Hind Limb Rehabilitation

Assisted Standing with Slings

- Slings may be used to allow your pet to have some independence while reducing the risk of stumbling, falling or doing the splits.
- The easiest way to make a sling is to roll up a towel, sling under the belly and support enough weight of your pets' back end to encourage as close to a normal posture as possible.
- Very useful in the first few days to weeks of recovery, but once your pet is taking some weight on the leg and seems stable, then discontinue, unless going over a slippery surface or over a small step.
- Gait training should begin with the use of a towel sling or "Help 'Em Up Harness" (http://www.dogsinmotion.com.au/shop/help-em-up-harness/). Encourage your pet to move slowly, allowing time for your pet to advance the limbs as independently as possible.
- Allow adequate time for the feet to come in contact with the ground with each step during the stance phase of gait. If your pet moves too quickly, it will often avoid bearing weight on a painful limb, adopting an abnormal gait, such as a three-legged lameness, hopping, or dragging of a limb.
- The emphasis is on weight-bearing with each and every step, encouraging a slow gait. It is important for each person handling your pet to be consistent and not allow your pet to move too quickly.

Assisted Standing Using Swiss Ball

- Used to actively assist your pet with stance, weight-bearing, weight-shifting.
- Unless your pet is small, this technique may require two people to properly assist the patient.
- Your pet is placed in a standing position over an appropriately sized exercise ball (or even an office chair with wheels)
- The size should allow your pet to touch the ground with all four feet
- If the ball is too tall, it may be deflated to meet your pet’s height
- Balls that are slightly deflated are softer, more stable, and easier to work with than those that are fully inflated and very firm, and conforms to your pet’s body better
After your pet is secure on the ball, one person stabilises the front of your pet and another stabilises the rear.

While your pet is supported in a standing position with paws on the ground, the handler can generate a very gentle up-and-down bouncing motion through the patient and the inflated roll.

This provides proprioceptive input and may stimulate contraction of the supporting limb muscles.

Weight-bearing in the back legs may be promoted by shifting the ball forward.

As your pet becomes stronger, these same techniques can be performed at faster speeds to provide greater challenges to neuromuscular function and balance.

### Standby Assisted Standing

- Your pet may have weakness and an occasional loss of balance, requiring standby assistance.
- You should be at your pet’s side, ready to guard against a fall due to a loss of balance.
- You don’t need to assist your pet unless support is needed to prevent a fall. As strength improves, your pet will be more willing to use the affected leg.

### Weight Shifting

- When an animal is able to stand independently (without assistance) and safely, activities to improve balance may begin. Dynamic balance is your pet’s ability to maintain balance while the body is moving, such as while walking.
- The following exercises may be performed to challenge your pet’s dynamic balance.
- These exercises should be conducted on a non-slip surface to provide adequate traction and reduce the risk of falling.

- While your pet is standing, a treat may be used to encourage weight-shifting.
- Your pet should follow the treat up and down and side to side.
- Start with small movements and progress to larger, more challenging movements. The movement of the head causes your pet’s centre of gravity (COG) to shift. As the COG shifts, your pet must shift its weight to maintain its balance.
- To maintain the unassisted standing position, your pet is required to use strength, coordination, and balance.
- You may also attempt to disturb your pet’s balance by gently pushing your pet at the hips or lifting the unaffected limb. The goal is to disturb its balance just
enough so your pet can recover, being careful not to push with a force that may cause your pet to fall. Generally, pushing your pet to the more affected side challenges your pet sufficiently to allow the activity to have the desired effect.

- Some dogs become conditioned to this activity and shift their weight toward you to prevent being pushed toward the affected side. In this case, a rebound weight shift may be effective. For this manoeuvre, gently push your pet toward the affected side. When your pet shifts its weight to resist the movement, suddenly release the pressure, and simultaneously push gently toward the unaffected side, but to keep from falling, it immediately shifts its weight back toward the affected side.
- Weight shifts may also be performed during walking. As your pet is walked in a straight line, gently bump or push your pet to one side to challenge your pet to maintain its balance. Caution should be used to tailor the force of the push to your pet’s stage of recovery to avoid falls and injury.

**Manual Unloading of One Limb during Stance**

- Lifting and holding a single limb off the ground while your pet is standing causes a shift in your pet’s COG. Your pet shifts its body weight and COG to maintain the standing position.
- Lift the good leg off the ground. If your pet is unable or unwilling to perform this exercise, it will not shift its weight properly, but instead will bear the weight on your hand or collapse to the ground.
- A technique to avoid bearing all of the weight on your hand is to slowly pull the leg away from your pet's body, which allows transfer of weight from you to the desired limb to avoid falling.

**Methods to Encourage Weight-Bearing**

- A bottle cap taped/bandaged under the bottom of the opposite (unaffected) foot pad often encourages weight-bearing in patients that are reluctant to place weight on a limb.
- Some dogs will build up a tolerance to the item; therefore continuous application is not recommended.

**Mega-Balance Disc**

- A mega-balance disc (available from some physiotherapists or sports stores – see hartsport.com.au located on Zillmere Rd in Aspley, about $55) may be used to gently rock your pet forward and backward, and side to side. This may be used to help your pet practice proprioceptive positioning by placing the hind limbs on the disc while the front limbs remain on the ground.
- Gently rock the pelvis from side to side and back to front to allow your pet an opportunity to shift its weight and exercise its proprioceptive (balance) mechanism, and recruit the appropriate muscles in the process.

**Leash Walking**

- Slow leash walks are the most important exercise in the early rehabilitative period, and they are commonly performed incorrectly.
- Walking your pet slowly encourages the use of all limbs in a sequenced gait pattern.
- Walks must be slow enough to allow weight-bearing; if your pet is walked too fast, the tendency is to simply hold the intended limb up in a flexed position and not bear any weight on it.
- Slow leash walking is indicated when your pet is reluctant to use a limb as a result of pain and/or weakness. Slow leash walks encourage placement of each limb on the ground, increasing stance time and weight-bearing.
- If there are no contraindications to weight-bearing, slow leash walks may begin very soon after most orthopaedic procedures.
- Behaviour modification is important. Your pet should be praised when touching the limb to the ground, and not praised when the leg is held up.
- As your pet regains use of the affected limb and is consistently able to place the limb at a slow leash walk, the pace of the walk may be increased.
- Faster walks further challenge balance, coordination, proprioception, and cardiorespiratory endurance, as well as functional muscle strengthening and endurance.

**Sit-to-Stand Exercises**

- Sit-to-stand exercises help strengthen hip and stifle extensor muscles and improve active range of motion. The act of sitting, then standing up, requires muscle strength of the quadriceps, hamstring, and gastrocnemius muscle groups.
- Some training will be necessary, and low-calorie treats may be offered as a training aid to provide motivation to perform the movement. It is important to perform these exercises correctly. Attention should be paid to sitting and standing straight, with no leaning to one side, and the joints of both rear limbs should be symmetrically flexed so that your pet sits squarely on its haunches.
- While on the leash, after a sufficient warm-up period of walking, ask your pet to sit squarely for a few seconds and then ask your pet to stand, take a few steps forward, and then again sit. The sit-to-stands may be repeated a number of times before your pet is allowed to rest. It may be easier in some cases to back your pet into a corner, with the affected limb next to a wall so that your pet cannot slide the limb out while rising or sitting. Start with 5 to 10 repetitions once or twice daily, and work up to 15 repetitions three to four times daily.
- This exercise may be particularly beneficial for dogs with osteoarthritis of the hips. These patients generally feel pain when the hip joints are extended. In addition, there may be atrophy of the gluteal muscles. The sit-to-stand exercise
allows active contraction of the gluteal muscles, but the hip joint is not generally extended to the point that results in pain. This allows strengthening without creating undue pain.

Aqua-treadmill Walking (Hydrotherapy)

- Walking in an aqua-treadmill is very useful in rehabilitation. Most dogs trained to a leash readily take to treadmill walking in one or two sessions. Dogs that are water-shy may take a little patience to become accustomed to hydrotherapy, but persistence is well rewarded with positive outcomes.
- When your pet stands with the foot carried near the ground, it will generally begin to weight-bear when it is walked on a treadmill.
- Having one person standing in front of your pet with words of encouragement or treats and one person straddling your pet behind is helpful in the early training stages to keep your pet walking straight.
- The ground moving underneath your pet often encourages a dog that is non-weight-bearing on a limb as a result of an orthopaedic condition to begin using the limb.
- In many instances, your pet will continue to use the limb even after the treadmill session is over.
- Treadmills may be useful during the initiation of rehabilitation programs for conditions in which extension of the hip or stifle is painful (eg hip dysplasia, post-operative recovery from cranial cruciate ligament surgery and/or medial patella luxation surgery).
- Normally, patients are reluctant to perform activities such as climbing stairs, because extension of these joints is painful.
- Treadmill walking is less painful in some patients because the belt provides assistance with hip and stifle extension by helping to pull the rear limb back.
- There is less need for active contraction of the gluteal and quadriceps muscles for joint extension when walking on a treadmill than when walking on land.
Inclines and Declines

- Walking your pet up inclines aids in strengthening of the quadriceps and hamstrings with relatively low-impact activity. Muscle strength in the hips and stifles is required for your pet to propel itself up an incline.
- Walking should be done slowly and on leash; otherwise your pet may only toe-touch with the limb or hop in a non-weight-bearing fashion. In addition, if the head is held up slightly, the weight will be shifted caudally, requiring your pet to drive up the hill with the rear limbs and use the muscles to a greater extent.
- Weight-bearing while climbing promotes extension at the knee and hip. When the limb is in the stance phase of gait and the body is traveling forward, the knee and hip must extend to propel your pet forward. If extension is painful, your pet’s stance time on the limb is shortened and an altered gait results.
- Inclines and declines should be introduced slowly, beginning with gradual inclines. As your pet’s range of motion and strength improve, your pet may be challenged by walking up longer, steeper slopes and by increasing the duration and speed of the climbing exercise.
- Walking down inclines is typically more difficult because it requires your pet to reach under the body with the hind limbs, requiring flexion of the hock, stifle, and hip.
- Start with gently sloping, short-declines and progress to steeper ones as your pet is able.

Standing or Walking on Different Surfaces

- Altering the texture of the ground surface over which your pet walks provides a challenge to your pet’s functional walking proprioceptive ability. Standing or walking on foam, rubber, egg-crate mattresses, normal bed mattresses, air mattresses, sand, and trampolines allows your pet to negotiate various surfaces that have some resiliency.
- Having different surfaces on either side of your pet while walking or changing the type of surface your pet must negotiate with all limbs during a walk provides additional challenges that may be integrated into the rehabilitation program.

Stair Climbing

- As your pet consistently begins to use the affected limb (or limbs) at a walk with decreasing lameness and is able to walk inclines and declines with minimal difficulty, stairs may be added to the treatment plan.
- Climbing stairs is useful to improve power in the rear limb extensors, range of motion, coordination, and balance.
- Quadriceps and gluteal muscle groups are strengthened as your pet pushes off, extending both hips and stifles while propelling the body weight up the steps.
- Stair climbing may begin if the repair is stable and your pet is consistently using the limb at a walk with progressively decreasing lameness.
- Your pet must begin slowly climbing stairs to encourage proper use of the rear limbs, as opposed to simply carrying the limb, hopping with both hind limbs, or skipping up stairs.
- Encourage your pet to go slowly and deliberately, climbing the stairs in a reciprocal stepping gait.
- Stairs should be introduced slowly because this is a challenging exercise for both the musculoskeletal and cardiovascular systems and your pet may fatigue quickly. Initially, some dogs may require assistance from you. Begin with five to seven steps, and gradually increase to two to four flights of stairs once or twice daily.

**Thera-band**

- To add resistance to limbs during walking activity to aid with muscle strengthening, an elastic band (Thera-band – available from most physiotherapists) may be used to provide resistance to specific muscle groups.
- The colour band you use depends on the stage of rehabilitation. The lighter resistance levels (tan and yellow) are good for pets in the early stages of rehabilitation. Medium levels of resistance (red and green) are good for pets that have made a good improvement in muscle strength and mobility and are ready to progress that bit further. Higher levels of resistance (blue, black, silver, and gold) are for pets and owners who are keen to get ready for full off leash activity, and have been given the all clear by your veterinarian.
- Tie a knot in one end sufficient to allow the loop to be slipped over the foot. The band can be placed under the belly, over the back and to itself with a bulldog clip, cable tie or similar. In some dogs with a steep sloping rump, there may be a tendency for it to slip off. If it slips towards the tail, you may need to secure it to the collar with an additional cord, strap or tie.
- Assisted active advancement of the limb during the swing phase of gait with a Thera-band really helps with muscle weakness. You may also manually place the foot as your pet learns to walk with the Thera-band.
“Dancing”

- Dancing is a technique to increase weight-bearing and force on the rear limbs, while also challenging proprioception, coordination, and balance.
- When your pet’s front legs are lifted off the ground, this shifts the weight to the hind limbs and also promotes stifle, hock, and hip extension.
- The higher your pet is elevated off the ground, the more extension is required in the rear limb joints.
- When your pet is using its affected limb consistently at a walk with minimal lameness, dancing may begin.
- The forelimbs are lifted off the ground, allowing the patient to bear weight only on the hind limbs. Most pets will naturally move the rear limbs as you move, and your pet “dances” backward and forward.
- Some dogs may resist dancing forward if you stand in front of your pet; dogs may plant their hind limbs and stretch out as you move until the forelimbs reach the ground. In this situation, you should stand behind your pet, placing their arms under the armpits to support your pet, and walk forward.
- How far your pet is elevated off the ground depends on the amount of stress your pet is able to comfortably handle on the hind limbs.
- Dogs may be elevated as high as possible and also dance up and down inclines or hills to place additional stress on the hind limbs.
- Your pet’s orthopaedic condition must be adequately stable to handle the stresses of this exercise.

Cavaletti Rails

- Cavaletti rails are poles that are spaced apart on the ground at a low height. Cavaletti rails may be used to encourage greater active range of motion and lengthened strides in all limbs.
- An alternative to cavaletti rails is to use a ladder and allow the rungs of the ladder to act as the low rails. Although ladders are readily available in most households, they have limited flexibility to change the distance between the rungs and the height that your pet steps over the rungs.
- One or more poles may be used and should be spaced at appropriate distances apart, determined by your pet’s natural stride length. After your pet becomes accustomed to the task, you can further challenge your pet by:
  - adding more poles
  - increasing the height of all the poles
  - putting the left and right sides at different heights
Walking in Sand

- Walking in deep sand provides resistance to limb movement during walking and jogging and strengthens the flexor muscles, which must contract more to advance the limbs. Exercising in sand minimizes concussive forces placed on arthritic joints, while allowing strengthening of supporting muscles.

Pole Weaving

- Weaving between vertical poles helps to promote side bending of your pet’s trunk and leg muscles. The distance between poles should be adjusted so that sufficient side bending results; in general, the distance between poles should be slightly less than the body length of your pet. In addition, you must lead your pet so that the head, neck, and body actually flex as the poles are negotiated.

Tunnels

- Agility training tunnels or children’s play tunnels may be used to promote flexion in the fore limbs and hind limbs.
- The size of the tunnel opening should be appropriate for the size of your pet, that is, just shorter than your pet’s standing height. Your pet is encouraged to crouch low and “crawl” through the tunnel, which requires greater limb flexion and strength than that needed for normal walking.
- Greater challenges may be instituted by using tunnels that are less tall as dogs strengthen their muscles.

Leg weights

- Leg weights may be fashioned from zip lock bags with sand in it strapped to the ankle/hock, or commercially available leg weights for people may be used. In general, 250g sand per 10Kg bodyweight.
- Caution should be used when first applying the weights because some dogs may shake the limb or have exaggerated limb motion because of the altered sensation. It is possible that injury may occur, so it is important to gradually introduce the weight to allow a period of accommodation.