go' (cranial pressure on the halter until foal steps forward) and 'Stop' (caudal pressure until the foal stops) from both left and right sides. Session length was determined by progress made and did not exceed 25 minutes. Training success was assessed using number of signals required (recall) for the foal to perform the task in the next training day. Biting behaviours exhibited by foals were instantaneously recorded during training sessions. Recall data for all tasks were non parametric (left 'Go' AD=6.32; 'Stop' AD=2.89; right 'Go' AD=4.24; and 'Stop' AD=6.10; all P<0.005). Foals' recall of any of the tasks did not differ according to whether they were trained with two non-sequential days break (Method A) or two consecutive days break (Method B) for either younger or older foals (all Mann-Whitney U, P>0.05). Younger foals (<8weeks) trained using Method B showed significantly more biting (median=7; range 0-9) in session four than those trained using Method A (median=0; W=36; P<0.05), however, this

difference disappeared by session five (median=0; W=46; P>0.05). There was no difference in biting behaviour exhibited by older foals (>8weeks) according to training method. On the basis of the findings of this study it is recommended that young foal initial training programs incorporate a day off within the first four days in order to decrease the development and occurrence of adverse behaviours such as biting.

Keywords: Foal; initial training; welfare; learning; equine; biting.

Highlights

- A foal's ability to recall previously learnt responses correctly is not influenced by the number of consecutive days of training or days off during a seven to nine day training programme.
- Foals less than 8 weeks of age that had four consecutive days of training showed significantly more biting behaviour than those who had a day off training prior to day four.
- There was no difference in biting behaviour exhibited by older foals (>8weeks) according to training method.
- It is recommended young foal initial training programs incorporate a day off within the first four days in order to reduce the likelihood of potential stress related behaviours such as biting.

Introduction

Thoroughbred horses are bred for participation in racing events and as a result will undergo some form of handling or training in their lifetime (Hausberger et al., 2008). This training should utilise appropriate learning theories, which align with equine ethology, to avoid confusion or conflict in order to improve the human-horse experience, handler safety and foal welfare (Loy et al., 2019). Handling foals appropriately and creating a positive human-horse relationship is critically important for a foals behavioural development and learning (Mader and Price, 1980) as a horse's behaviour or ability to learn can be influenced by human interactions at a young age (Brubaker and Udell, 2016). It is argued that young thoroughbred horses trained using consistent and clear signals will make them better able to cope with changes in handlers (Randle, 2010), improving their chances of making it to the racetrack and to a career after racing (King et al., 2019). Handling and initiating training of foals at around three weeks of age coincides with the early socialisation developmental phase (Ladewig et al., 2005) and allows handlers to take advantage of the foals natural tendency to create new relationships and explore their environment (Henry et al., 2009). A common practice on studs is for young horses to be handled and taught to lead over the course of one to two weeks which may be completed whilst the foal is on the dam or post-weaning. Whilst it is important to ensure that foals receive sufficiently frequent and intense handling and training to prepare them for their future careers, it is worth remembering that too much training can potentially impact their ability to learn and increases stress. Recent research showed that riding horses learn and recall novel tasks, using negative reinforcement, just as well if they are trained once every three days as when they are subject to training every day (Schomber et al., 2018). This finding raises questions regarding the frequency of training in foals given they are often subject to an intensive period of handling rather than periodic handling over a number of weeks.

The aim of this study was to determine if the number of consecutive days of training and days off influences foals learning ability as measured by their ability to recall tasks taught using negative reinforcement.

Materials and Methods

This research was conducted at Little Avondale Farm, by qualified Foal NZ Ltd trainers, with ethical approval; Charles Sturt University, Animal Care and Ethics Committee Approval No. A18085.

Animals

Nine female and 11 male unweaned Thoroughbred foals, age 47 ± 13.6 days on their first day of training, were selected for this study based on age and physical soundness from the breeding herd at Little Avondale Stud. The foals and their dams were housed in paddocks with other mares and foals and were maintained on irrigated pasture and fed as necessary. On training days mares and foal dyads were brought individually into a small holding yard (3m x 3m with dirt surface) adjacent to the paddock and the other mares and foals. Mares had access to salt licks during foal training sessions and mares and foals were returned to their paddock at the end of each session.

Trial design

Due to the age of the foals the trial commenced in mid-November 2018. The study was conducted using a randomised block design. The foals were grouped by age (<8 weeks old [38.7 ± 8.5 days]; >8 weeks old [61.3 ± 7 days]) and randomly assigned to training method A or training method B. All foals underwent a set six to seven session training plan that varied only by the number of consecutive days of training and days off (Table 1).

Table 1. Foal training timetable for both training methods

DAY	TRAINING METHOD A	TRAINING METHOD B
1	Session 1	Session 1
2	Session 2	Session 2
3	*DAY OFF*	Session 3
4	Session 3	Session 4
5	Session 4	*DAY OFF*
6	*DAY OFF*	*DAY OFF*
7	Session 5	Session 5
8	Session 6	Session 6
9	Session 7	Session 7

Training Procedure

Two Foal NZ Ltd trainers performed the training sessions of 8-25 minutes duration (mean 12 minutes). At the start of each training session foals were brought into a small 3 x 3m yard fitted with safety pads (Figure 1) before moving into a larger yard once the foals were familiar with the handler, the halter and figure eight rope (Figure 2). The foals underwent six to seven set training sessions over eight to nine days as outlined in Table 2. These training sessions use the ten ISES training principles as outlined by King et al. (2019) in order to produce safe-to-handle horses. Some foals required additional training sessions if they were not responding to the established cue or if their arousal became too high or too low. When this occurred foals underwent a repeat of the session that required more work, on the same day, before advancing to their next session. Foals complete the training program when they respond lightly to pressure cues regardless of handler side and can walk in a rhythm, independent of the mare.

FIGURE 1 - FIGURE OF FOAL ON PADS HERE

FIGURE 2 – FOAL IN FIGURE 8 ROPE

Table 2. Six-part training procedures performed on foals by experienced Foal NZ Ltd trainers

Session 1
Mare is led into a small yard with her foal
Mare is backed into pads and foal is approached and guided into position alongside the mare
Foal is touched all over by the handler
Foal has feet picked up
Foal is haltered and has a figure eight rope applied
Foal is led with the handler on the left alongside the mare in the small yard using only moderate pressure on the ropes
Foal has halter and ropes removed and mare and foal are returned to their paddock
Session 2
Start is the same as session 1
Once the ropes are applied the mare and foal are moved into a bigger yard and the foal is asked to walk alongside the mare. Pressure is gently applied to the head collar and rump rope until the foal moves forward then the pressure is removed. Likewise, backwards pressure is gently applied to the head collar until the foal stops, then the pressure is removed. These actions are in conjunction with the mare handler stopping and starting, to aid the foal in achieving the correct response initially. This is repeated with the handler on both sides walking alongside the mare at all times.
Foal and mare are **led** back to the pads
Foal has halter and ropes removed and mare and foal are returned to their paddock
Session 3
Start is the same as the previous session
Addition of left and right cues. Gentle lateral pressure on halter until foal turns its head away from the pressure
Foal is required to respond to cue introduced in sessions 1 and 2 by walking around the mare with the handler on both sides
Foal and mare are **led** back to the pads
Foal has halter and ropes removed and mare and foal are returned to their paddock
Session 4
Start is the same as session 1
In session 4 the foal is asked to move around the mare with the handler out the front applying light cranial pressure to the head collar, reducing the use of the figure eight rope
Foal and mare are **led** back to the pads
Foal has halter and ropes removed and mare and foal are returned to their paddock
Session 5
Start is the same as session 3
Foal is then **led** independently and away from the mare in response to cues on the head collar
Foal is asked to rein back
Foal and mare are **led** back to the pads
Foal has halter and ropes removed and mare and foal are returned to their paddock

Session 6 and 7
Same as session 5 above, repeated as needed.

Foal is expected to be light on the go, stop, turn and rein back cues prior to graduation from the training program

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Foals underwent the set training program performed by experienced Foal NZ Ltd trainers. Some foals required additional training sessions if they were not responding to the established cue of if their arousal became too high or too low. When this occurred foals underwent a repeat of the session that required more work (on the same day) before advancing to their next session.

Testing procedure and behaviour recording

Each foal's recall was measured by the number of cues required to get the desired response when negative reinforcing cues were applied. Foals were asked to move forward in response to pressure applied to the head collar in a cranial direction resulting in pressure on the foals' poll until they stepped forward and pressure was released. Similarly, to stop, pressure was applied to the head collar in a caudal direction, resulting in pressure on the foals' nose until the foal stopped and pressure was released. This was asked in each of their training sessions from both the left and right side. A response to the forward pressure was deemed successful when the foal moved all limbs forward. A response to the stop cue was deemed successful when the foal stopped within three footfalls. Behaviour and response related (recall) data were recorded instantaneously during all the training sessions. Foal handlers were responsible for relaying the number of attempts required to achieve the desired response to the independent observer. Assessment of attempts to recall was performed in Session 5 as all foals had underwent four training sessions and two days off (non-consecutive, training method A; consecutive, training method B).

Data analysis

The number of attempts to correct recall were manually recorded and data were analysed using MiniTab® version 19. Anderson-Darling tests were conducted to determine the distribution of both the recall and biting behaviour data. Mann-Whitney U test was performed

to analyse the effect of training schedule as the data were non-parametric. Unpaired *t*-tests were performed to determine the effect of age on foal recall.

Results and discussion

Mean ± standard error of the mean of number of attempts to correct foal recall is presented in table 3. Recall data for all tasks were non parametric (left 'Go' AD=6.32; 'Stop' AD=2.89; right 'Go' AD=4.24; and 'Stop' AD=6.10; all P<0.005). There was no significant difference between age groups on foal recall in all tasks (left 'Go' t=0.8964, P>0.05; left 'Stop' t=1.6686, P>0.05; right 'Go' t=0.9788, P>0.05; right 'Stop' t=0.3234, P>0.05).

Table 3. Number of attempts to correct foal recall (± STD) in session five in both treatment and age groups for left and right handling.

Treatment Schedule	Left 'Go'	Left 'Stop'	Right 'Go'	Right 'Stop'
Method A[1]				
Foals >8 weeks of age	1.00 ± 0	1.25 ± 0.5	1.50 ± 0.58	1.25 ± 0.5
Foals <8 weeks of age	1.57 ± 1.51	2.00 ± 1	1.33 ± 0.9	1.00 ± 0.38
Method B[2]				
Foals >8 weeks of age	1.00 ± 0	1.00 ± 0	1.33 ± 0.58	1.00 ± 0
Foals <8 weeks of age	1.17 ± 0.41	1.67 ± 1.21	1.00 ± 0	1.17 ± 0.41

[1] Trained for two consecutive days followed by a rest day, two more training days, rest day, finishing with up to three more consecutive training days
[2] Trained for four consecutive days, two rest days, finishing with up to three more consecutive training days

The foals' recall of any of the tasks did not differ according to whether they were trained with two non-sequential days break (Method A) or two consecutive days break (Method B) for either younger or older foals (all Mann-Whitney U P>0.05). The neonatal period is often considered to be a favourable period for training and results obtained by Mal and McCall (1996) indicate the presence of a potential 'critical' period of learning as handling foals prior to 42 days of age was more effective than handling them between 43 and 84

days of age. In this study however there was no significant difference between age groups (<8 weeks old, 38.7 ± 8.5 days; >8 weeks old, 61.3 ± 7 days) on foal recall for any task indicating that age did not affect learning.

Interestingly, younger foals (<8weeks) trained using Method B (no days off prior to session 4) showed significantly more biting (median=7) in session four than those trained using Method A, who had had one day off previously (after session two) (median=0; $W=36$; $P<0.05$). This difference in biting behaviour disappeared by session five (median=0; $W=46$; $P>0.05$), with foals of both training methods having a day or two off between session four and five.

FIGURE 3 – INSERT HERE - FIGURE 3 YOUNG FOAL BITING BEHAVIOUR

Behaviour is an important factor to be taken into account when handling or training horses. Biting is the act of opening and rapid closing of the jaws with teeth grasping onto horse flesh (McGreevy, 2004). Biting not directed at another horse can be a sign of conflict, stress or pain and is generally considered an unwanted behaviour by those responsible for managing the individual (McGreevy et al., 2018). Søndergaard and Ladewig (2004) reported that horses housed by themselves bit their trainers significantly more than those housed in a group. In this current study housing is an unlikely contributing factor as all foals, regardless of age, were housed with other mares and foals from a few days after birth and for the duration of this study (and beyond). Biting is considered a conflict behaviour and these behaviours are seen more frequently in horses handled by amateurs than in horses handled by professionals (Kydd et al., 2017). Interestingly during the handling sessions the foals often engaged in biting behaviour on entering the pen, biting the training pads in addition to their handlers during the session. One notion is that this could be indicative of anticipation of the impending training session. Von Borstel et al. (2007) reported that anticipation, arousal and fearfulness can be transferred from rider to horse, particularly in less experienced riders. Given the handlers in this study were experienced and handled foals across age and training groups it is not likely to be due to handler influence as it would be expected to see this response more widely. The occurrence of the bit-

ing behaviour was only significantly higher during session 4 in the younger foals trained using training method B (no days off prior to session four). These results indicate that regardless of the underpinning cause, young foals are mentally unable to cope with four consecutive days of training, the manifestation of which is an increased frequency of biting behaviours. Older foals (>8 weeks of age) however do not have the same response to four consecutive days of training as there was no difference in biting behaviour exhibited according to training method.

Summary

This study shows that whilst the foal's ability to recall previously learnt responses is not influenced by the number of consecutive days of training or days off during an eight to nine day training programme, younger foals (i.e. those <8weeks) that had four consecutive days of training showed significantly more biting behaviour than those who had a day off training prior to day four. It is recommended that young foal initial training programs incorporate a day off within the first four days in order to decrease potential stress related behaviours such as biting.

Conflicts of Interest

There are no conflicts of interest to declare.

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Authorship Statement

Jaymie Loy co-designed the experiment, collected and analysed the data and wrote and edited the paper

Leigh Wills co-designed the experiment, collected the data and edited the paper

Sally King co-designed the experiment and edited the paper

Hayley Randle analysed the data and wrote and edited the paper

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Figures

Figure 1 Mare and foal backed into training pads. Foals are started on the training pads to decrease risk of injury.

Photograph: Jaymie Loy (2018)

HAVE ASKED LEIGH FOR PIC

Figure 2 Figure of eight rope – going to get a better quality photo

Foals have a figure of eight rope applied to aid in understanding of pressure and release for forward and back movements prior to relying on the halter.

Photograph: who took it (year)

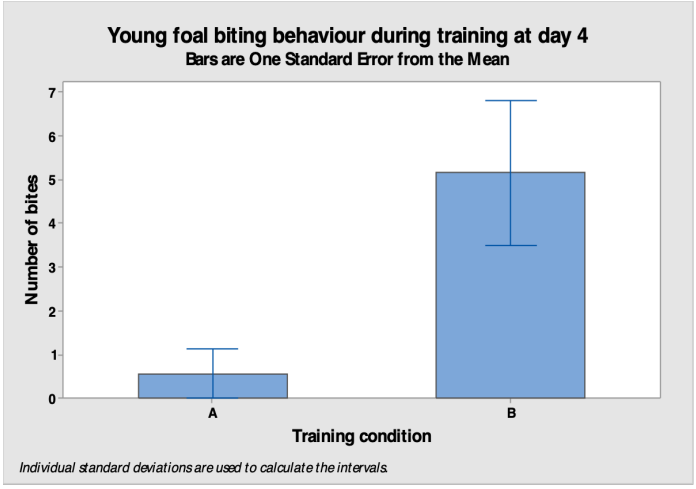

Figure 3 Young foal biting behaviour during training in session 4