Clinical Application of Equinosis Q (Lameness Locator) in Race Horses

BELL EQUINE
SURGERY & LAMENESS

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Lameness in Race Horses

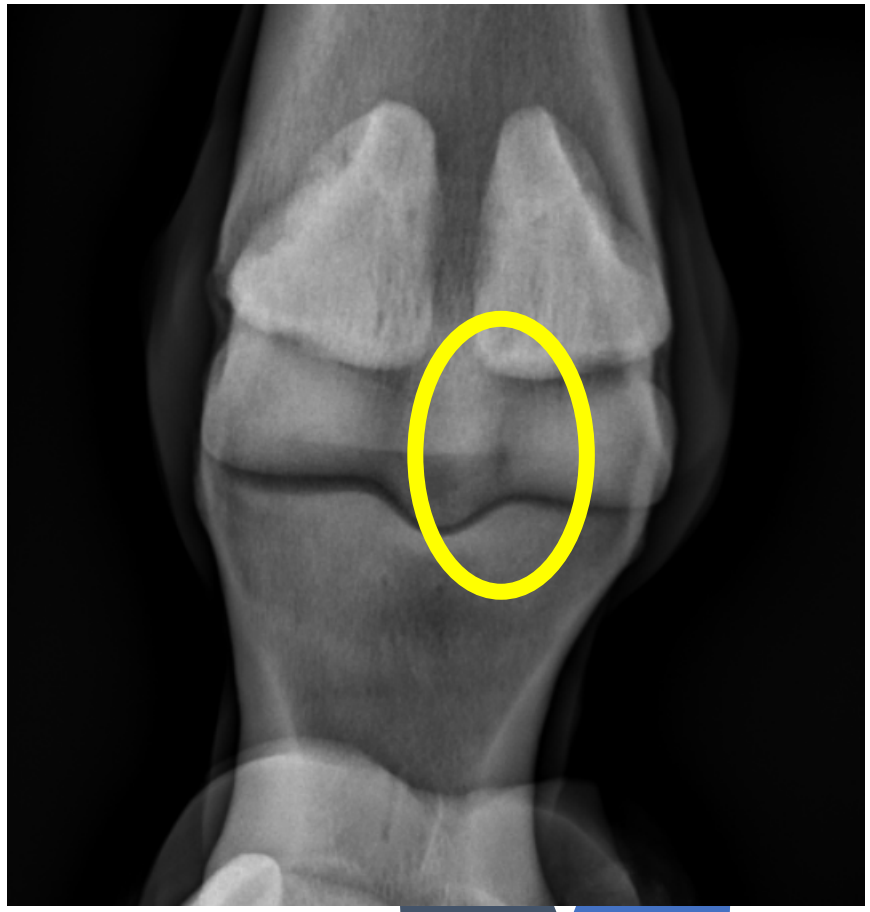
- Lameness may occur in race horses by all of the same mechanisms as horses in other careers

Lameness in Race Horses

- Joint inflammation from development (OCDs), juvenile arthritis or athletic trauma are common causes of lameness

Lameness in Race Horses

- In racehorses, stress fractures are the most important cause of lameness because this category of lameness may progress to catastrophic injury

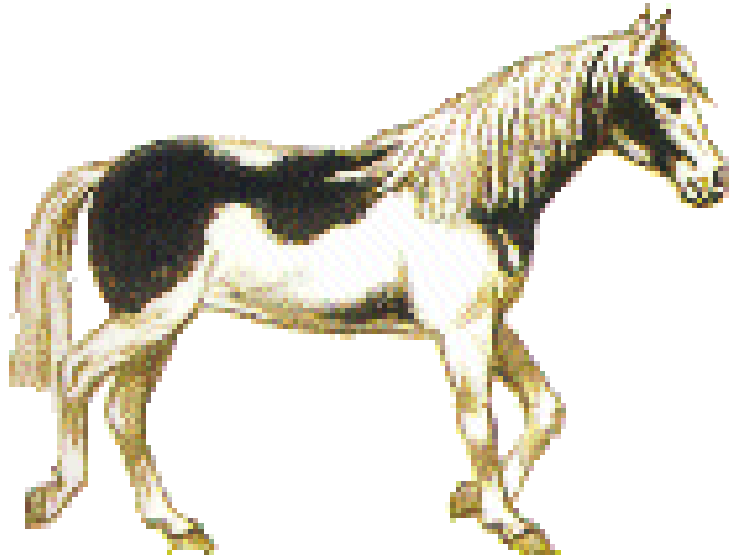


Stress Fractures in Race Horses

- Many catastrophic injuries in race horses occur at the site of stress fractures
- This pre-existing injury may manifest as subtle lameness, asymmetry or a change in “gait signature”
- If so, intervention could be implemented before progression to a catastrophic injury

Overview

- Lameness or gait asymmetry in horses is determined by the difference between head (front limb) or pelvic (hind limb) height over a full stride cycle.



Difference in head/pelvis height

Difference in max head height

Difference in max head height

Difference in min head height

Difference in min head height

Overview

- The detection threshold for asymmetry as a function of human perceptive ability is 25%.
- Subtle lameness can be agreed upon among experienced clinicians only about 75% of the time for front limbs and about 67% for hind limbs.

Subtle Lameness in Race Horses

- The objective measurement of lameness or gait asymmetry overcomes the limitations of human perception

Subtle Lameness in Race Horses

- We evaluated race horses monthly as part of a larger study evaluating the utility of the Equinosis Q for early identification of injuries in race horses

Longitudinal Study

- The study will continue until the racing careers of the enrolled horses is complete, or ownership is transferred (sale or claim)
- In this presentation, we will discuss preliminary findings that underscore the utility of objective lameness measurement in racetrack practice

Case Studies

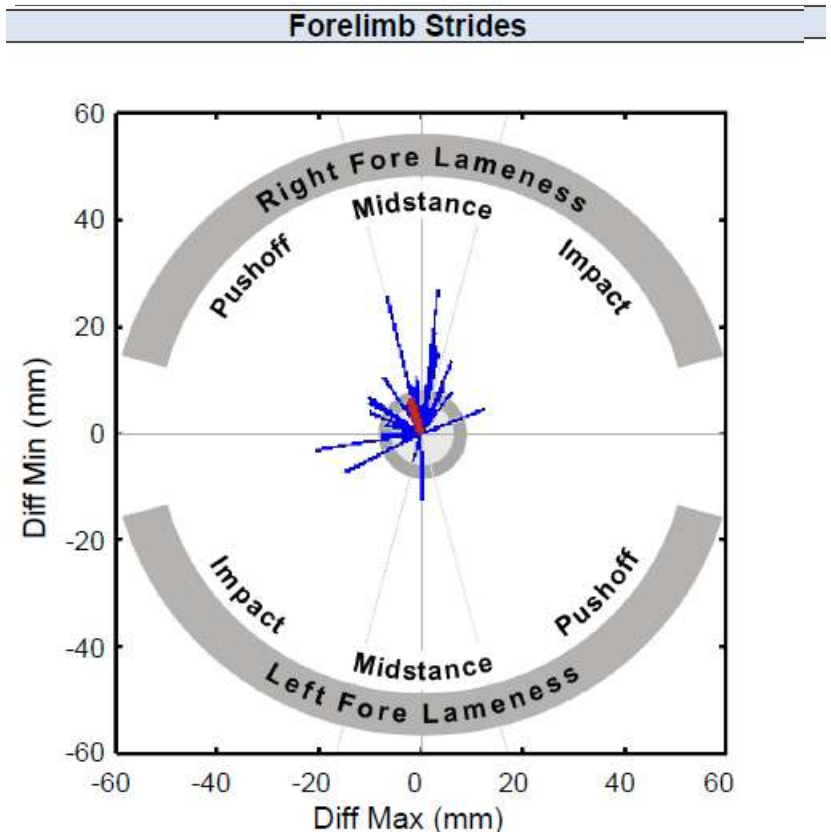
- The reference ranges used by the Q were developed for evaluation of horses presented for lameness.
- The reference ranges are the measured differences between maximum and minimum height of the head and pelvis over a stride cycle when its lameness grade was “0” (determined by three experienced clinicians)

Case Studies

- In 2019 – 2020, a preliminary study was conducted in which race horses were evaluated weekly over 16 weeks
- A preliminary threshold for serviceably sound horses was chosen as one standard deviation of observed gait asymmetry among a population of racing horses

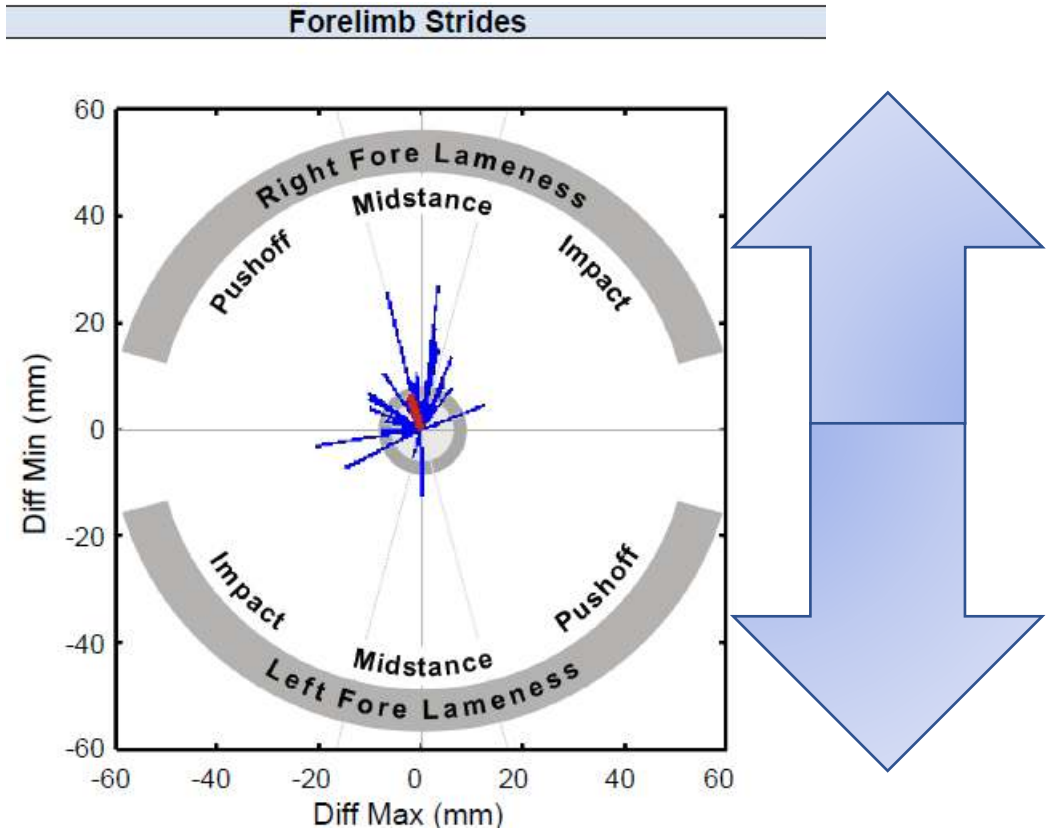
Case Studies

- In forelimb lameness, the minimum and maximum head heights over a stride cycle are biomechanically related.
- The rays in the forelimb plot depict the amplitude of head movement asymmetry for each individual stride.



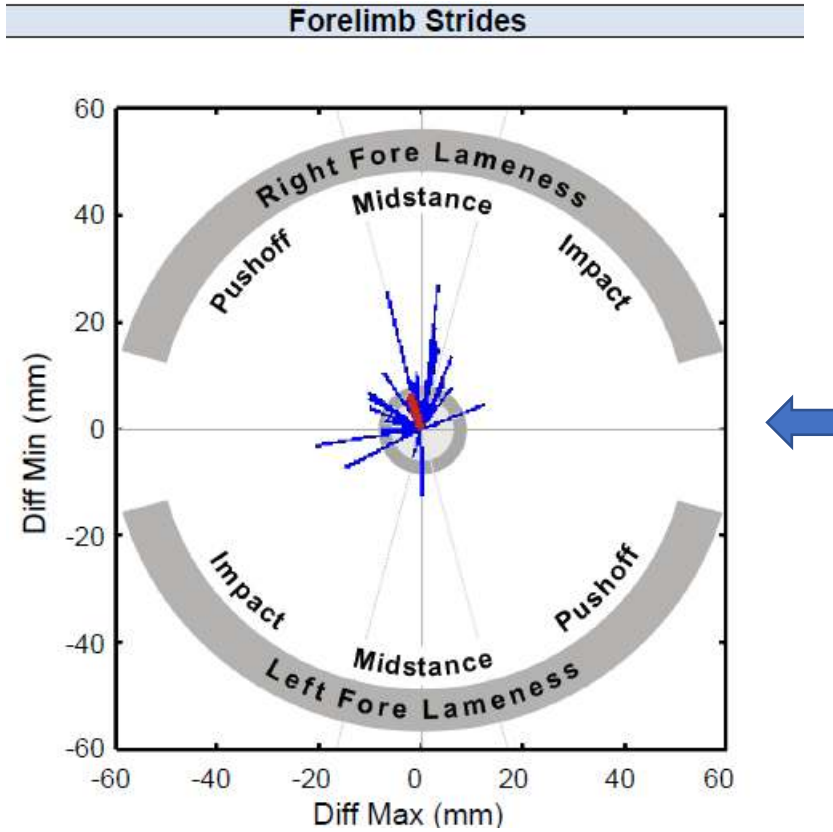
Case Studies

- The red ray is the average of all strides (mean **Vector Sum**).
- Strides with RF asymmetry are drawn above horizontal
- Strides with LF asymmetry are drawn below horizontal



Case Studies

- The threshold of detectable asymmetry among experienced clinicians is 8.5 mm



8.5 mm

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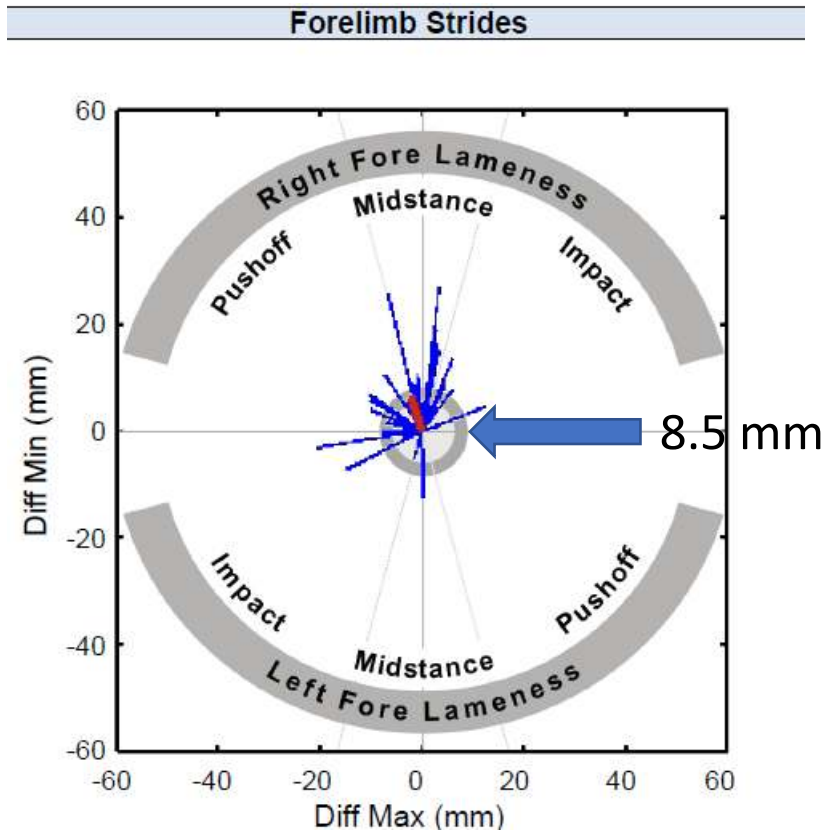
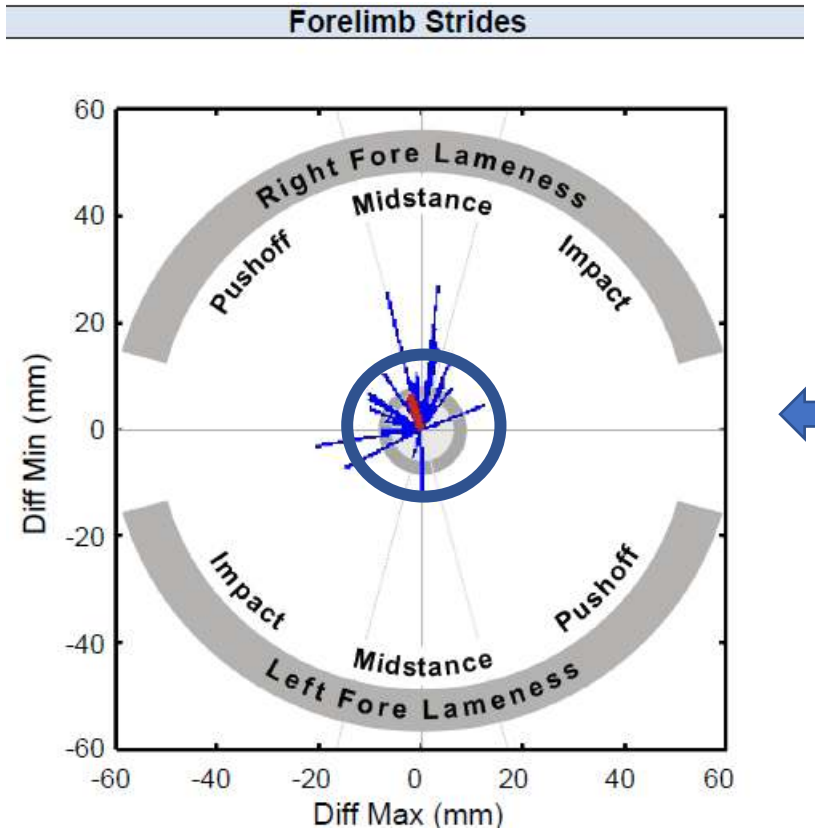


Case Studies

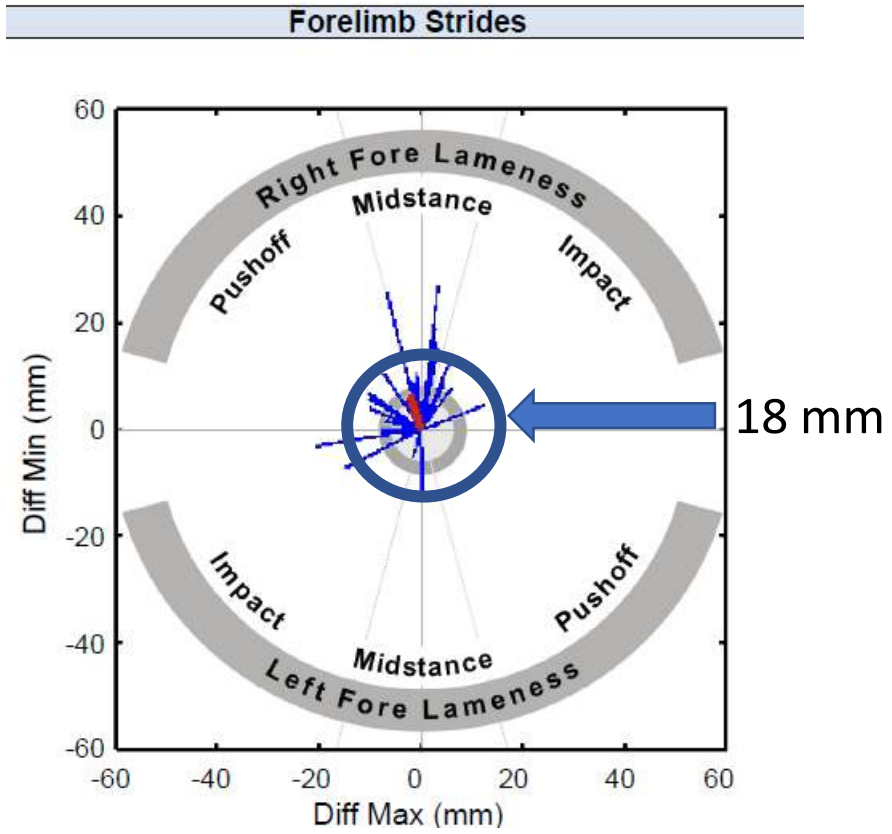
- All of the horses in this case series were evaluated using the serviceably sound thresholds presumptively established previously



18 mm

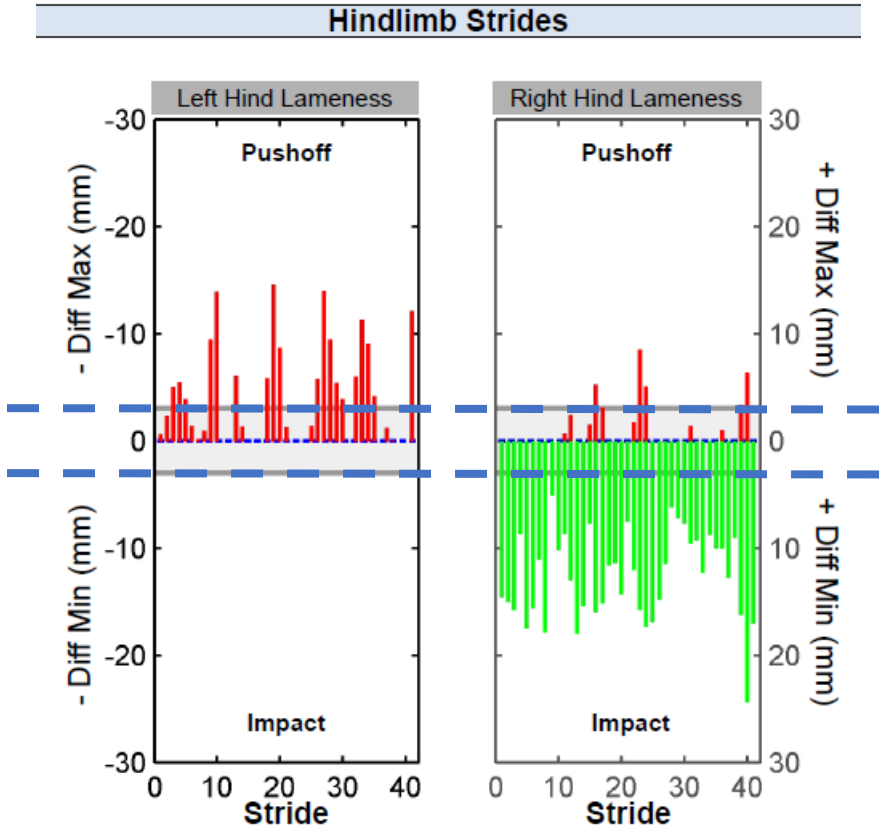
Case Studies

- This presumptive serviceably sound threshold is 18 mm for head height vector sum.



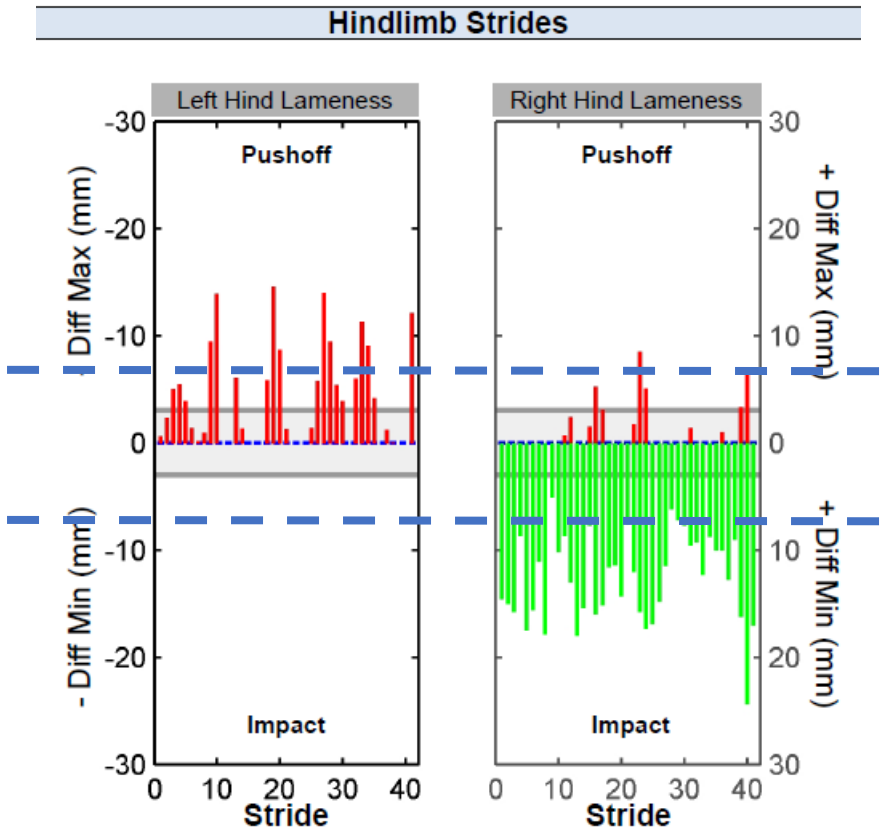
Case Studies

- The reference range for Pelvis Diff Max and Diff Min is +/-3 mm.



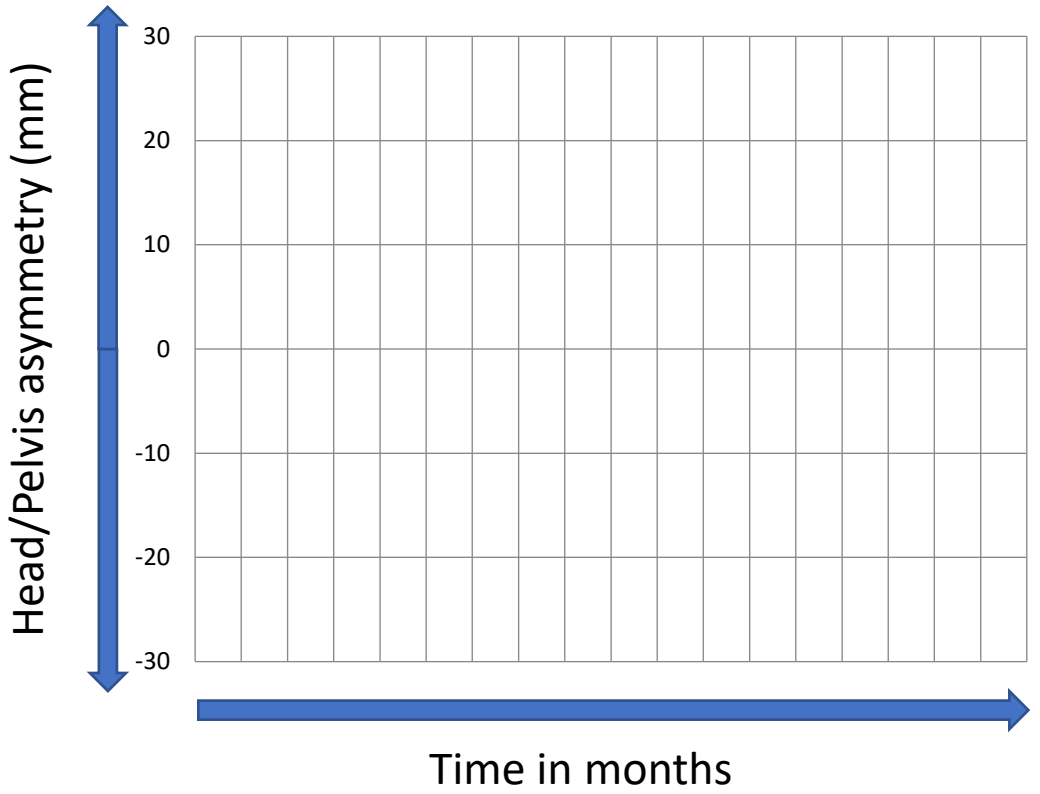
Case Studies

- The presumptive serviceably sound threshold is 7 mm for mean pelvic height asymmetry after pushoff (Diff max – red rays) and during impact (Diff min – green rays) over all strides



Case Studies

- In the studies, front and hind limb asymmetry were averaged at each time point, and
- plotted against time in months



Case Studies

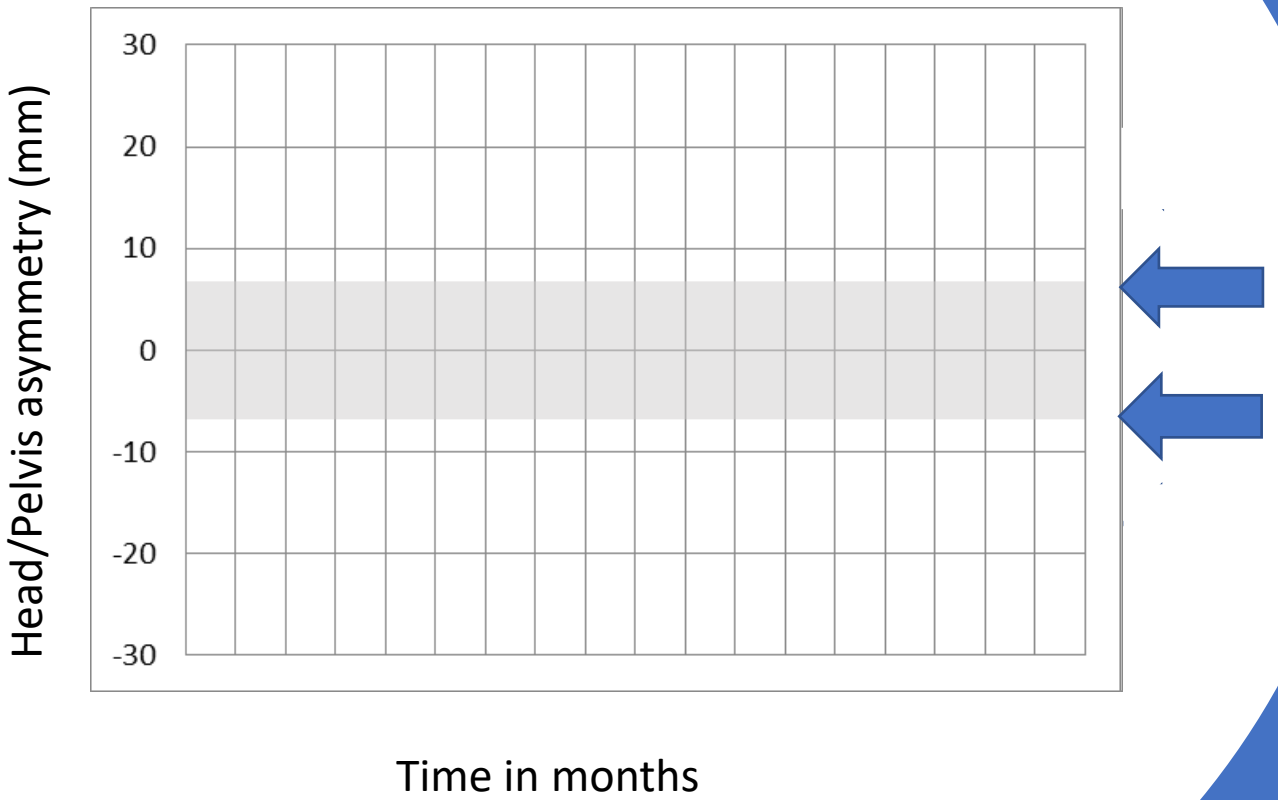
- The thresholds for

Forelimb asymmetry

- and

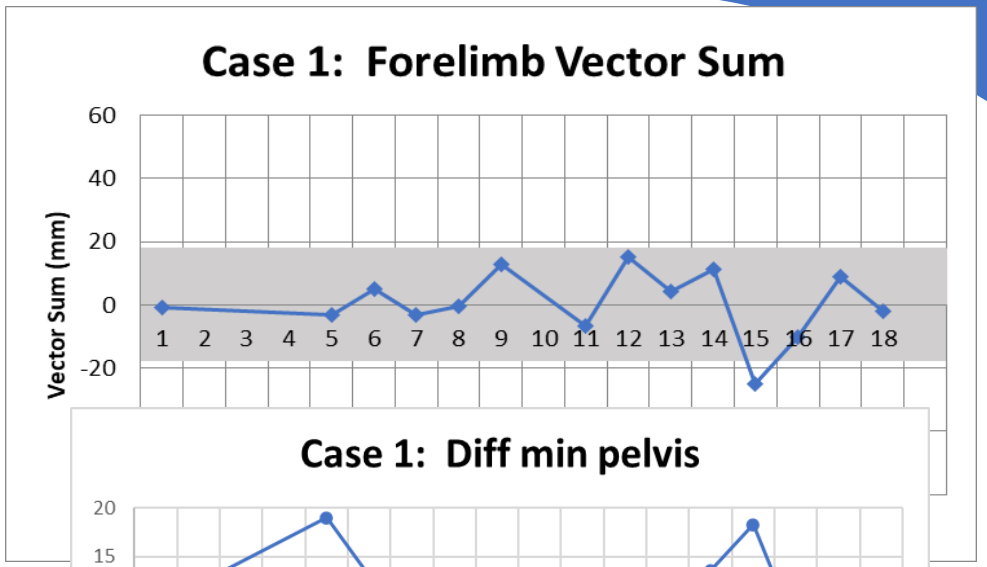
Hindlimb asymmetry

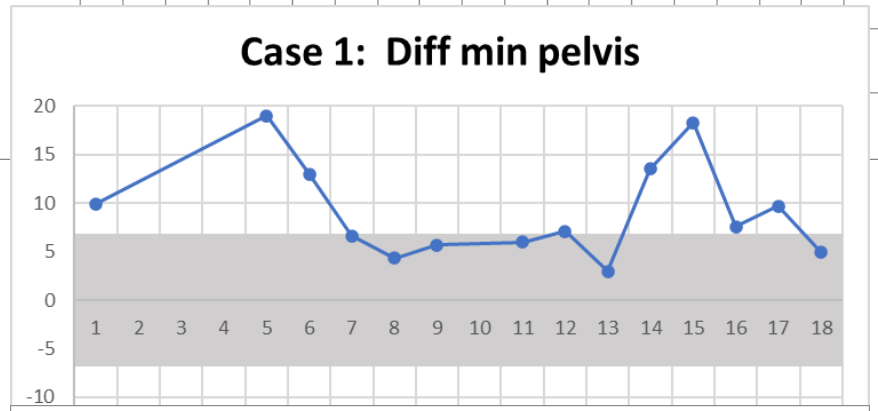
- are shaded on the case reports

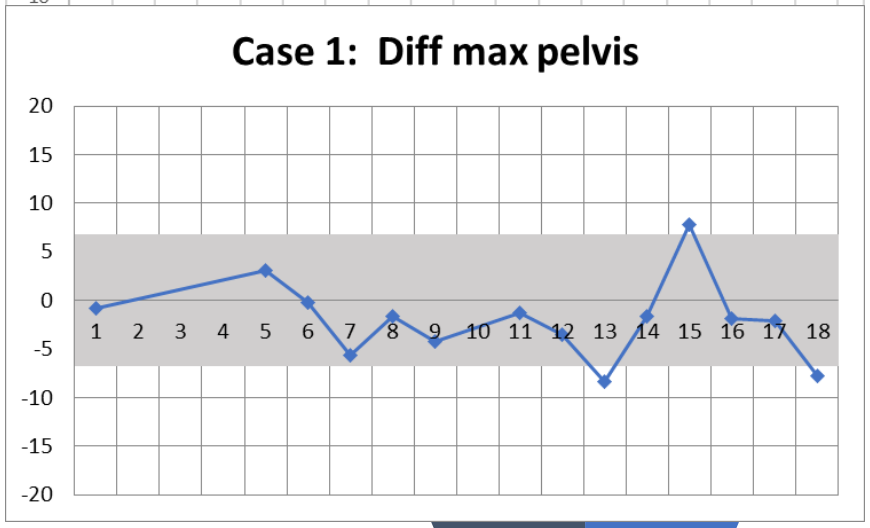


Case 1:

- 2-4 yo TB gelding
- Laid up for presumptive Tibial Stress fracture due to acute RH lameness after a work approximately 4 months before first LL-Q evaluation
- Followed over 18 months

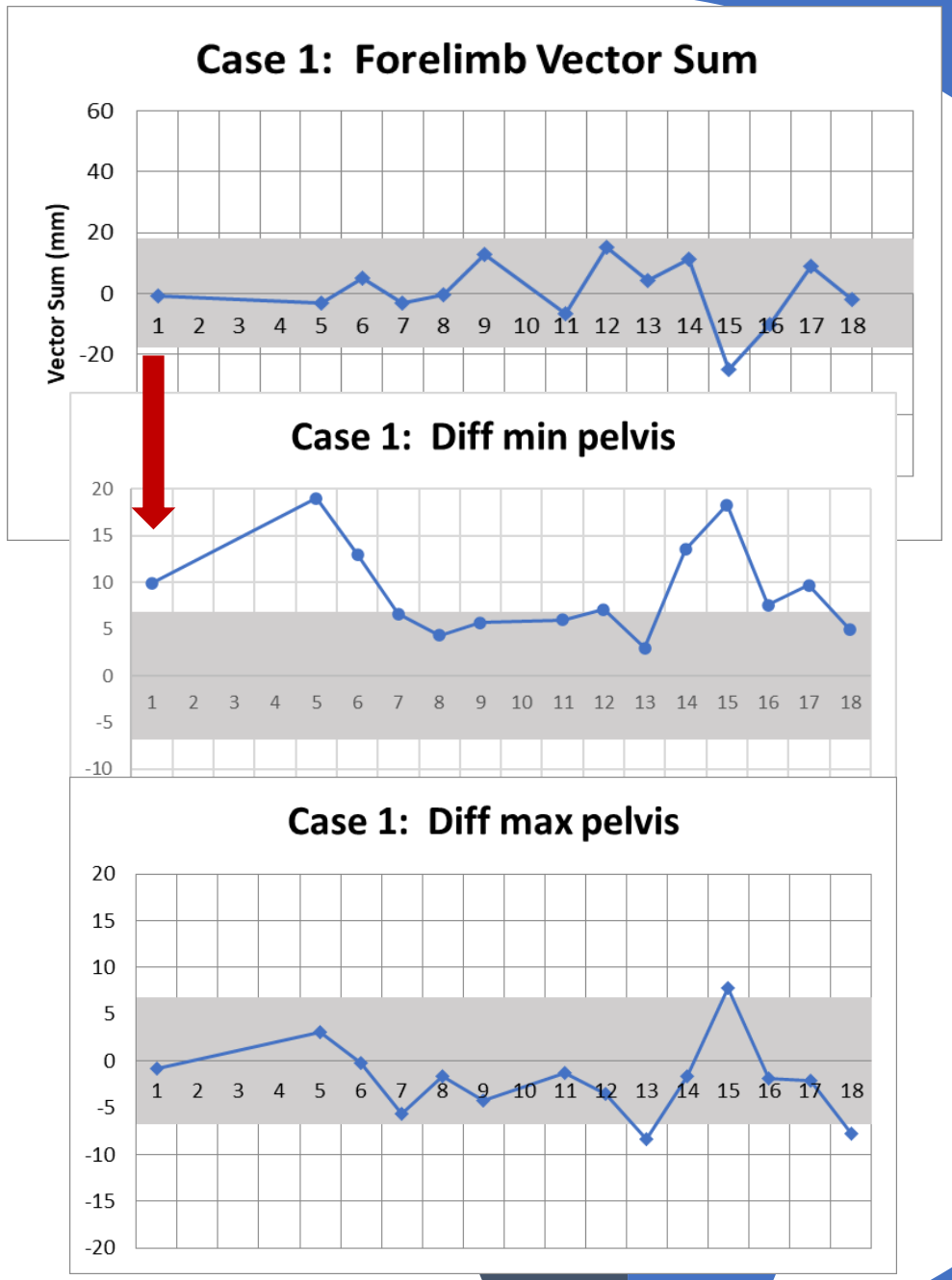






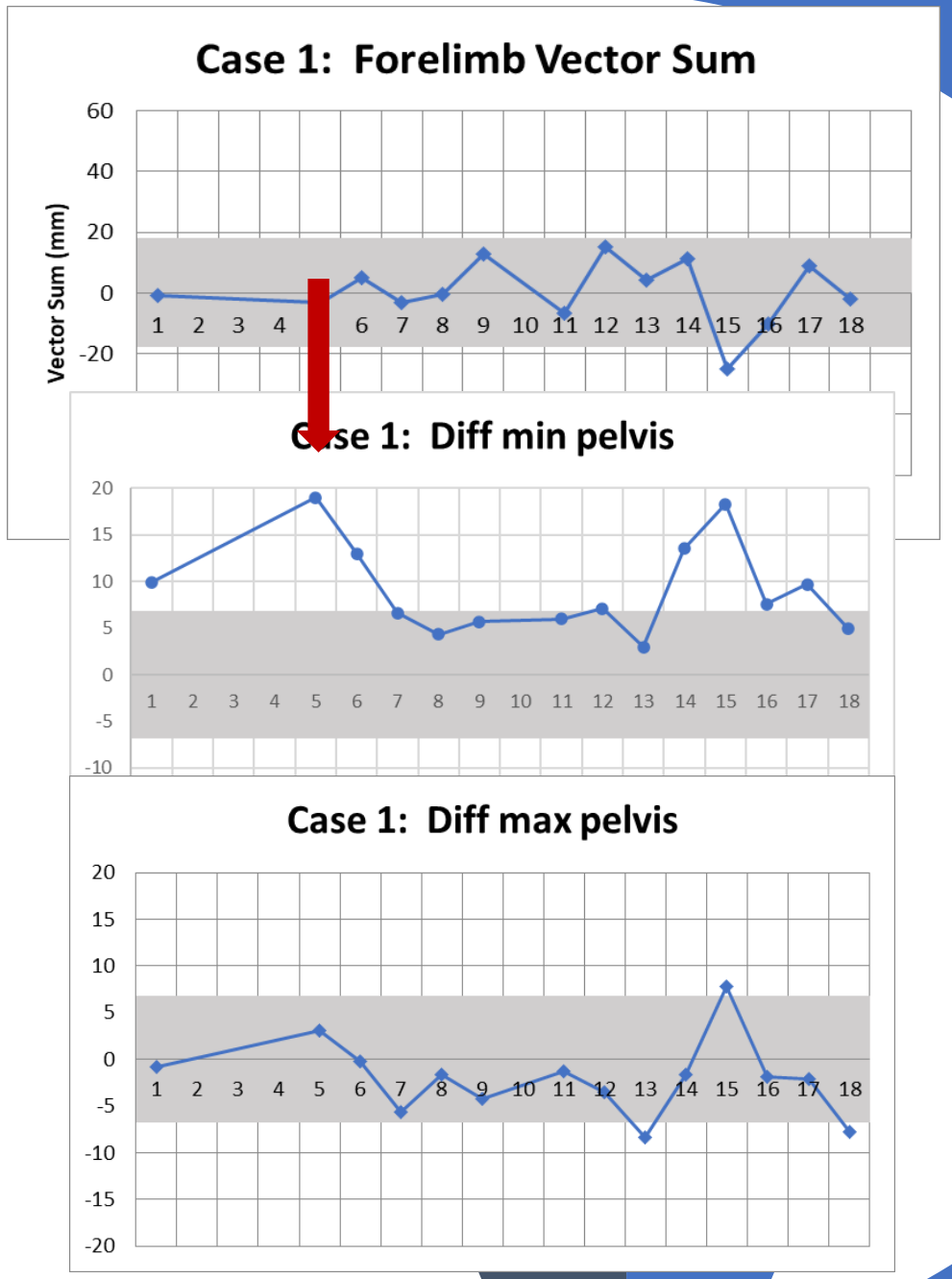
Case 1:

- First exam is after 4 months of layup for a presumptive tibial stress fracture
- Based on Equinosis Q data, returned to training at month 1



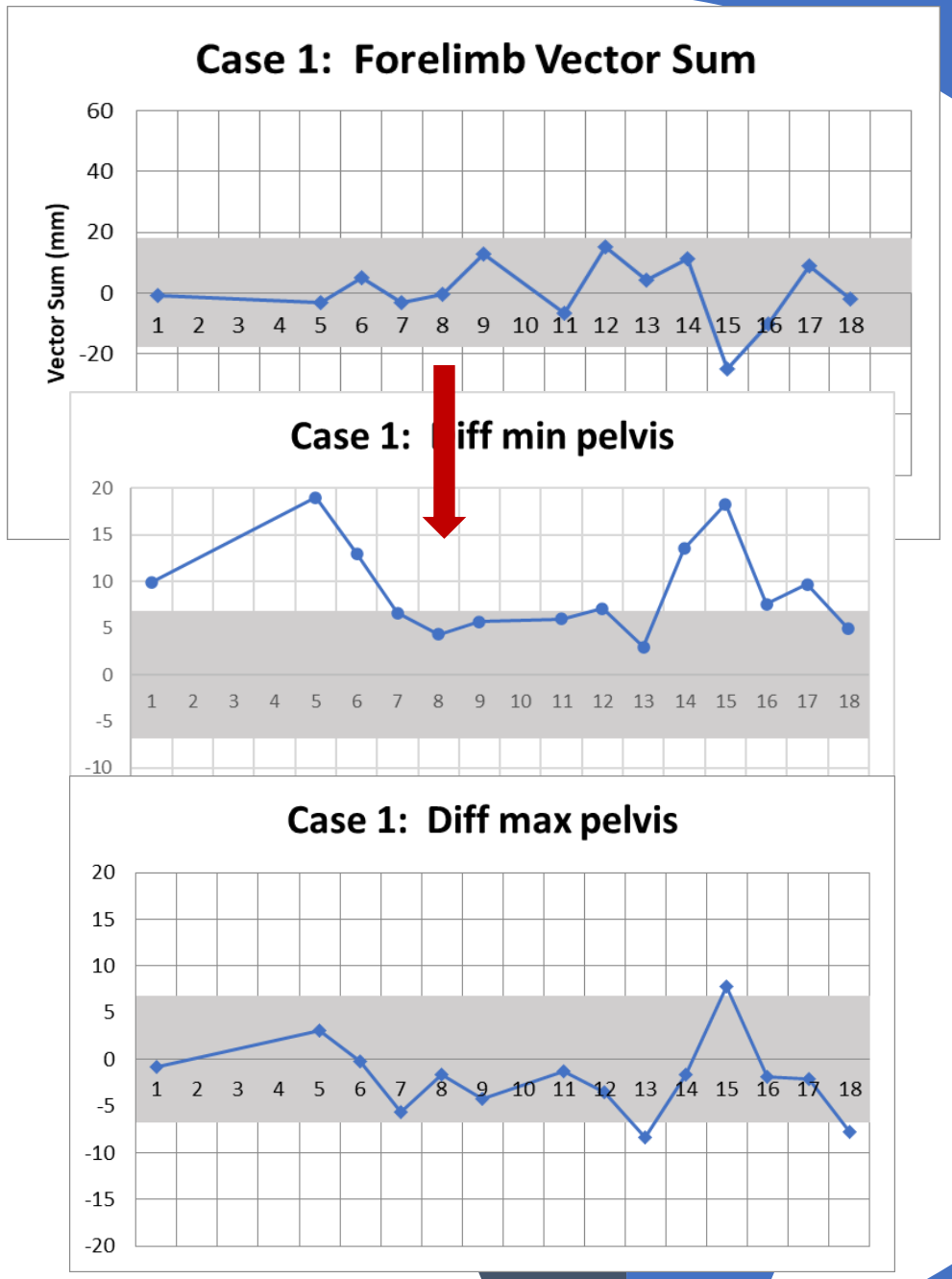
Case 1:

- Next exam is after training for 5 months.
- Acutely lame
- Suspected recurrence of tibial stress fracture
- Returned to stall rest then turnout



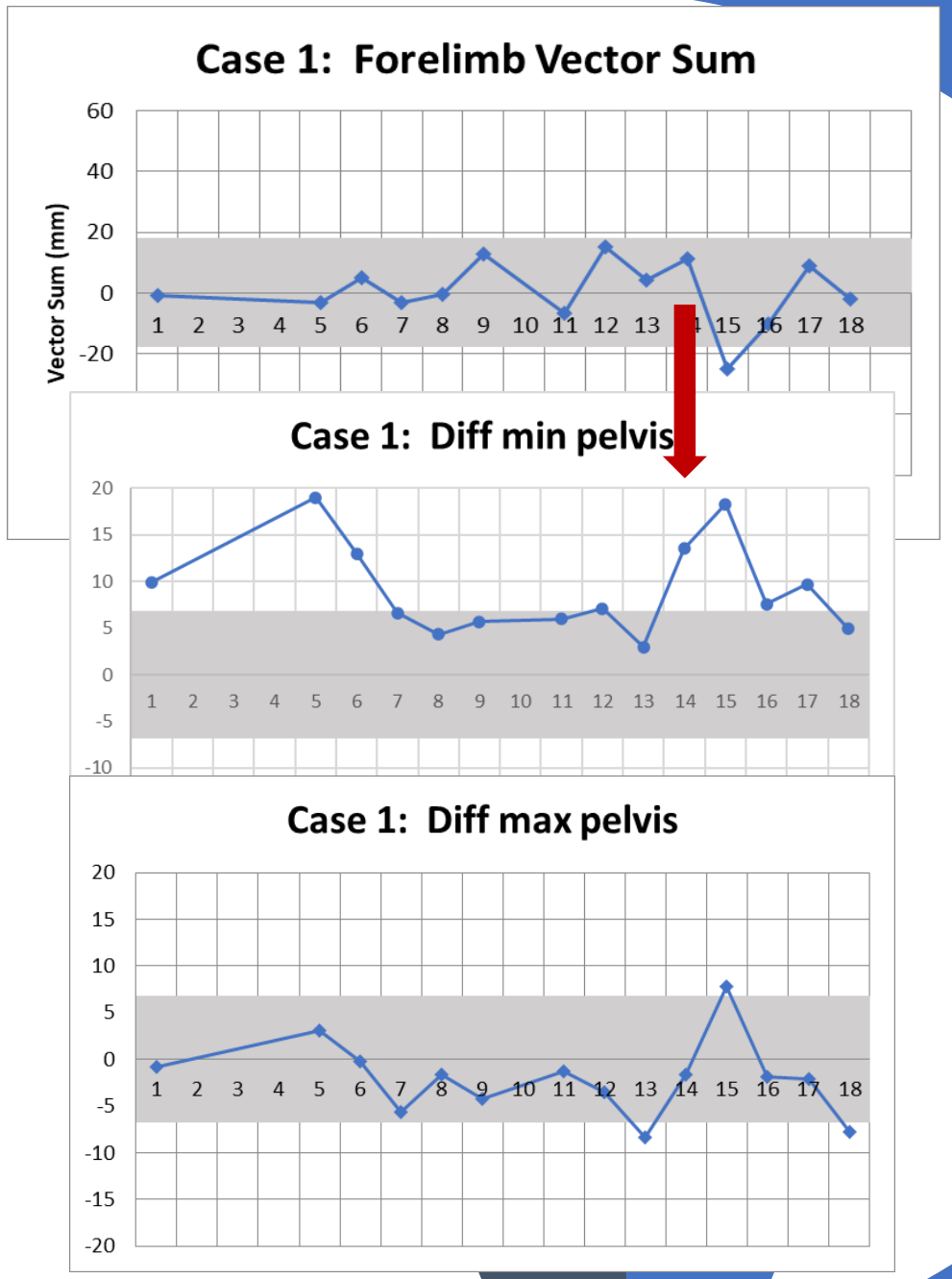
Case 1:

- After the 4th exam (4 months off from training), returned to training based on Equinosis Q data



Case 1:

- After 5 months in training, the horse follows the identical pattern of acute lameness after a workout
- Lameness worked up with blocks

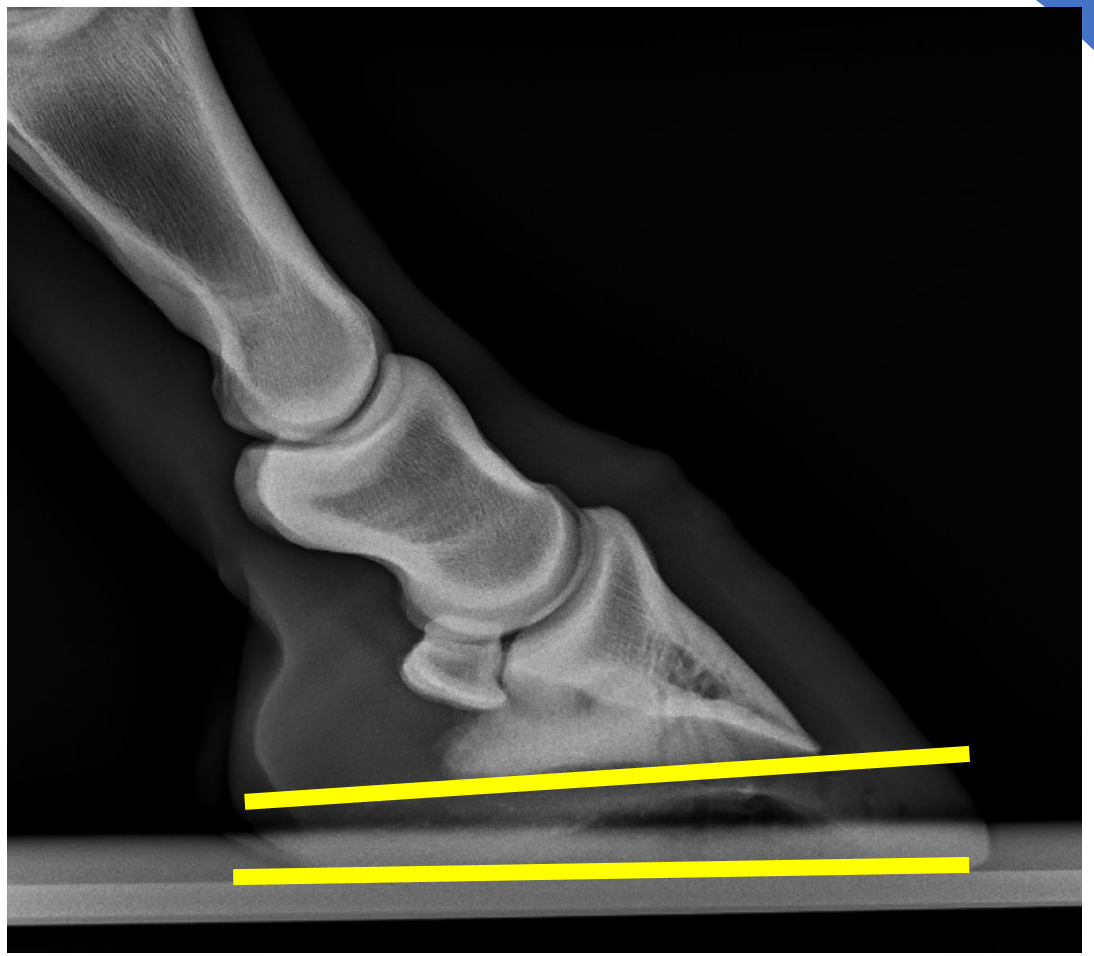


Case 1:

- Diagnostic nerve blocks are pursued
- A block of the right hind foot causes the lameness to shift to the left
- A block of the left hind foot eliminates the lameness
- Radiographs are pursued of the feet

Case 1:

- Negative Palmar angle:
- Places excess strain on the impar ligament (attachment between the navicular bone and coffin bone)

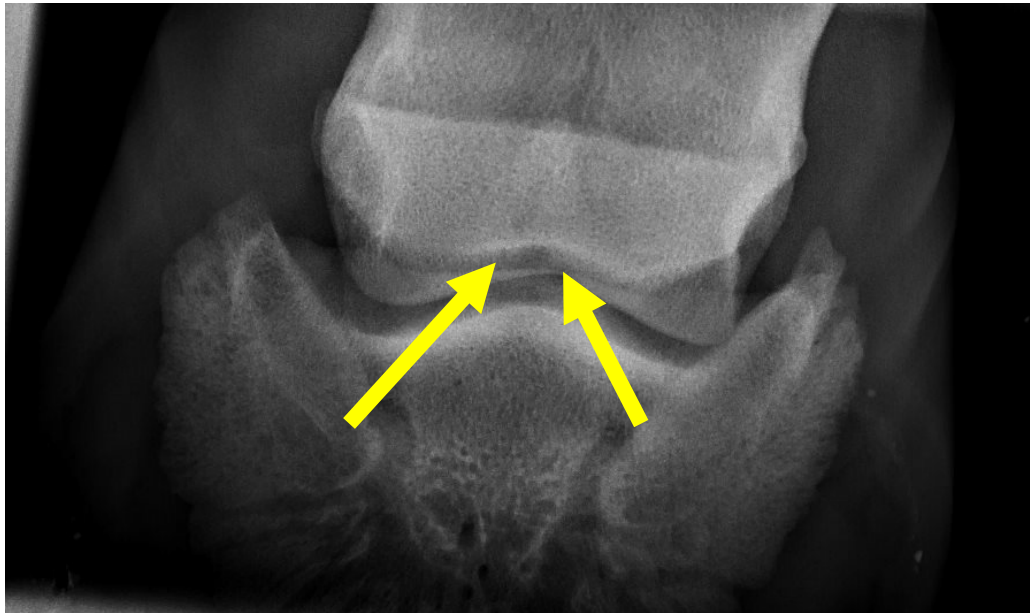


Case 1:

Sclerosis of distal border of navicular bone.

Suspected enthesiopathy of impar ligament – navicular attachment

MRI was not performed but would be expected to more conclusively demonstrate pathology



Case 1:

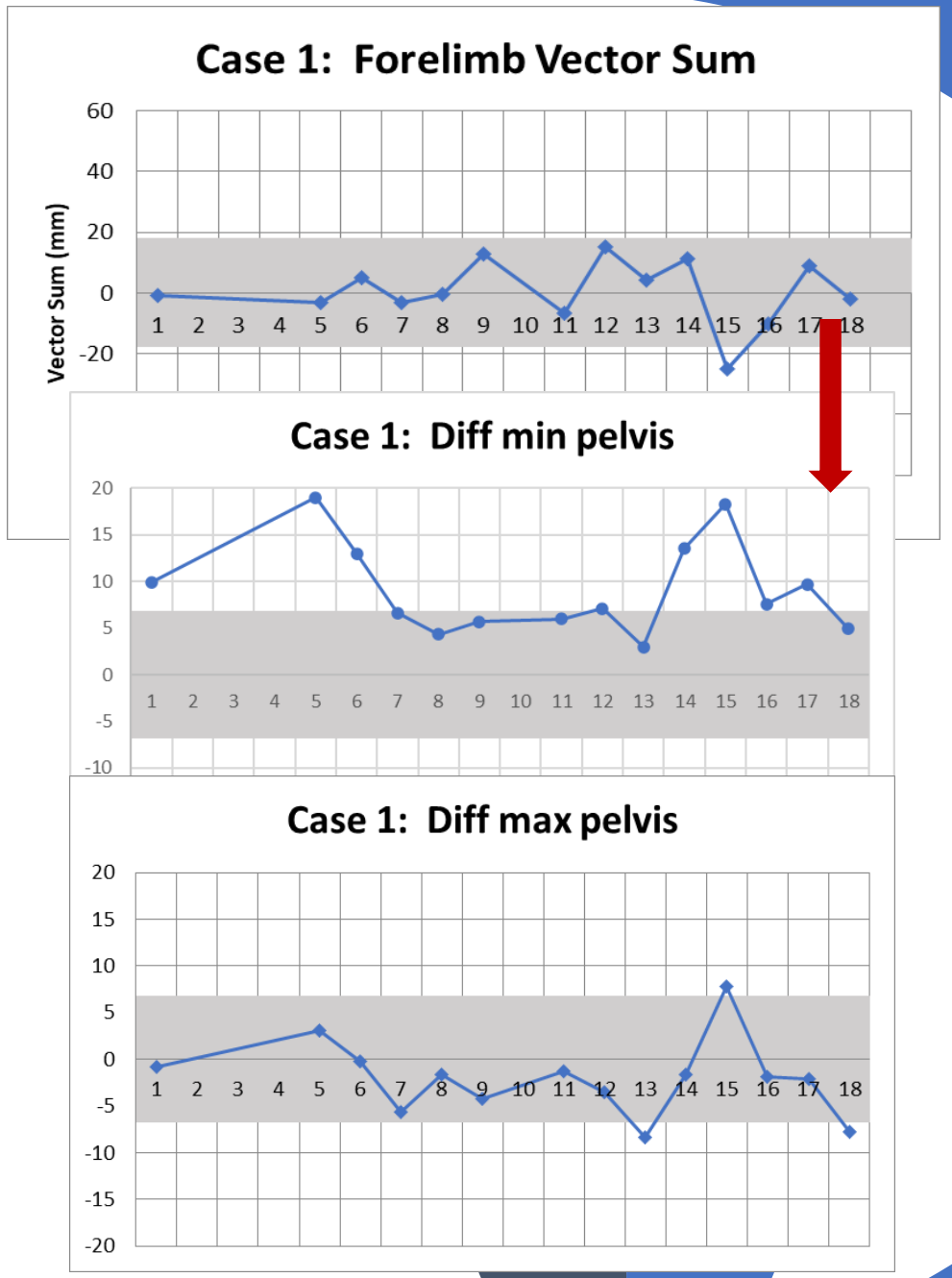
- Treatment:
- Trimming to balance the foot, removal of excess toe, apply XT shoes (no toe grab), shoe at regular intervals, and do not allow to go too long between shoeing

Case 1:

- Treatment:
- Primary treatment aimed at corrective shoeing
- Indicated therapies*:
- Corticosteroid injection of coffin joint/navicular bursa to alleviate local inflammation
- Bisphosphonates
- Shock wave of the impar ligament
- *Due to medication/procedure regulations, indicated therapies may be limited
-

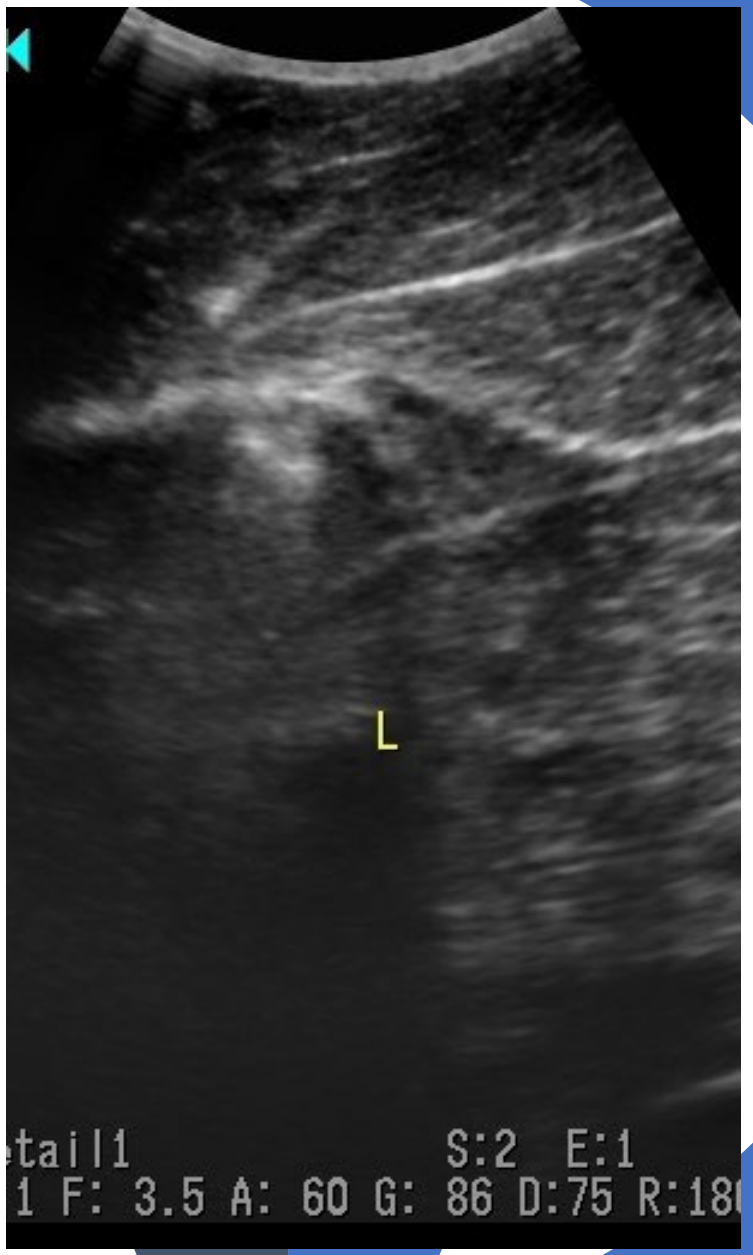
Case 1:

- Raced successfully between month 17 and 18, finished 3rd, no recurrence of lameness after the race!!



Case 2:

- 3 yo TB gelding
- Entered for first race on Nov 18, 2020.
- Flipped in the gate, vanned back to the barn non-weight bearing Left Hind limb
- Ultrasound shows traumatic fracture of greater trochanter



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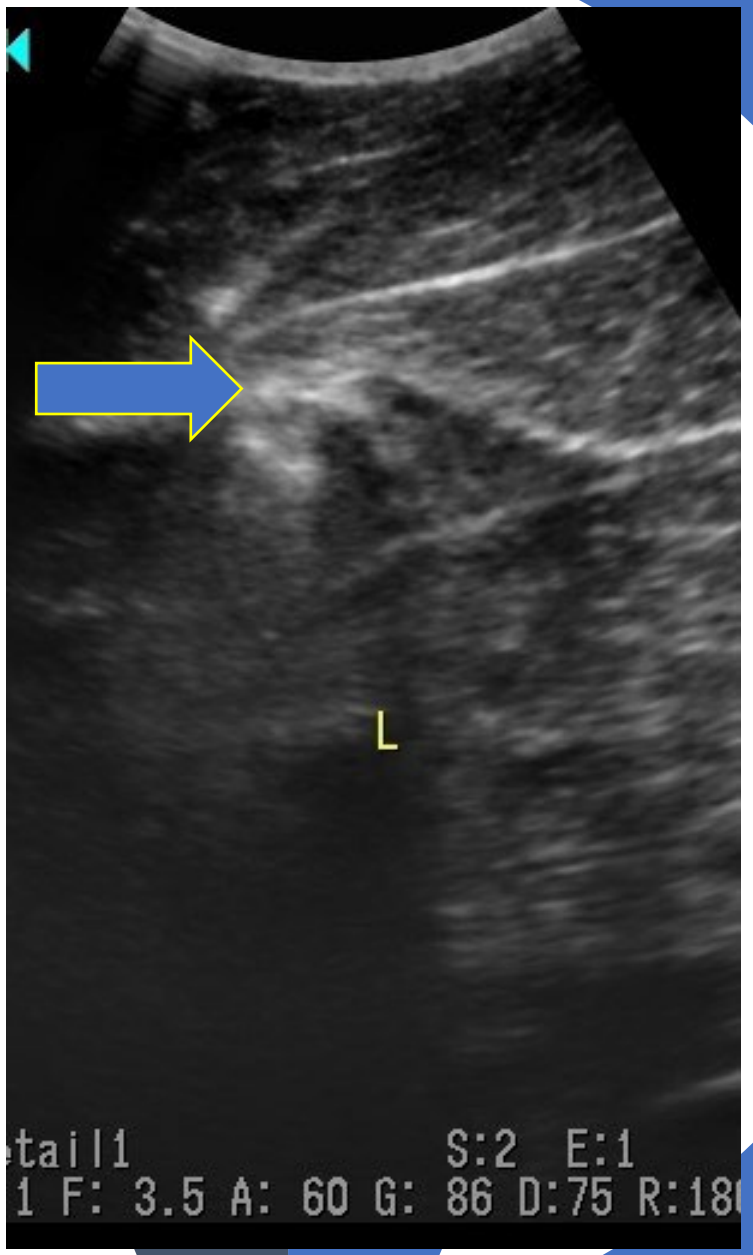
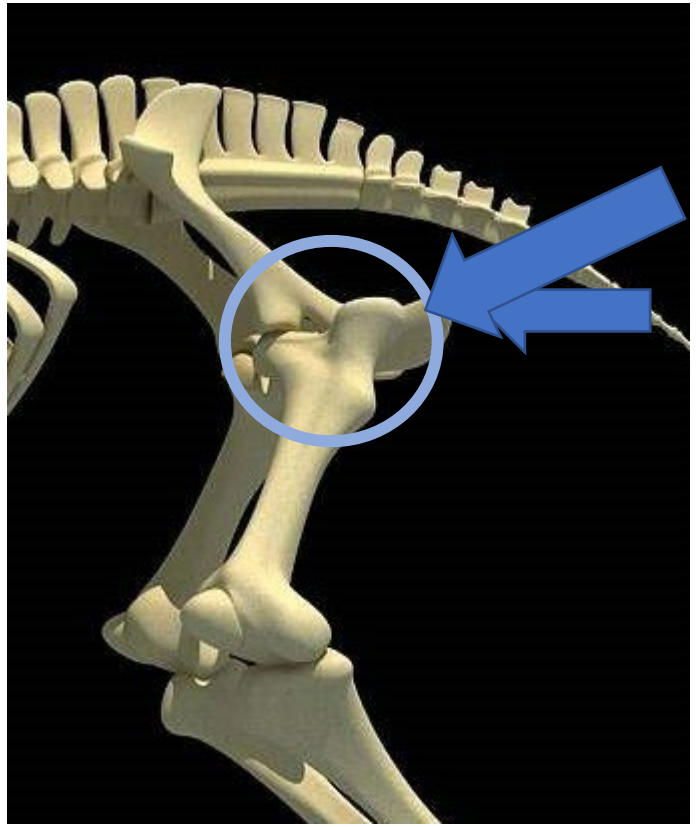


Case 2:

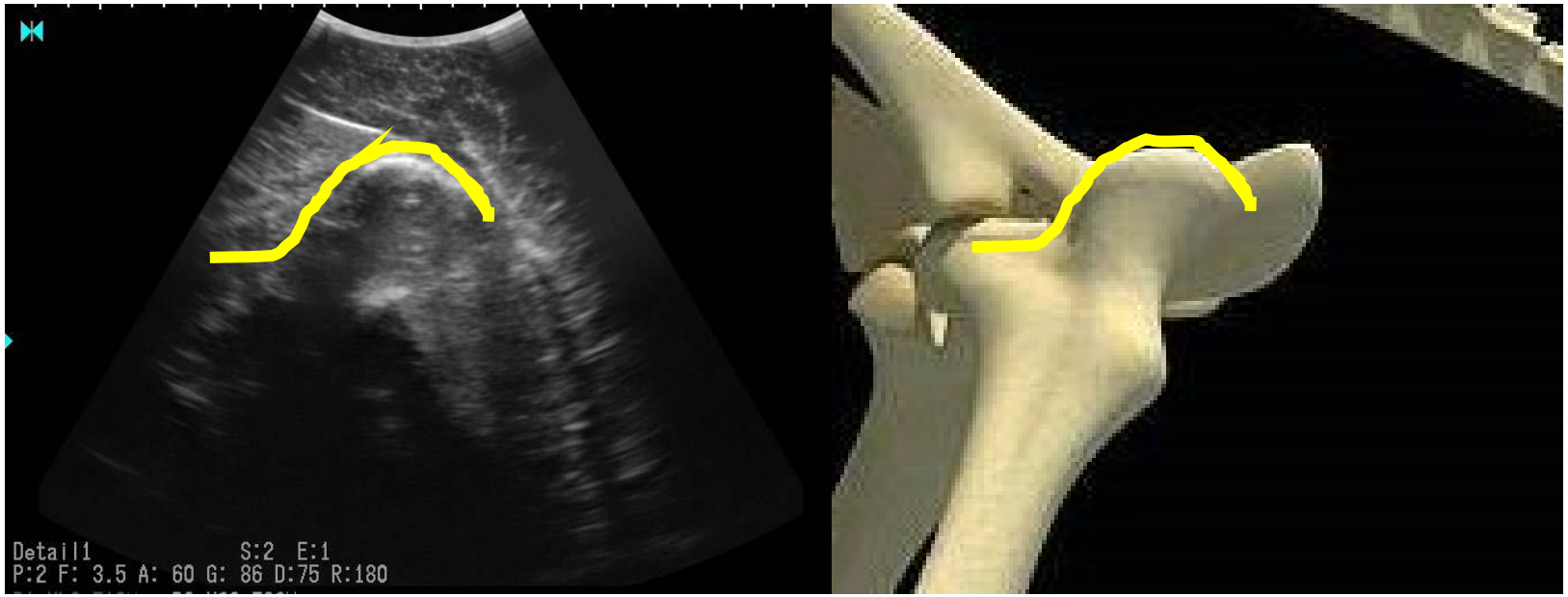


Greater Trochanter

Hip Joint

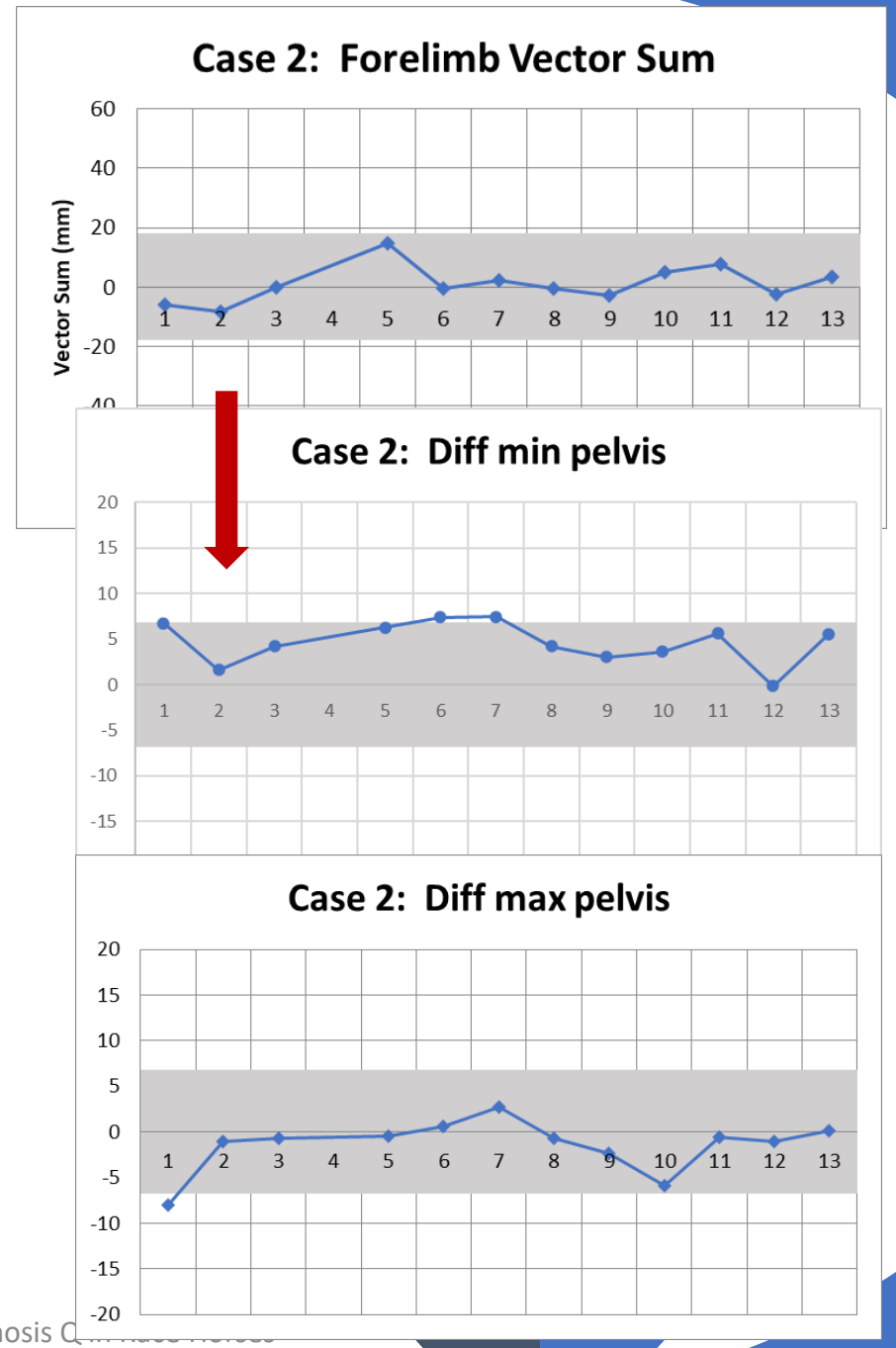
Case 2:

Normal ultrasound image of Greater Trochanter



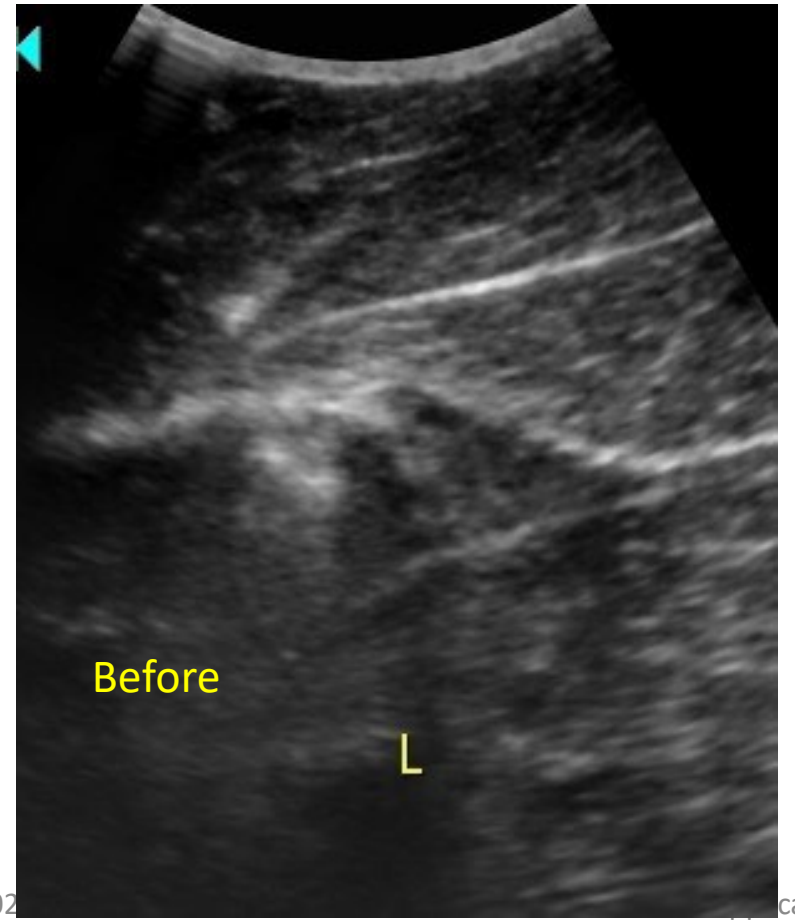
Case 2:

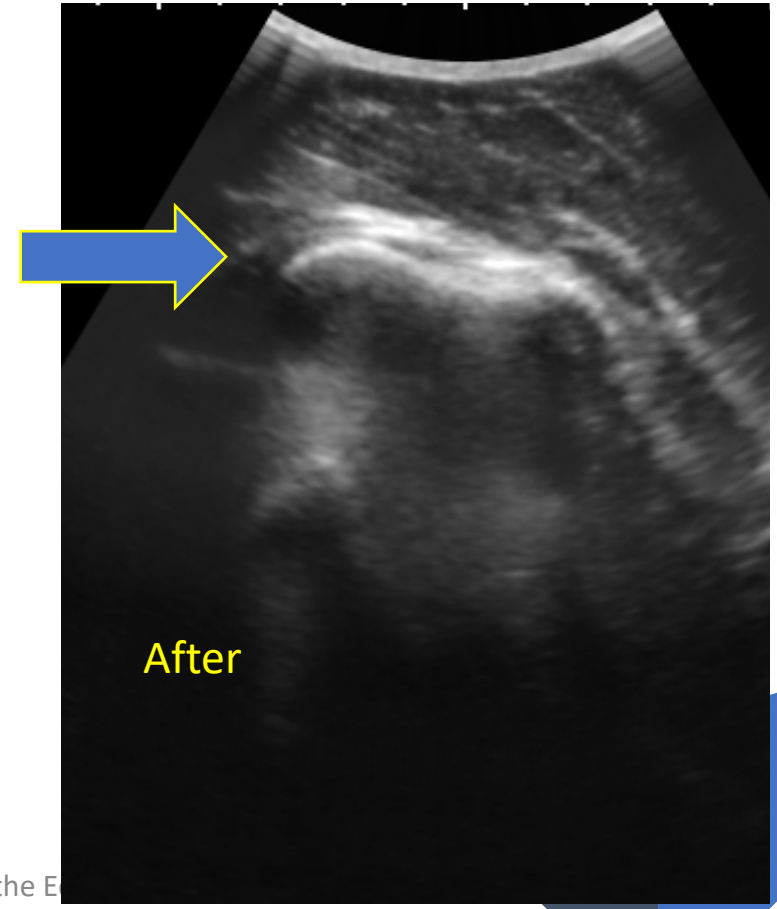
- Second evaluation three months after accident
- LH Lameness resolved as determined by Q, horse returned to training



Case 2:

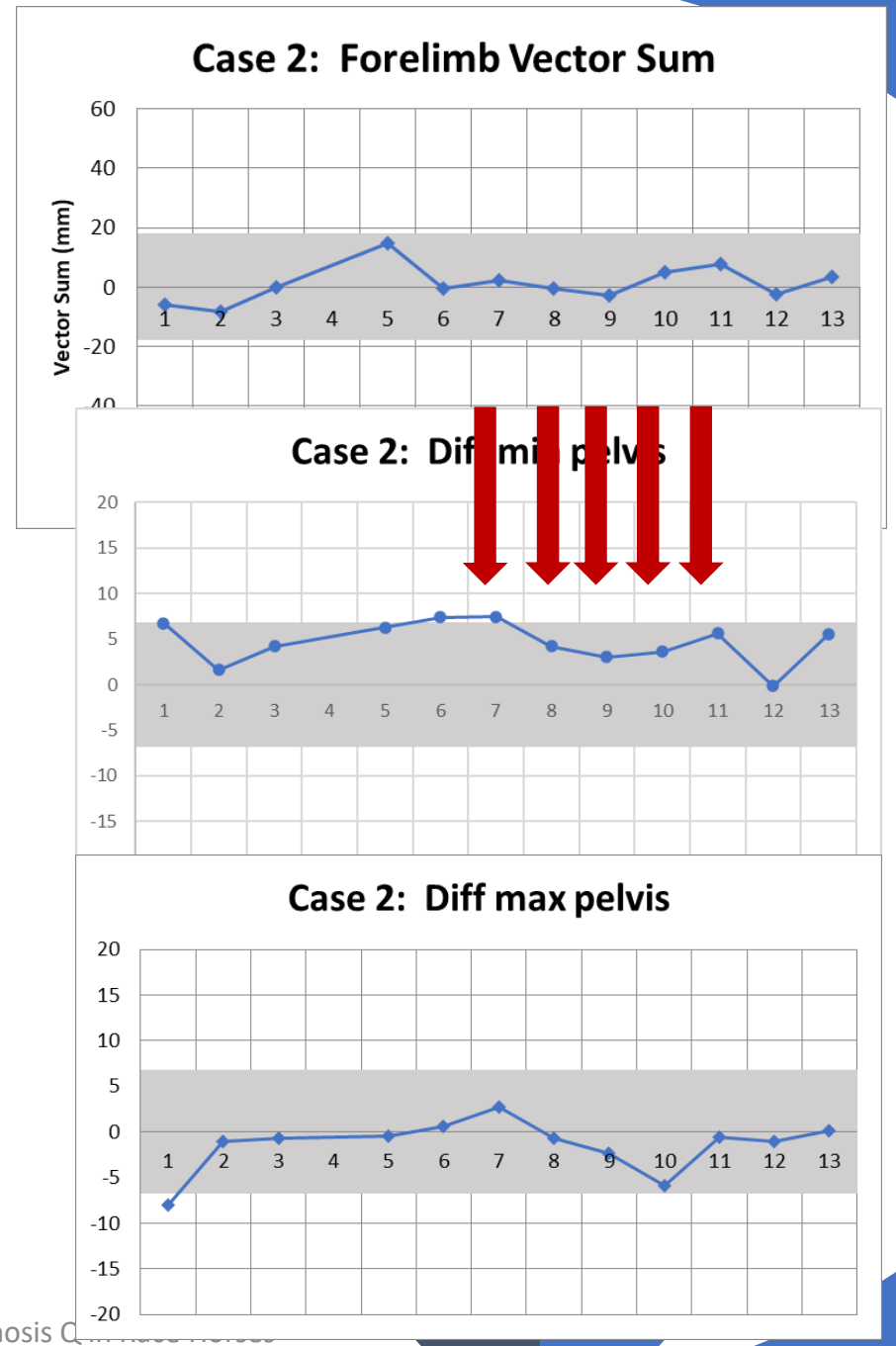
- Recheck ultrasound shows smooth remodeling of the greater trochanter





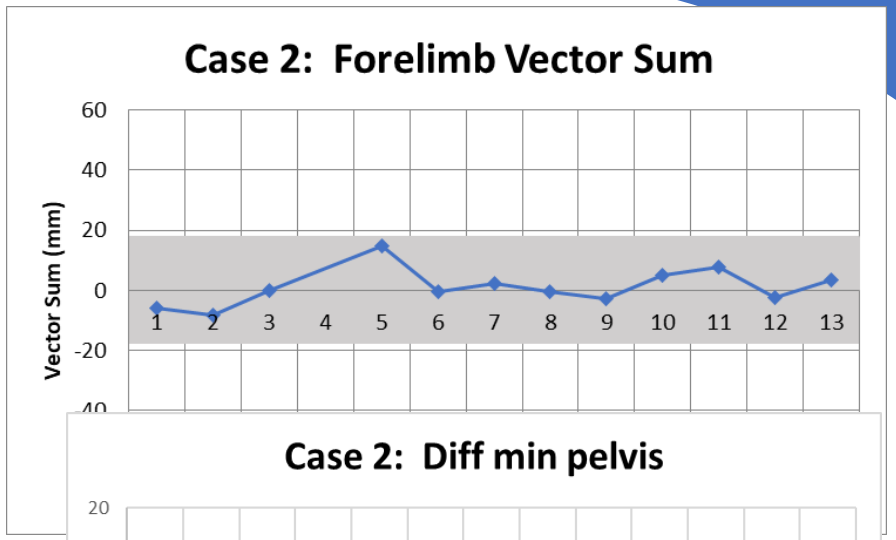
Case 2:

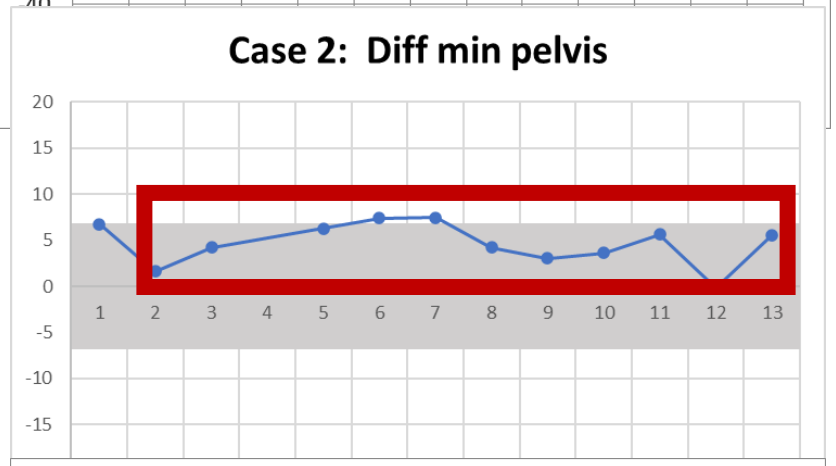
- Consistent hindlimb asymmetry evident in RH over the year, but the LH pushoff lameness associated with the accident does not return
- Competes successfully in five races in the season, with two wins

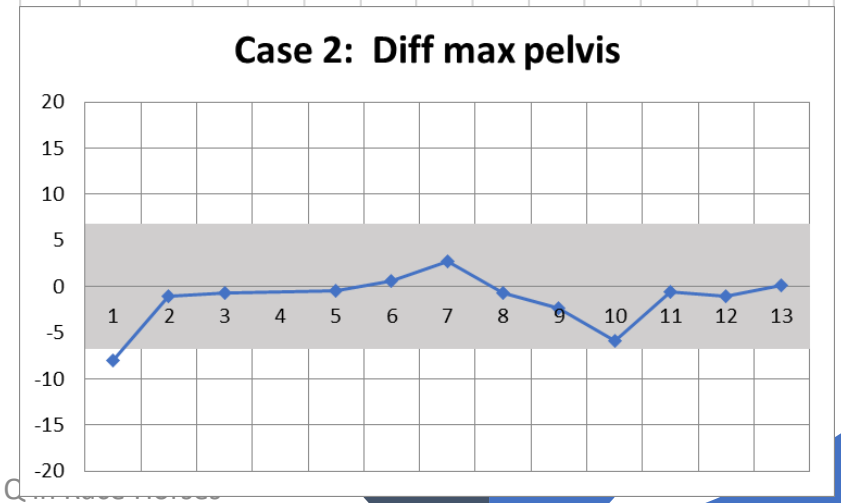


Case 2:

- Note that the RH impact asymmetry remains consistent over months of training and racing, suggestive of a “gait signature”
- The asymmetry exceeds the Q reference range, but only barely exceeds the “serviceably sound” threshold

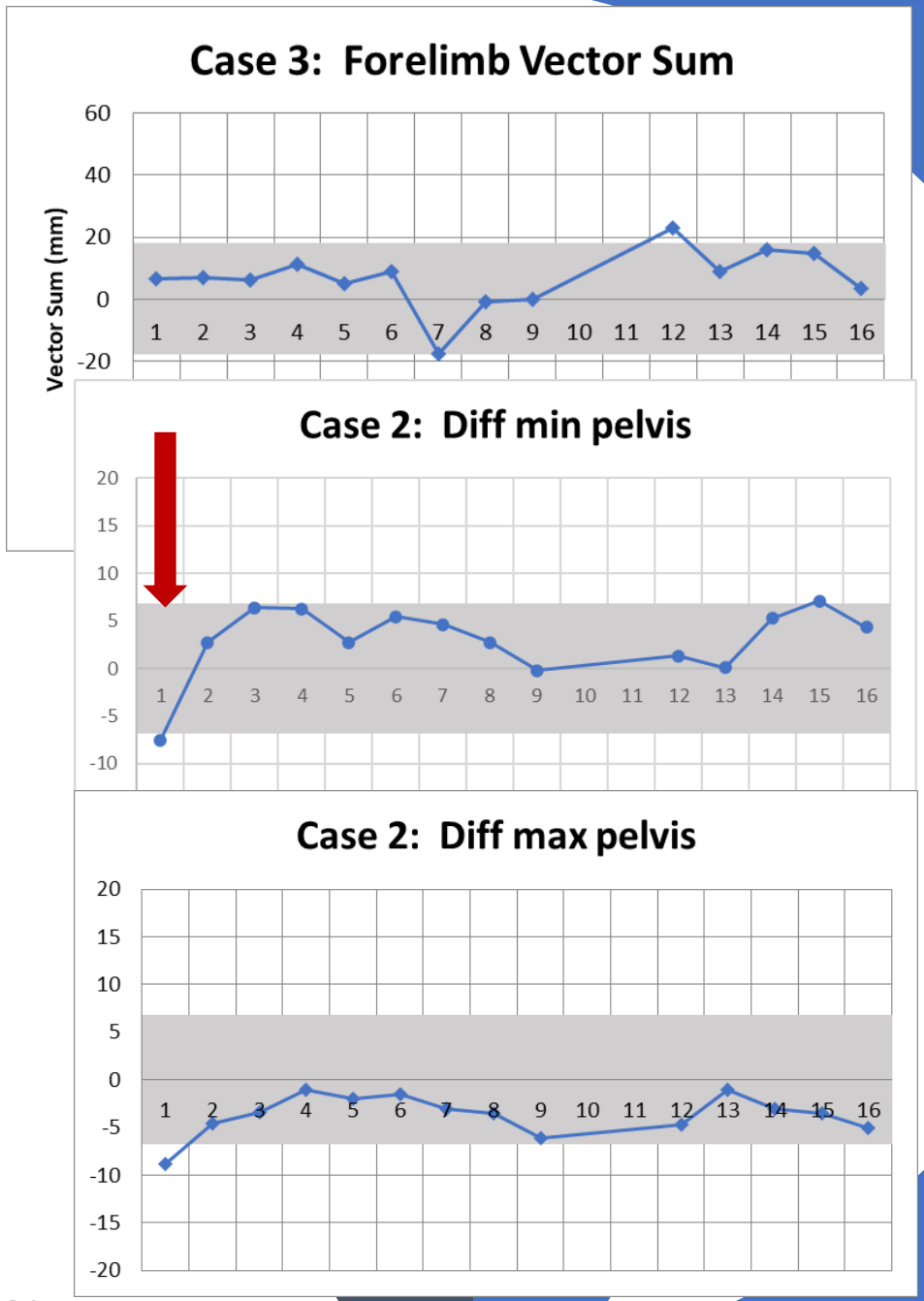






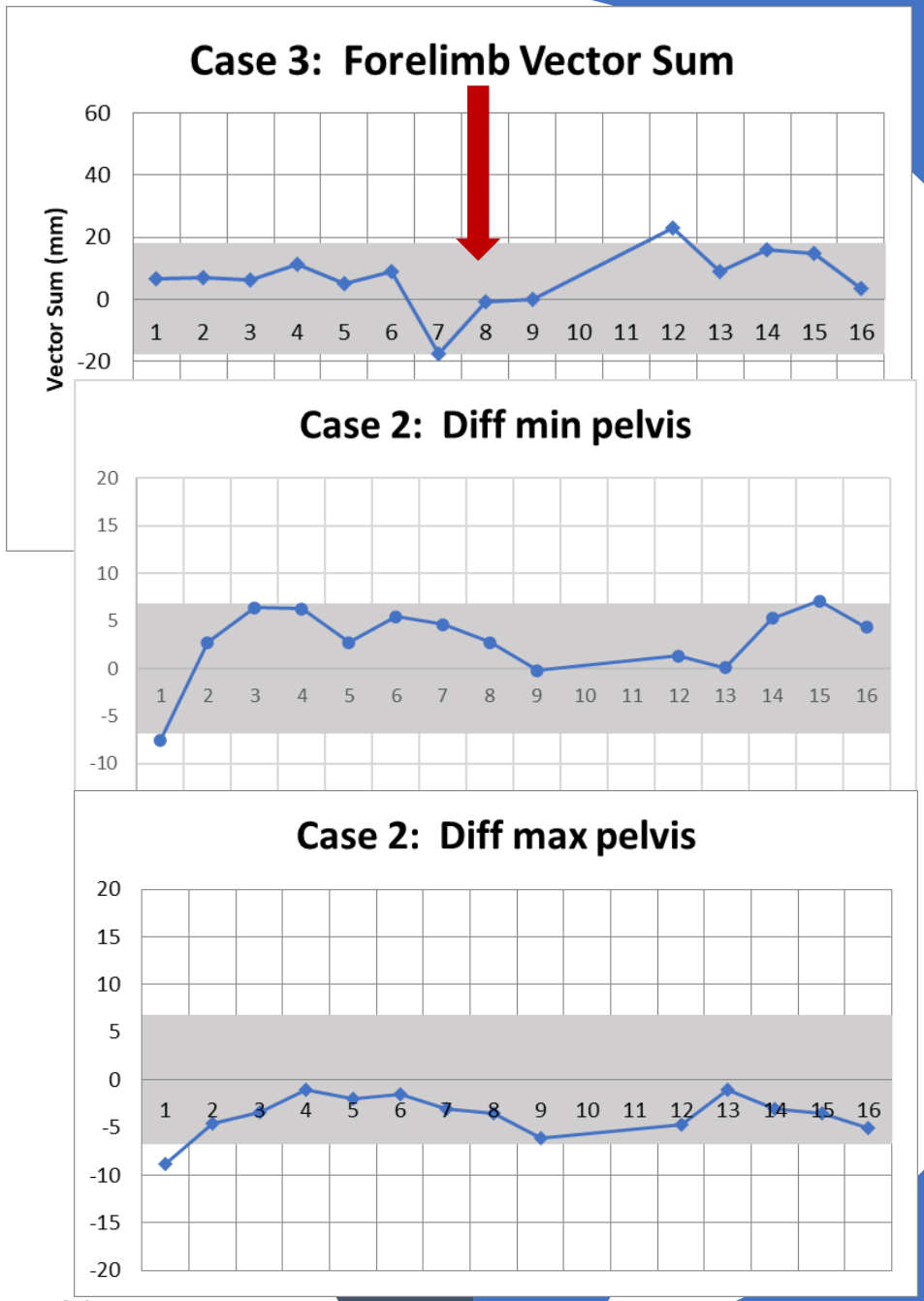
Case 3:

- In order to assess whether horses have a “Gait Signature” that is consistent over their lives, a group of horses were evaluated starting as yearlings, before breaking



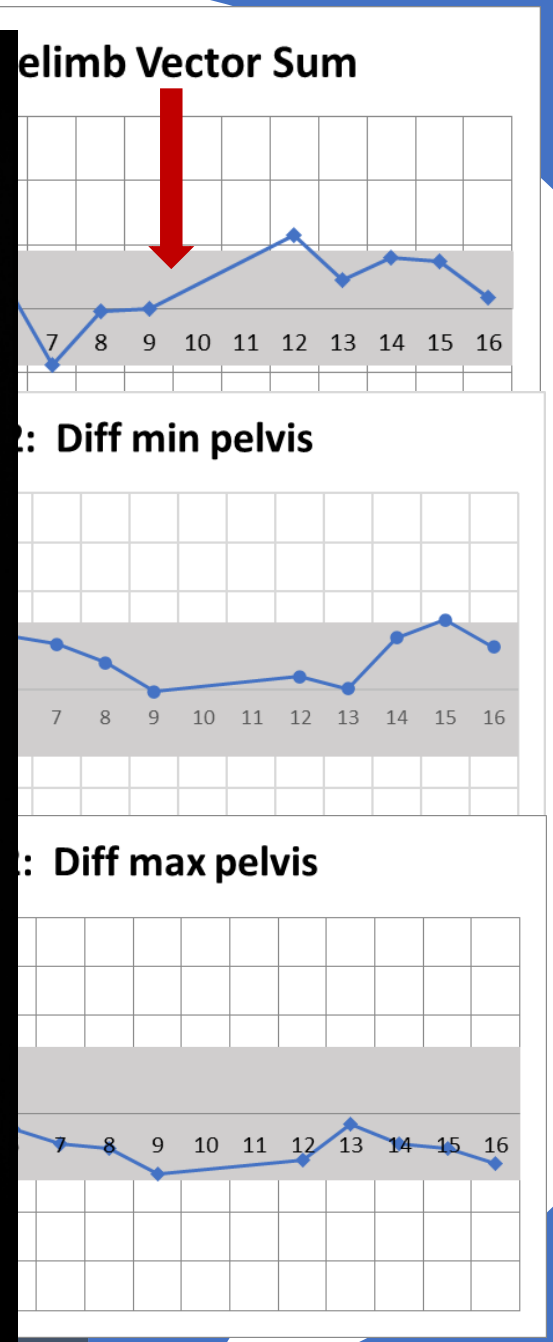
Case 3:

- Yearling filly
- Broke and started in training after month 1 evaluation
- Paddock turnout and barefoot until month 8, when front shoes were applied



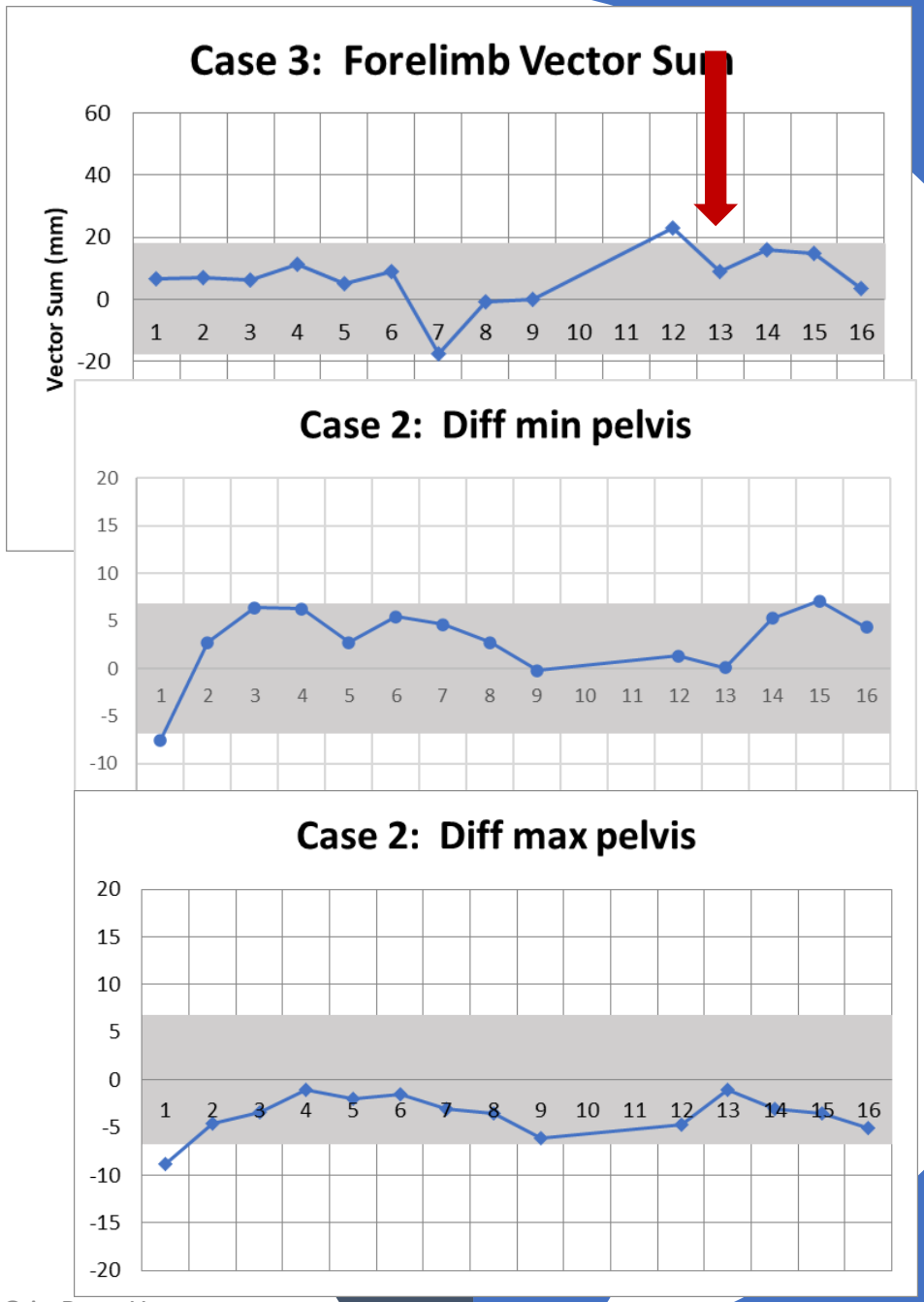
Case 3:

- Apical Sesamoid fracture sustained after a work three weeks after month 9 Q evaluation



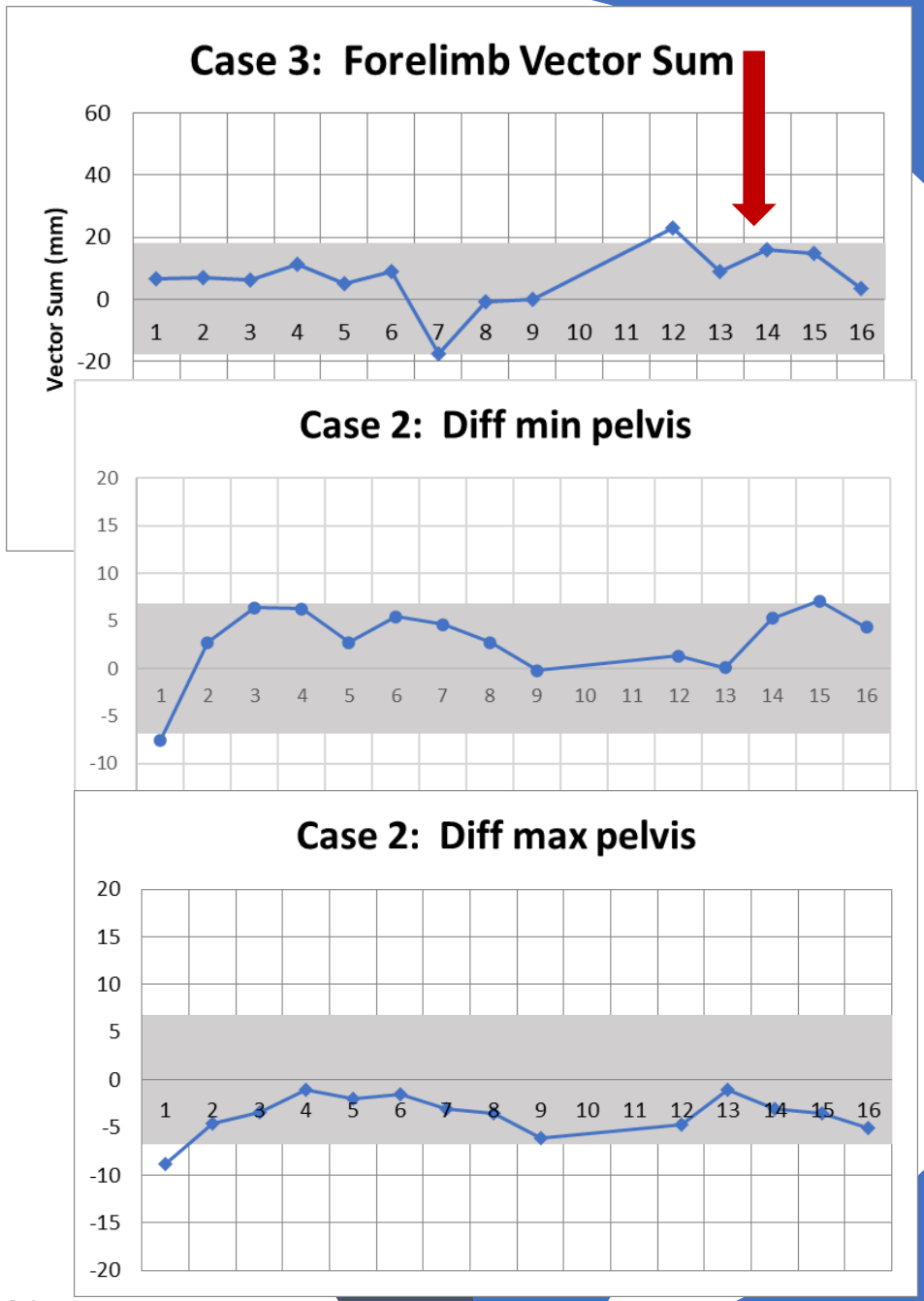
Case 3:

- Surgical removal of the apical sesamoid fragment between month 9 and 10
- Returned to training at month 13 based on Q finding



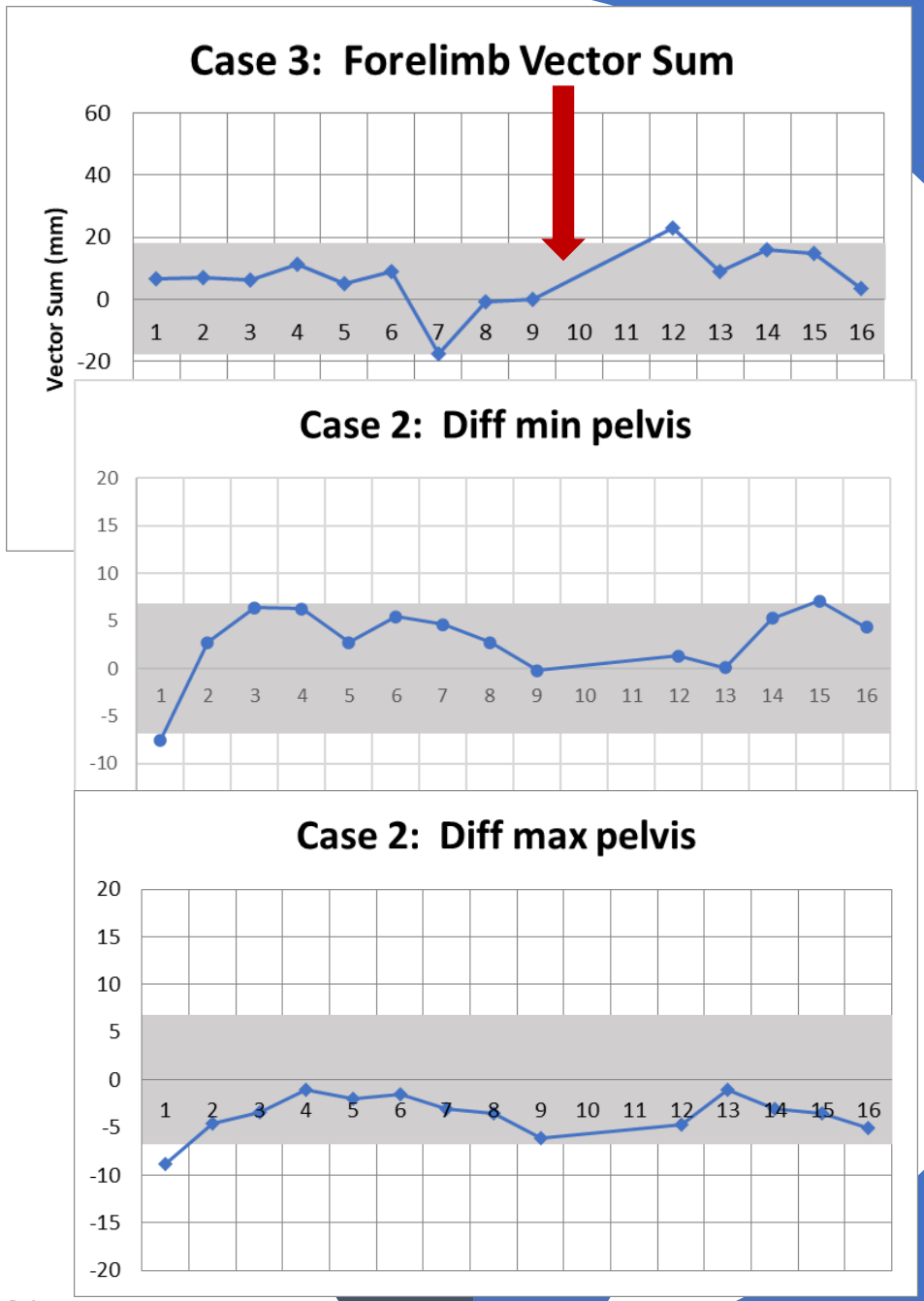
Case 3:

- Ankle injected with Noltrex between month 14 and 15
- Several works starting after month 15 evaluation
- So far, no negative impact of increasing speed



Case 3:

- No apparent evidence of pre-existing RF lameness before the sesamoid fracture
- It was three weeks between the month 9 examination and the fracture



Take Home Messages

- The Equinosis Q was an effective tool to determine when these horses on layup for an injury could safely return to training
- A single lameness examination by Equinosis Q is not effective as a screening tool to predict injury
- An objective “Gait Signature” can be identified when serial examinations are conducted over time
- Additional cases are needed before further conclusions can be drawn

Questions, or to enroll in the study, Contact:

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