FOUR LEG NEWS

September – October 2014 Volume 3, Issue 5

HI FOLKS …

As fall starts to settle in (in the northern hemisphere), there are some days and evenings that a better spent indoors, bundled and warm, with a good newsletter in hand (or on the iPad). And I have a great newsletter for you to do just that!

This issue of Four Leg News is dedicated to canine athletics, with agility being the main focus. I have found a number of references (some you might already be familiar with, and some might be new to you), but overall, there isn't much in the literature on this sport. Which is unfortunate, as it can make up a large percentage of a rehab clientele base!

I am delighted to also have two 'guest reviewers' provide commentary on 4 separate articles. So, you are getting more than just MY opinion on things. Thank you to Lorna Clark, PT and Carrie Smith, PT for generously allowing me to print their article reviews.

Enjoy this issue… and be sure to drop me a line to give me feedback on this newsletter, make topic suggestions for other educational pieces of content, or to offer up some of your own useful videos, tools, articles, etc. If they're right for the group, then perhaps we can share!

Until next time… Cheers!
Laurie

A Survey of Injuries Occurring in Dogs Participating in Canine Agility

Levy I, Hall C, Trentacosta N, Percival N. A Preliminary Retrospective Survey of Injuries Occurring in Dogs Participating in Canine Agility Vet Comp Orthop Traumatol 4/2009, 321-324

Objectives:
Canine agility is a relatively new sport and at the time of publication there was not much known about the potential for injury. This study looked at risk factors associated with, and injuries sustained by dogs competing in agility trials.

Methods:
The study was a retrospective survey. Dog owners and handlers were asked to complete a questionnaire including questions on signalment, the injury sustained, any obstacles involved with an injury, and environmental factors. A separate questionnaire was completed for each injury any individual dog suffered.

Results/Conclusions:
1627 dogs were included in the study. 67% were uninjured. Of the 33% with injuries, 58% were injured during competition.

Border Collies, Australian Shepherds and Shetland Sheepdogs sustained the most injuries, with soft tissue injuries being the most common type of injury and the back and shoulder being the most common location.
Most injuries related to direct contact with an obstacle, the A-frame, dogwalk and bar jumps being obstacles resulting in 65% of contact injuries. The most common non-contact injury was slipping.

Of dogs not able to compete, 39% had minor injuries (unable to practice or compete for </= 6 weeks), 49% had major or chronic injuries (unable to practice or compete for >/= 6 weeks) and 12% dogs retired due to their injuries.

This study provided information regarding injuries occurring in dogs participating in canine agility. The hope of the authors was that this information would help guide future development of the sport as well as help veterinarian health professionals understand the nature of injuries related to the sport.

Commentary / Relevance to Rehab:
Firstly, I want to start by reminding readers to always read an article with a questioning mind and beware of taking all information at 'face value'. In the case of this article, an owners' survey can only tell us about the owners'' perceptions of what occurred with their dog and/or their own interpretation of what their veterinarian may have diagnosed. These perceptions and interpretations may or may not be accurate. As well, assuming that a veterinarian assessed the injured animals, an assumption cannot be made that the diagnosis was accurate. I know from teaching veterinarians in canine rehab for over 12 years, that without further training in rehab or manual therapy, that many are unable to pinpoint localize many soft tissue injures or spinal joint dysfunctions prior to advanced instruction in this area. Thus, I feel it would be important for studies to be conducted where rehab professionals with more advanced training in canine rehab & spinal manual therapy do assessments in this clientele-base. Secondly, it is very rare to have soft tissue injuries in the back. In my clinical opinion (based on 22 years in clinical practice), the back injuries were far more likely to be mechanical in nature (i.e. facet joint, rib joint, or sacroiliac joint).

Evidence of Phase Transitions by Utilizing Running Estimates of Performance Variability

Helton WS. Animal Expertise: Evidence of Phase Transitions by Utilizing Running Estimates of Performance Variability. Ecological Psychology, 23:2, 59-75.

When humans learn a new skill there is a novice stage where knowledge and rules directly related to performance of the task. This stage is demanding, requiring concentration and attention to the task. With experience task completion becomes routine and automatic. The novice developing into an expert uses intuition rather than relying on rules learned during the novice stage.
This paper looks at the ability of dogs to acquire expertise. While the development of motor skills is visible to the observer, perceptual and cognitive skills are not. The author proposes that performance variability may be one way to detect these "invisible" changes, providing evidence that movement from a rule-based to an intuition-based system as seen in humans also occurs in dogs.

Method:
Two perceptual tasks were performed. The first was a visual task where dogs were taught to differentiate between pictorial stimuli. The second was an olfactory task, dogs being trained to detect Trinitrotoluene (TNT). (But let's not get into the details of how they tested… it's the discussion and conclusions that are far more interesting!)

D**iscussion and Conclusions:**
During training and testing, performance measurements showed an increase in performance variability (variability in performance decreasing with experience once a task is initially learned, then increasing as rules begin to be replaced by intuition, finally decreasing as intuition becomes the sole system in use), similar to that seen in humans.

Rule-based decision-making is fast and efficient, however not amenable to all situations. Challenges to "the norm" may require the development and use of a more complex decision making system, manifested by increased performance variability. The author sees this natural progression as very important, especially for working dogs that may be dropped from training as unreliable when in fact they are just transitioning from one system to another.

This article supports earlier work that animals have the ability to acquire expertise and that the models of expertise development and phase transitions seen in human experts may also be seen in non-humans. The use of performance variability measurements may be a tool for detecting these transitions.

Commentary / Relevance to Rehab:
You have to slow down a bit to really understand what this paper is telling us… but once you do, it's fascinating! Humans and dogs will learn first by rules and then they will develop other strategies (which are attributed to intuition in this article). This is normal and helpful for problem solving in new situations. However, during that transition, the dog (or human) might seem to become 'worse' at a task (which they are… but it's part of their learning curve to become more efficient in the end!) So don't 'throw out the baby with the bath water'… instead take comfort that the dog (or heck, you yourself or your new employee, or kid, etc.) is going through a more advanced learning phase. And from a rehab perspective, take the opportunity to educate your sporting dog owners about this phenomenon should a conversations come up about the performance of their dog!

Skill in Expert Dogs

Helton, WS. Skill in Expert Dogs Journal of Experimental Psychology: Applied 2007, Vol. 13, No. 3, 171–178

Objectives:

One model of skill development and expertise in humans proposes that skills develop in three stages (Fitts & Posner, 1967). The initial cognitive stage involves close attention to detail and requires active coordination of the elements comprising the skill. The second, associative stage, is where individual skills are organized into groups, resulting in an increase in speed and decrease in required attention. In the final stage skills become automatic, allowing an individual to focus on other activities such as decision making.

Helton proposes other animals develop skill sets in a similar manner and may be useful models for looking at human theories of expertise development. Additionally applying the human models and theories of expertise science to non-human species may lead to the development of more proficient working animals e.g. detection, service, search and rescue, and herding dogs.

This study looked at performance differences between expert, advanced, intermediate, and novice dogs participating in canine agility to see if theories developed to explain human skill development can be applied to agility dogs.

Methods:

Participants were 60 dogs and their handlers, handlers being required to have prior experience working with expert dogs in to reduce, the impact of handler experience.

Fifteen dogs were selected from each of the four levels of agility: novice, intermediate, advanced, and expert. The dogs were assessed over 3 days and competed on agility courses consisting of all obstacle types. Performance was measure by looking at speed and precision (refusal/runouts, obstacle, and table errors).

Results/Conclusions:

Study results matched the three-stage model of expertise development. Improvement in motor control was seen across all dogs, however most improvement was in dogs at novice, intermediate and advanced levels. The transition between novice and intermediate dogs was seen as an improvement in accuracy of individual course elements. Between intermediate and advanced dogs, skills were better organized resulting in increased speed and fluidity. The transition from advanced to expert was seen as an increase in precision (fewer refusal/runouts and overall errors) and speed, suggesting that the skills required were automated and the dogs were able to focus on detecting handler signals.

It is worth noting two alternative explanations to the study findings. The first is that that dogs who make mistakes from the start of their career are or who do not develop the necessary motor and signal detection skills during their agility career are withdrawn from the sport. The second relates to handler ability. Agility is a team sport where dogs rely on direction from their handler. It may be that handler differences were responsible for study findings rather than differences between the dogs.

The author calls the study findings “provocative”, recommending further research into expertise in non-humans, especially working dogs, to develop a “science of canine expertise”.

Commentary / Relevance to Rehab:

This is an interesting study in regards to learning and skill acquisition. I like the fact that this researcher is looking at human science & knowledge and testing those theories on dogs. This is exactly what needs to occur in canine rehab as well. In regards to the findings of the study, what I would wonder is whether there might be an increase in injuries during any of these transition stages, or perhaps with beginner handlers.

Exceptional Running Skill in Dogs Requires Extensive Experience

Helton WS. Exceptional Running Skill in Dogs Requires Extensive Experience. The Journal of General Psychology, 2009, 136(3), 323–332

Performance development pattern is similar across animal species, starting off low, increasing over time, then declining as the animal ages.

Skill development requires more than physical development and genetic predisposition. Practice is required to sharpen skills and more efficiently coordinate perception and action. In this study the author looks at skill development in exceptional individuals (Greyhound dogs) in skills often seen as more influenced by genetics and physical development.

In this paper the author examined changes in running performance in racing Greyhounds, comparing findings to human performance. It takes 7-10 years of practice and experience for elite human athletes to reach their peak performance, Helton suggested that for non-human animals this would be approximately 10% of their lifespan.

Method:

Race statistics from the 14 fastest greyhound 503-m track runners (7 female dogs, 7 male dogs) between 2003 and 2008 was analyzed. Other information included dates of birth, lineages, age the dog began and stopped racing at 503 m, and the age when the dog achieved peak running performance. The percentage of the dog's life devoted to skill acquisition was also calculated.

Results / Discussion

Performance was seen to improve steadily throughout a dog's racing career, until at some point a decline was noticed (or the dog was retired). On average Greyhound 503-m track runners reached peak performance at 2.4 years of age and had an average lifespan of 8.2 years. The percentage of lifespan devoted to skill acquisition was 9.1%, close to the 10% stated in human expertise literature. This is similar to findings in human literature and supports a claim by the author that the development of expertise is not restricted to humans.

The results of this study indicate that running on a flat surface is not, as some believe, a skill primarily influenced by biomechanical changes and genetics. Performance improvement is also influenced by learning through practice. The author suggests that animal studies may be helpful in determining the role played by genetics and practice as animal researchers, unlike their human counterparts, are able to control early life experiences and genetics.

Relevance to Rehab & Overall Thoughts:

I think the results of this study could simply be summed up as "practice makes you better!" And really, this could equate to any aspect of rehab (i.e. post-op CCL repairs or neurologic dogs). What this study doesn't tap into is how much of the skill acquisition is mental and how much is physical… And on the physical side, how much improvement can be attributed to neural adaptations and how much to musculoskeletal (or even cardiovascular)? It would be a fascinating direction to take future research!

Canine Agility Trials – Survey of Dog Breeds, Injuries and the Role of 'Warm-Up

Holmes L. Canine agility trials – survey of dog breeds, injuries and the role of 'warm-up'. In The 3rd Annual RVC Veterinary Physiotherapy Conference. North Mymms, Hertfordshire, UK, Sept 18, 2005: pp 36 – 38.

Dogs competing in agility trials complete a timed course consisting of jumps (height determined by the height of the dog), contact obstacles, tunnels and weave poles. Courses contain 11-20 obstacles and take 30-45 seconds to complete.

Human and equestrian sports typically involve some warm up activity prior to strenuous exercise. In canine agility the author has noticed this is not the case, devising this study to look at the use of warm-up activities in agility dogs, quantify breeds participating in the sport, identify the type of injuries sustained by dogs participating in agility and finally to look at modalities used when rehabilitating dogs from these injuries.

Method:
Information was collected from owners of dogs participating in agility trials in the United Kingdom.
500 questionnaires were distributed and 185 (37%) returned. Thirty eight breeds were represented in the study, the most common being border collies and working sheepdogs

Results / Discussion:
83% of owners often or always completed some form of warm-up, with 34% saying they had never had any advice about warm-up activities. 12% of respondents did agility-related warm-up, but 89% stated they had seldom or never seen a warm up area at an event.

Effective warm-up activities should be general and sports specific and include stretching exercises. In this survey 83% of the warm-up activities were walking or running on lead, throwing a ball, or leaving the dog off leash. The author sees these as only a general warm-up, not specific to agility activities, suggesting that specific agility related exercise may help to 'tune both dog and handler in' and improve their performance.

39 dogs sustained injuries during training or competition. The most common injury was "nonspecific lameness", followed by muscle / ligament injury. The number of specific injuries were small and included cruciate ligament rupture, luxating patella, prolapsed intervertebral disc, fractured coccygeal vertebra, fractured tooth, and dew claw injury.

The causes of injuries included turning/twisting during jumping (36%); contact injuries, falls, and surface related injuries. Injuries were evenly distributed between sides, forelimb, hindlimb and the spine. 54% of injured dogs returned to normal activity with 4 weeks and 46% returned to the sport within 10 weeks. 26% of the dogs injured never returned to agility.
At the time of this study only 34% of respondents were aware of rehabilitation. 26% of the injured animals were referred for rehabilitation, 78% seeing significant improvement, the remainder being 'cured'.

Discussion / Relevance to Rehab
This study illustrates the need (and opportunity) for educating agility dog competitors about 'warming up' during agility. Additionally, it would be prudent for we, the rehab professionals, to device a sport-specific, science-guided, appropriate warm up strategy / routine. Additionally, efforts should be made by rehab professionals to make contact with agility clubs / competitors (because more than 34% of competitors should be aware of rehab!!)

Laterality: Asymmetries of Body, Brain and Cognition

Siniscalchi M, Bertino D, Quaranta A. Laterality and performance of agility-trained dogs, Laterality: Asymmetries of Body, Brain and Cognition. Laterality: Asymmetries of Body, Brain and Cognition (2013): DOI: 10.1080/1357650X.2013.794815

Agility is one of the most popular canine sports, dogs having to negotiate a variety of obstacles, jumping at speed and changing direction rapidly, all without making errors. Both athletic and spatial skills are essential requirements of participants in the sport.

Lateralisation of the dog brain has been reported with functional asymmetries found in paw usage and in sensory perception of acoustic, visual , and olfactory stimuli. In this study the authors examined the influence of lateralisation in agility dogs, looking at paw preference, owner/handler location, and temperament in relation to performance on the agility course.

Method:

Participants were 19 healthy adult agility dogs (9 males and 10 females) ranging in age from 1.4 to 9.5 years. Dogs were a combination of purebred and crossbreeds and of all body sizes. Two males and four females were neutered. To avoid any possible handling effect, pairings were chosen based on owners who worked with their dog from both sides during daily activities and agility training.

Paw preference was assessed by presenting each dog with a Kong toy filled with a mixture of meat and dry dog food. The dog's use of the left or right forepaw to hold the Kong while eating its contents was video recorded. Each dog was tested for 2 minutes at monthly intervals over a period of 10 months.
Testing involved dogs negotiating a jump obstacle and then an A-frame. The weave pole obstacle was tested separately. Dogs were required to negotiate the 12 weave poles always entering with the pole to the left, and not skipping any poles. Dogs had been trained prior to testing for between 14 to 87 months. Each dog was tested on a series of three obstacles (jump and A-frame) or runs through the weave poles that were run consecutively at 3-minute intervals, twice a week over 2 weeks, until a set of 12 trials for each dog was collected. The total time required to complete the obstacle course was recorded. Performance was recorded using digital video cameras positioned on the right and on the left side of the dog's starting position.

Owners also completed a questionnaire about their dogs' temperament and social interactions.

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Laterality: Asymmetries of Body, Brain and Cognition contd….

Results/Discussion:

There were 7 male dogs (37%) and 8 female dogs (42%) who showed a significant preference for using a particular paw during the study. There was a significant difference between males and females in paw usage males showing a left-paw preference, females preferring the right.

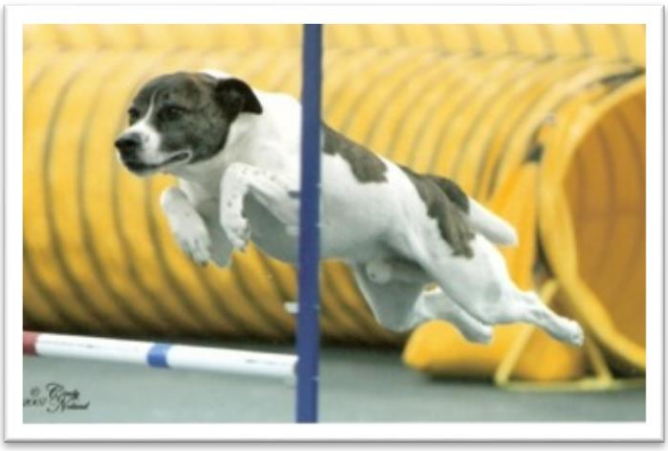
Dogs made more errors and took longer to complete exercises when the owner was in the dogs left visual field compared to the right. The lateral field of each eye projects to the contralateral side of the brain, one explanation for the asymmetry found in the study being that there is a different activation of the two brain hemispheres during visual analysis. Specifically the authors hypothesize visual analysis of the owner by the left eye (activity in the right hemisphere) is likely to increase the dogs' state of arousal and be distracting, as analysis of spatial information (agility obstacles) and visual analysis of an emotional stimulus (owner) are both under the control of the right hemisphere.

A correlation was found between paw preference and the trainability of the dog. The weaker the paw preference and lateralization, the more likely a dog was to be distractible during training and the more reactive it would be to other external stimuli (e.g. thunderstorms).

The authors concluded that behavioral lateralization correlates with performance in agility dogs and supports previous studies showing that lateralization in dogs can directly affect visually guided motor responses.

Relevance to Rehab

Wow! There are some rather interesting correlations and findings that come out of this study! Firstly, I'm surprised that less than ½ of the dogs in the study showed a lateralization, and further shocked that having a lateralized preference equated with better performance & reduced overall reactivity. I would have guessed the opposite, to be quite honest! (Psst… maybe this is one thing that agility-dog owners should look for in their prospective agility puppies.) I would also wonder if when training a new dog (i.e. in agility) or working with a dog (i.e. in a rehab context) whether that handler or therapist could get better results by positioning him- / herself on the dog's right side. OR, if you have a very nervous owner who is affecting the dog's behaviour in-clinic, perhaps keeping the owner on the dog's right side could minimize the amount of owner-induced anxiety the dog demonstrated! Just a thought!



Guest Reviewer Carrie Smith, BScPT, CAFCI, CCRT

Cullen KL, Dickey JP, Bent LR, Thomason JJ, Moëns NMM. Survey-based Analysis of Risk Factors for Injury Among Dogs Participating in Agility Training and Competition Events. JAVMA, Vol 243, No. 7, October 1, 2013. Pages: 1019-1024

Agility competition is one of the fastest growing canine performance sports worldwide, and with this increase in participation comes a growing interest in understanding the factors that influence the risk of injuries amongst dogs competing in this sport. The name "Agility" is well-suited, as dogs perform tasks that include jumping, weaving, making tight turns in tunnels, climbing ramps, balancing on see-saws and moving on or across elevated surfaces while being timed for speed and scored for faults.

The objective of this recent study was to identify risk factors for agility-related injuries. Data was collected from 1,669 handlers of 3,801 agility dogs from 27 countries. Variables evaluated included: demographics; frequency of practice and competition; use of warm-up, cool-down, and conditioning exercises; "alternative therapy" treatments (acupuncture, massage, chiropractic); breed; and dietary supplements.

A multivariable logistic regression analysis allowed each potential risk factor to be considered independently of all other factors.

Results showed that 32% of dogs sustained at least 1 injury during agility, with 1602 injuries reported in total. Dogs in the study were made up of 162 different breeds. The proportions of Border Collies and Standard Poodles injured were greater than those of all breeds combined. With further analysis, only the Border Collie breed showed a significant differences compared to all other breeds.

Variables Associated With Increased Risk Of Injury:

1. Previous injury – after controlling for all other variables, dogs with a previous agility injury were 100 times more likely to sustain another injury.

2. Border Collies – this breed is more prevalent in agility than any other breed. In this study, 16.8% of all dogs were Border Collies. These dogs are known for their athletic stamina and willingness to perform tasks, and this may allow handlers to work with Border Collies for longer durations during competition and practice than with other breeds. When controlling for all variables (including percentage of Border Collies studied), these dogs still had 1.7 times the odds of injury compared with other breeds. The authors postulated that this may be due to reasons like: the speed at which Border Collies navigate an agility course and high drive, speed and quickness at changing direction.

3. Experience – there was an increased risk of injury in dogs with less than four years experience. The authors related this finding to improved skills in dogs, with increasing accuracy and speed as well as better decision making. Also, the odds of injury were reduced if the handler had more than five years of experience. In this study, amount of practice per week and number of competitions per month were not significant factors.

4. Use of alternative therapies (acupuncture, massage, chiropractic) – the authors discussed that these therapies were likely implemented after a dog had sustained an initial injury, and because previous injury was a high indicator of future injury, dogs receiving these therapies were more likely to sustain injury.

5. There was no relationship found between the use of warm-up and cool-down exercises and injury.

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Risk factors for injury among dogs participating in agility training and competition events contd …

6. There were no significant differences with use of dietary supplements.
7. There were no significant differences between countries.

Previous studies of agility related risk factors have been smaller in scale and included only simple descriptive analyses. The authors believe that this study has several advantages over previous studies including:

- Large numbers of injured and non-injured dogs
- Multiple logistic regression analyses to estimate individual risk factors
- Participants from 27 countries which improved the generalization of findings

The results of this study can help to guide future research and prevention activities aimed at reducing agility related injuries.

Relevance To Rehab:
This was a really interesting study to read since I treat a lot of agility injuries and funnily enough, most of them are Border Collies! Having current information on the risk of injuries for agility dogs may help prepare and educate owners, particularly if they are new to the sport. It may also help owners/handlers realize that they also have a role to play in injury prevention since agility is truly a team sport. It may be of interest to physiotherapists treating agility dogs to note that repeat injuries are common, and education of the owner in prevention of subsequent injuries should be addressed in the early stages of return to sport. - Carrie

Cullen KL, Dickey JP, Bent LR, Thomason JJ, Moëns NMM. Internet-based Survey of the Nature and Perceived Causes of Injury to Dogs Participating in Agility Training and Competition Events.

This is a second agility study by the same authors. The objective of this study was to characterize agility injuries on the basis of type, severity, and affected body part. Surveys were received from 1,669 handlers of 3,801 agility dogs worldwide.

During agility competitions, dogs and handlers work as a team to navigate a sequence of obstacles at speed. A typical agility course can include 18-23 obstacles that involve jumping (bar, panel, broad, spread, and tire jumps), weaving between poles, turning in open or closed tunnels, climbing ramps and see-saws and movement on, across and off elevated surfaces. The type, number and sequence of obstacles can vary from competition to competition. Specifications for these obstacles vary between sporting organizations.

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Risk factors for injury among dogs participating in agility training and competition events contd …

Agility is rapidly becoming the most popular canine sport in the world. In North America, national clubs are seeing growth of approximately 10% per year, and in 2010 the number of entries registered by the American Kennel Club was over 950,000.

In recent years, the caliber of top performing dogs has risen, with very small differences in scores determining the winners. At an international competition in 2011, the top 20 dogs scored within one second of each other. In response to the high degree of athletic ability of these dogs, judges are designing more technically challenging courses, which increase the physical demands on the dog and may potentially increase the number of injuries.

Results

Results of this study were consistent with previous studies indicating that approximately one-third of dogs participating in the sport sustain an injury. Soft tissue injuries (strains, sprains and contusions) to the shoulder, back, phalanges and neck are the most common types and sites of injury.

Almost 42% of the injuries in this study were attributed to interaction with 3 specific pieces of equipment: bar jumps (16%), A-frame (14%), and dog walks (11%). Dogs typically perform many more jumps on a given course compared with A-frames and dog walks. In general, for a course containing 20 obstacles, 13 of these were bar jumps, with only 1 A-frame and 1 dog walk. Given the exposure to bar jumps, it is not surprising that many injuries were attributed to contact with this obstacle. It is possible that injuries associated with a particular obstacle may be in part related to the previous obstacle as it may influence the speed and direction that dog approaches.

The authors state "The fact that many injuries were attributed to interactions with A-frame or dog walk obstacles was disconcerting, considering the lower degree of exposure to these obstacles in typical competition courses." They also found that a higher than expected number of shoulder and phalanges were injured during the A-frame. Shoulder, elbow, stifle and carpal injuries were most frequently reported with bar jump injuries. Contact with or a fall from the dog walk most often caused ribcage and head injuries, as well as abrasions. 27% of injuries had a non-specific cause, and the authors postulate that handlers are not always able to identify early signs of injury or lameness.

There were no significant differences found between injuries sustained in training, and those sustained in competition.

Relevance to Rehab

There was quite a discussion amongst the executive about the results of this article at the recent ARD (Animal Rehab Division of the Canadian Physiotherapy Association) course "Advanced Manual Therapy for the Canine Spine". Results were based on self-reported injuries from handlers, and not all handlers reported. Handlers also self-reported regarding which obstacle caused the injury and the body part injured. It would be quite easy for handlers to miss an injury as the dog is not always within sight of the handler, and handlers may not be able to discern subtle injuries in their dogs. If the results from this study are a true indication of obstacles which cause injury, it may change the dogs graduated return to sport planning. For example, if A-frames and dog walks were a leading cause of injury, should they be the last obstacles introduced into training post-injury and in preparation for return to full agility trialing? Food for thought! - Carrie

Guest Reviewer Lorna Clarke, BPT, MBA, Dip Canine Rehab

Pfau T, Garland de Rivaz A, Brighton S, Weller R. Kinetics of Jump Landing in Agility Dogs. Vet J (2011) 278-283.
The authors of this article were exploring the kinetic and kinematic parameters related to three types of activities performed by agility dogs: running, jumping over a bar jump and jumping over the long jump. Measurements were collected via force plates and infrared motion-analysis cameras. Six reflective markers were placed on each dog. Two hundred and eleven trials were analyzed from 11 border collies (20" to 22" in height).

A 22" bar jump and a long jump were used as the obstacles. Distances of 11' 10" and 16'5" between bar jumps were used. Only a 16'5" distance was used between the long jumps. The dog was placed 33' in front of the first obstacle. Measurements were taken at the second jump of the sequence.

Dogs with a higher approach speed had flatter jumping trajectories. There was no difference in results with the bar jumps placed at the two different spacing distances. Higher obstacles resulted in lower approach speed and more acute landing angles. The highest forces going through the forelimbs was at the landing phase with the bar jump, followed by the landing phase with the long jump with flat running causing the smallest forces. The high peak vertical forces observed in the forelimbs was 4.5 times the bodyweight with the bar jump. The authors noted that previous research revealed that dogs and horses land jumps asymmetrically resulting in higher forces in one front limb compared to the other.

The authors concluded that analysis of loads experienced by internal anatomical structures is required to correlate biomechanical results to the clinical presentation of shoulder and back injuries of agility dogs.

Birch E, Lesnaik K. Effect of Fence Height on Joint Angles of Agility Dogs. Vet J (2013)

In dog agility competitions, the height of jumps is based on the height at the withers. Some agility organizations offer five jump height categories within a 6 inch to 26 inch span while other only offer four. The authors believed that more staggered height increases would reduce the risk of injury because the dogs are jumping at a shorter jump height in relation to their own height. The intent of the study was to measure differences in limb and spinal joint angles in agility dogs over jumps of two different heights, set in relation to their wither height.

Eight canine subjects that were healthy and experienced in agility were selected. The dogs were all currently competing at 26" jump heights. Wither heights of the subjects ranged between 18-28 ½ inches. The dogs jumped at 4 inch intervals, starting with the lowest height. Test heights were calculated as 7% lower than the dog's height and ended at a height that was 51% higher than the dog's height. Joint angles were measured using video technology, 14 different anatomical markers on the dogs and Dartfish software. Angles were measured at six phases of jumping, specifically at the final approach, take-off, aerial phase at the mid-point of the jump, landing phase and departure. Maximal points of anatomical flexion and extension that occurred at each of the phases was analyzed.

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Effect of Fence Height on Joint Angles of Agility Dogs contd …

At the higher jump heights, the dogs had significant increases of extension of the sacroiliac region during take-off. Also, there was significant flexion in the scaupulohumeral and radiohumeral joint angles during take-off that continued as the dog was in the aerial phase. Extreme joint flexion of the forelimb places substantial strain on the biceps brachii. During the approach phase, the head and base of the neck were extended. As the dog moved into the take-off phase, this changed to a position of flexion which was significantly greater with higher jump heights. This flexion of the upper cervical area along with the extension of the sacroiliac region caused the spinal column to flatten.

The authors concluded that dogs jumping at a higher jump height in relation to their own height may be a greater risk of sustaining injuries of the spine and forelimb. Further research is required to study injury sites and injury frequency in relation to jump heights.

Summary and Clinical Relevance

Jumping has been identified in previous research as a source of injury in agility dogs. The canine rehab clinician must be aware of the potential implications of this and carefully question the owners as to type of jumps, height of jumps, training and competing frequency and style of courses that the canine client is participating in. These variables are extremely important for the rehabilitation of the agility dog and successful reintegration back into competition. The Agility Association of Canada offers a "specials" and two "veterans" categories, allowing dogs to compete at a lower jump height. The canine rehab clinician has a role in recommending these options to owners when appropriate, based on potential for injury, past injuries or the dog's overall physical structure. - Lorna