

GREYHOUND RACING VICTORIA

Attending and Training Greyhounds

Booklet 13 – Advanced Knowledge



Greyhound Racing Victoria
Attendant and Trainer Education Pack

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Date Published 2019

This is the thirteenth in a series of booklets that support you in attending and training racing greyhounds.

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Anatomy

As a public trainer you are expected to have a higher level of knowledge than an owner-trainer, both of training techniques, and the care and welfare of the greyhounds you are responsible for. It is expected that you will not only have a good working relationship with your greyhound veterinarian, but also that you will have some understanding of the internal workings that enable the racing greyhound to move at such incredible speeds. This way you will be able to detect changes that may indicate injury or disease and see to them promptly, ensuring the greyhounds in your care are always presented to race in top condition, and if things go wrong, they get the best care possible.

There is a lot of valuable information at <https://greyhoundcare.grv.org.au/> including a range of Injury and Illness Management Fact Sheets.

13.1 Musculoskeletal system

The musculoskeletal system includes the bones that form the skeleton of the greyhound, along with the muscles that act to move the body, and the joining structures; tendons that connect a muscle to a bone, and ligaments that connect a bone to another bone.

Understanding some basic anatomy is important if you are going to be able to watch out for injuries and discuss them effectively with your greyhound veterinarian, the stewards or other trainers.

No-one expects you to know all of the names of the muscles, bones, tendons and ligaments, but you should understand the role of the important parts, especially those which are predisposed to injury when racing. Having said that, for your own benefit, it is a good idea to continue to study and review diagrams of the musculoskeletal system to help you become familiar with their names and locations.

It is always important to discuss any signs of injury or illness with your veterinarian for a clear diagnosis.

There are some excellent diagrams in the book *'Care of the Racing and Retired Greyhound'* produced by Blythe LL, Gannon JR, Craig AM, Fegan, DP (2007). You could also look at any textbook on the anatomy of dogs, but it is often easier to visualise the structure when the diagram is of a greyhound.

Skeleton

The skeleton of the greyhound consists of 321 individual bones. The skeleton provides the body its frame, and also acts to provide protection to important organs such as the brain and heart. The muscles then attach onto various points and, by contracting, they give the movement that allows the dog to walk, turn and run.

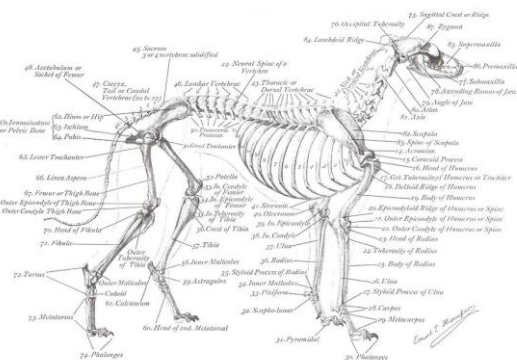


FIGURE 1. THE ANATOMY OF THE GREYHOUND. THE SKELTON. For the sake of clarity, the ribs and thoracic bones of the thorax are omitted.

The skeleton is a living organ that is constantly being modeled and remodeled depending on the forces applied to it. It can also repair damage such as fractures and chips. The skeleton acts to provide the body with a storage place for minerals such as calcium and phosphorus. If the body's supplies of calcium are low, then calcium is reabsorbed from the bones and moved to where it is needed, potentially leaving the bones weak and brittle.

The skeleton is also involved in the immune system as the cavities inside the long bones are where the body produces important red and white blood cells. This is the bone marrow.

Bone growth

The skeleton of the greyhound develops and grows from puppyhood through to about 14-15 months of age. The long bones grow from special areas called 'growth plates' which are made up of cartilage and don't fuse to bone until the dog matures. These growth plates can be damaged in the growing dog which can lead to stunted, uneven or abnormal growth of the bones. Because the growth plates are weaker than bone, they are also a common site of fractures in the young, skeletally immature dog.



Joints

Where two bones come together, they form a joint. There are different types of joints, but the one that is most important for trainers to understand is the 'synovial' joint. In these joints the surface of the bone's end is covered with smooth cartilage, and the joint is surrounded by a 'joint capsule' made of fibrous material that, along with the ligaments, holds the joint together. The joint space is filled with a special 'synovial' or 'joint' fluid that helps lubricate the joint.

Any damage to the joint capsule or ligaments can severely affect the movement of the joint. If the joint surfaces become damaged, the cartilage can wear away leaving the underlying bone exposed. Damage to the joint surface can lead to arthritis developing, so joint health is very important in the racing athlete.

Muscles

Each joint of the body is moved by a set of muscles. The muscles have their effect due to the contracting (shortening) of the muscle fibres. For every joint there are usually two sets of muscles - the 'flexors' and the 'extensors' - that work in opposite directions to flex (bend) and extend (straighten) the joint.

Each muscle has a point where it attaches to the bone. The point closest to the head of the greyhound, or highest up the leg is called the 'origin' of the muscle, and the lower attachment point is called the 'insertion' point. Muscles are attached to the bone by fibrous material called a tendon, whereas ligaments attach bone to bone. Most muscles have a technical name which is often a Latin description. There are also common names that are

more often used by trainers to describe the muscle that has been injured.

At this stage no one will expect you to remember all of the names, however, you will need to know the common muscles that get injured and where they are located. Again, there are diagrams that you can study so that you can start to understand which muscle is which, and the action it has when it contracts.

Muscles can be damaged during racing or exercise. This may be due to unusually high forces being applied, or from unusual movement that stretches the muscle in a way it was not designed to stretch. Muscle injuries can be minor strains, right through to tears or ruptures. When the muscle is damaged, muscle pigment (myoglobin) can leak into the bloodstream where it is removed by the kidney and passed out in the urine (myoglobinuria - *meaning myoglobin in the urine*). This leads to the dog producing red or brown coloured urine after a run - something you should always be looking out for. Severe muscle damage can progress to a condition called rhabdomyolysis (acidosis) which is caused by excessive stress and requires urgent veterinary attention.

Mild myoglobinuria occurs in the hours following a race/trial and is corrected with fluids.

Red or brown coloured urine can also be a sign of bleeding within the urinary tract (haematuria - *meaning blood in the urine*) or breakdown of red blood cells due to some disease with excretion of blood pigment (hameoglobin) in the urine (haemoglobinuria).

When feeling the muscles of your greyhound after a run, you should be

feeling for changes in size and shape, feeling for any swelling or bruising, as well as whether the muscles feel hot, hard or tight. Low-grade muscle injury may not lead to any changes in the gait of the dog, but will decrease the speed, and may then predispose the dog to further injuries.



If the muscle is torn or ruptured, the damage should be easier to detect. The muscle will be sore, the greyhound may be limping, or there will have swelling or fluid accumulation at the site of (or below) the injury. Bruising is often seen at the site as well, especially where there is little hair to cover the area.

If a muscle injury is suspected or detected it is important that it is dealt with properly straight away. The amount of damage and swelling needs to be minimised and the greyhound should be rested from running or training until the muscle has had time to fully repair. It is vital that the greyhound does not continue to race or trial, as it will be predisposed to further injury. Injured muscles can cause a greyhound to be 'off-balance' and can lead to the development of 'track leg' a bony callus that develops due to the elbow striking the inside of the back leg (tibia) on the same side.

Depending on the severity of the injury

your veterinarian may recommend rest, ice packs, anti-inflammatory treatment, massage, stretching or the use of one of the therapies designed to help heal the muscle tissue (such as microwave, infra-red, ultrasound, magnetic field or laser treatments). If your greyhound is treated with anti-inflammatories, you will need to ask about the withholding period as these drugs will lead to a positive swab. It is vital that your greyhound does not run on anti-inflammatories as they simply mask the pain and you will be predisposing the greyhound to further, more severe injury.

Early return to function is important for the physiotherapy of the injury. Once the muscle has had some time to repair, the dog should be *gradually* brought back into full work - not returned immediately to its former work load. The rest needed during the recovery phase leads to a reduction in fitness, and it is easy to put too much stress on the newly healed tissue too early if you overdo it. It is also important that the greyhound receives a proper warm up and cool down to further prevent damage to the muscles.

Feet, paws and limbs

Feet are very important and need to be checked thoroughly after every run. The greyhound's feet are responsible for propelling it along during a race, and foot related problems will very quickly affect performance.

The feet should be examined for cuts and cracks, uneven wear, papillomas (warts) and corns (painful growths in the pads). The nails and nail beds along with the webbing between the toes also need to be thoroughly inspected. Each toe should be gently flexed and extended to

check for damage or soreness, and any problems investigated.

It is not uncommon for the side ligaments of the toe to be damaged or stretched leading to 'sprung' toes or 'dislocated' toes. These sorts of toe injuries are very painful, especially with the huge pressures applied to the toe during cornering in a race. Webbing injuries such as sand grazes are often due to problems with the action of certain ligaments or tendons.

Another very important foot problem is 'sesamoiditis' which is inflammation or damage to the small sesamoid bones that are located at the back of the top toe joint where the top toe bone (P1) joins the shins. These are the metacarpophalangeal joints in the front feet and metatarso-phalangeal joints in the back feet. Sesamoids are pairs of tiny bones located within the tendons behind these joint and help with movement of the various flexor tendons.

Sesamoiditis is a very common injury detected during the education phase of training, leading to painful toe joints with a reduced range of movement. The pain caused by these sesamoids can lead to problems turning, jumping out of the boxes and changing direction at high speed. The most important sesamoids are those in the front feet. Occasionally sesamoid bones are found on x-ray to be in two or three pieces (usually with reduce range of movement in the joint), and while this sometimes can be a result of a previous fracture, in some cases it appears to be a normal (and harmless) finding.



As you examine your greyhound, you should pay particular attention to these joints and if you notice that the joint is swollen or painful, or if the toe does not move as far as it normally does when you examine it, then you should have the area checked by your greyhound veterinarian. Many cases of sesamoiditis will resolve with rest and treatment, but others require veterinary intervention. Having any painful toes checked early by your veterinarian will mean the best chance of your greyhound returning to full speed and will reduce the risk of long-term problems developing.

Developing a routine for checking your greyhound is very important to ensure that any minor injuries or soreness are quickly detected. It is often easiest if you have an experienced person guide you through a routine check for the first few times then develop a set pattern that you will follow. Starting at the same place every time and checking each thing in order means you will get into a habit and will automatically check each area in turn. Don't forget to compare left to right, as this will often give you an ideal opportunity to compare. If you find something amiss, get the dog properly examined by your greyhound veterinarian so that you know what is wrong, and can be given the correct advice about the best method of rehabilitating the greyhound.

When examining a greyhound where you suspect an injury in a particular place on one side, many experienced people will examine the opposite side first.

The role of physiotherapy and massage

Similar to human athletes, it is important to keep muscles and joints as healthy and flexible as possible. No athlete would compete in a race without first properly warming up. This may include stretches, massage, and gentle movement to increase the blood supply to the muscles in preparation for the stresses of hard exercise. Similarly, there is also a great emphasis on correctly cooling down after exertion to help reduce the impact of any stress to the joints and muscles.

Physiotherapy and massage can be used to help prevent injuries by preparing the greyhound's muscles for a race and can also be used to help treat problem areas when there has been an injury to a specific area. Many greyhound veterinarians will recommend massage of injured areas, and gentle stretching and flexing to assist with improving the range of movement of a particular joint. It is important not to overdo either the massage or the stretches as you can also do damage if you push a joint too far, especially if it is badly damaged and painful!

Massage helps to increase the blood flow to the area being targeted. This extra blood flow is very valuable as an increased blood supply brings with it valuable nutrients and oxygen, along with the white blood cells that help clean up the area if it has been injured. The massage also helps to break up and remove the fluid and waste products from swelling or bruising. Massage needs

to be done gently and can be done by hand or with the assistance of a mechanical vibrating machine.

Always, ask your greyhound veterinarian to give you a demonstration.

There are also now other physiotherapy treatments including underwater treadmills that help support the body as the animal moves against the added resistance of the water, along with various treatment machines that assist with increasing blood flow to specific areas. The treatment used will depend on whether you are aiming to prevent or treat an injury, and what sort of injury it is. It is important that you find out which treatment is best for your greyhound, along with how often you should be doing it, and for how long. Incorrect treatment can lead to further problems, as well as a worsening of the original injury, so make sure you get the right advice from the start.

Canine sports medicine has come a long way in the last few decades, and it is an area of medicine that has undergone a lot of changes. There is now some hard science that supports many new techniques, and the old 'witch doctoring' methods are being recognised for what they really are. An example of an outdated practice is that of 'blistering' (applying caustic solutions to the skin over bones and joints) which is now considered not only outmoded and potentially cruel, but you could be prosecuted under POCTAA if it leads to skin burns and damage to the deeper structures.

13.2 Digestive system

The digestive system of the greyhound

can be thought to include all of the body systems involved in the break down and digestion of food, the uptake of nutrients and the excretion of solid wastes. Starting at the mouth, the intestinal (alimentary) tract is like a long tube that extends from the mouth to the anus. Along the way this tube is modified in shape and size to allow digestion, storage, and absorption. There are also a number of other organs such as the liver and pancreas that assist digestion by manufacturing and delivering enzymes and other substances that help break the food down into usable elements.

The abdomen (belly) is the part of the body containing the digestive and reproductive organs.

Mouth

The digestion of food begins in the mouth, with the teeth responsible for grabbing onto food and moving it into the mouth. The first step of digestion is the chewing of the food which mechanically breaks it into smaller pieces and mixes it with saliva. Saliva contains some enzymes which help to begin the digestion process and also lubricates the food for its trip down to the stomach.

Dental health is something that is often overlooked in greyhounds, with a high level of dental and gum ('periodontal') disease seen even in young greyhounds. This is thought to be largely due to the greyhound's diet being soft and not requiring a lot of chewing, and because greyhounds are not often given raw bones or other dental type items to chew on. Yet this type enrichment - chew toys or bones are important.



Dental disease can become a source of infection to the rest of the body as the bacteria in the mouth slowly leaches into the bloodstream. The low-grade infection that results can significantly affect the performance of the greyhound and can lead to elevated white cell counts as the body tries to deal with the constant assault. Poor dental health can also lead to foul smelling breath and ultimately impact on a greyhound's capacity to race.

Remember that a failure to provide proper veterinary care can lead to a prosecution under POCTAA and/or the Racing Rules.

Oesophagus

Food that is swallowed is passed out of the mouth into the oesophagus, which is the tube that connects the mouth to the stomach.

Stomach

Food passing down the oesophagus empties into the stomach. The stomach acts as a 'storage sac' where food is mixed with acid and enzymes to further break down the food. It has a muscular wall and the contraction of the muscles helps to mix the food and acid together, before releasing it gradually into the

small intestine.

Small intestine

Once the food has been broken down and mixed with the enzymes and acid of the stomach, it is released into the small intestine ('small bowel'). The small intestine is a long narrow tube with a lining that is specially designed to allow the uptake of nutrients. The small intestine is made up of three sections; the duodenum, the jejunum and the ileum. It is actually here in the small intestine that most of the digestion process takes place. Powerful enzymes from the pancreas are added to the mix, along with bile from the liver. The enzymes break down protein and carbohydrates, and the bile is involved in the breakdown of fats. The release of both bile and enzymes occurs when the food moves into the small intestine from the stomach.

Once the food is broken down into its basic elements, the body can then absorb the required nutrients from the 'slurry' that is produced. Sugars, amino acids, vitamins, minerals, and fats are all absorbed at this point as the food moves through the small intestine.

Large intestine

As the food continues along the intestines it moves into the large intestine or 'large bowel' (so called as it is a larger size tube than the small intestine). The large intestine is also made up of three sections; the caecum, the colon and the rectum). Some further absorption of nutrients occurs in the large intestine, but it is mainly where water is absorbed into the body. This uptake of fluids ensures that the body retains vital water, and that the fluids used in the digestion process are not simply lost to the body.

Towards the end of the large intestine, the waste matter will start to firm, and can be stored until the dog is ready to 'empty out'. The large intestine also produces a mucous that assists with the passing of faecal matter.

Common Problems of digestion

Vomiting and diarrhoea

Vomiting and diarrhoea are both a form of protective mechanism for the body. If an animal eats something that is rotten or toxic, vomiting helps the body rid itself of the substance. Similarly, diarrhoea can hasten the passing of matter through the intestinal tract.

Although they can be considered normal in some cases, vomiting and diarrhoea can also be symptoms of many more serious illnesses. Vomiting and diarrhoea can be caused by sudden diet changes, viral, bacterial, protozoal or parasitic infection, as well as other causes. It is important that you notice quickly any vomiting or changes to the faeces of greyhounds in your care, especially if they are housed with other greyhounds. Many of the causes of vomiting and diarrhoea can be passed from one greyhound to another, especially if the kennels are not thoroughly cleaned.

As a rule, one or two vomits may not be anything to be concerned about *provided* the dog is otherwise bright and alert and is drinking adequately. Temporarily stopping all food and ensuring that they are drinking small amounts of fluids regularly is the first step if you have a vomiting dog. You must then closely observe the dog for signs of discomfort, abdominal pain and/or swelling (as occurs in bloat) and watch its general

demeanour. If the greyhound looks unwell, has a swollen abdomen or is refusing to drink, then the greyhound needs to be examined by a veterinarian immediately.

Repeated vomiting can quickly dehydrate a greyhound, and can cause electrolyte imbalances so early intervention is best. If the greyhound looks lively, and is drinking, then you can wait up to 24 hours for improvement but must then seek veterinary assistance to determine why the vomiting has not resolved.

In cases of bloat (see later in this section), every second counts!

Diarrhoea that is very watery or has blood in it is a definite concern and should be investigated immediately. While fresh blood is obvious, be mindful that digested blood in faeces ('melaena') will appear black and tarry and is generally from higher in the digestive tract such as the small intestine. If the faeces are simply not formed, or soft, and the greyhound is otherwise well, then it is reasonable to change the dog to a bland, low fat, highly digestible diet for 24 hours and ensure that it continues to drink well to maintain hydration. Some dogs are very sensitive to things such as diet changes and will have soft faeces for a day or two if you switch food brands or suppliers.

If there have been no changes to the diet, then diarrhoea may be a symptom of something more serious. In highly anxious greyhounds, the stress of travel or other incidents can sometimes lead to diarrhoea, but this is usually fairly obvious as the diarrhoea occurs at the time of the stressful event, and usually resolves once the greyhound returns to its normal kennel environment. If the greyhound is bright and the diarrhoea continues for

more than 24-48 hours, or at any time the greyhound looks uncomfortable and is straining to defaecate, then you should immediately have it checked by a veterinarian.

Parasites

There are a number of the intestinal worms that can cause problems with digestion. Ensuring that you have an effective and reliable parasite treatment program recorded and implemented is very important to ensure that you are not contributing to problems within the digestive system. Intestinal worms not only rob the greyhound of vital nutrients, they also can cause damage to the lining of the intestinal tract. This can lead to blood in the faeces, diarrhoea and loss of condition.



It is vital that any worming program covers all of the important intestinal worms (hookworm, whipworm, roundworm and tapeworm) and the worming program is designed to prevent the worms from becoming resistant to the drugs. The hygiene of kennels and the environment is also a vital element of parasite control given that important stages of their lifecycle are spent outside of the dog.

Booklet 8 in Owner - Trainer: Trainer

Unit 2 discussed worming in further detail.

It is important that you speak to your veterinarian to discuss an appropriate worming schedule for the greyhounds in your care.

Bloat (Gastric Dilatation Volvulus or GDV)

Bloat can occur in any large, deep-chested breed of dog. For some reason, the normal filling and emptying process of the stomach becomes altered, and gas accumulates. The stomach is anchored to the body in such a way that if it fills up with gas it can twist. If this happens it can also twist the spleen, which leads to serious interruption to the blood supply of the stomach and spleen, which is the life-threatening condition commonly called bloat. It does not take very long for the weakened and stretched stomach wall to die if it has no blood supply, leading to a rupture of the stomach.

Bloat can kill a dog very quickly, so getting help urgently is a priority if the greyhound is to be saved. Even with surgery, some dogs die from complications, so the earlier you notice a dog with a distended abdomen the better.

Bloat is linked to stressful events, dietary factors (including sudden food changes) and excessive eating (i.e. if a dog gets into the food supply and gorges itself). It has also been suggested that there may be a link to exercise immediately before or after eating or drinking. In some breeds there is a definite 'genetic predisposition' with certain lines bloating more than others.

Obstruction

Obstruction of the intestine is most likely to occur in greyhounds who eat and destroy bedding, or who chew on rocks or the like in their runs or kennels. Certain objects are unfortunately the correct shape and texture to lodge in the intestinal tract, and once lodged prevent the movement of food through the body. Obstructions can be partial or complete (more severe signs). Probably the most dangerous item is the corn cob - it is the perfect shape and size and has a rough surface which prevents it from being moved along - so make sure that you never place them in the compost or where the dogs may have access.

The most common symptoms are abdominal pain (dog is sore in the belly, and may be 'hunched up'), vomiting and there is a reduction in faeces (as nothing is getting past). If you have a greyhound that is at risk of getting an obstruction, it is important to choose bedding and kennel items accordingly. If you suspect that the greyhound has eaten something that may cause an obstruction, it is important that you let your veterinarian know so they can advise you accordingly. Some items that cause a severe blockage may have to be removed surgically, and it is important to get to them early to prevent damage to the bowel wall.

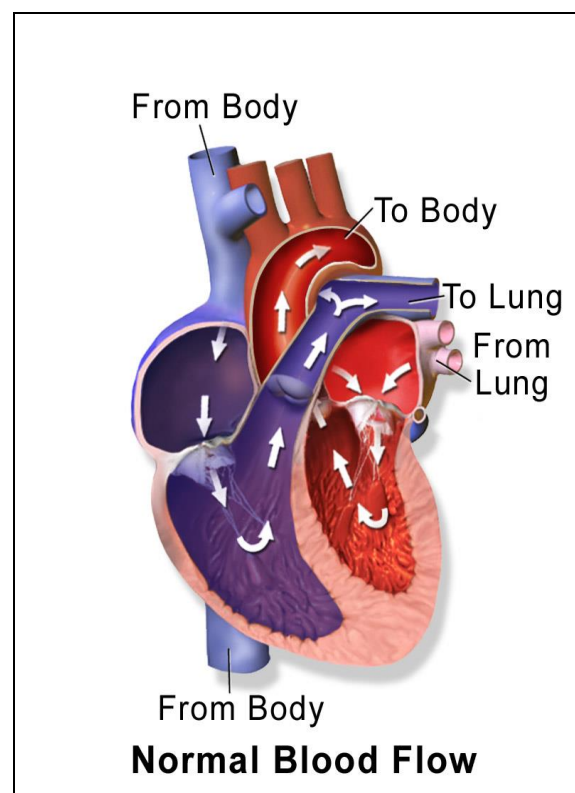
13.3 Circulatory system

The circulatory system of the greyhound includes all of the blood vessels (arteries, veins and capillaries) that carry blood around the body to each individual cell, and the heart which acts as the pump for the system. It also includes the blood itself which carries important things such as oxygen and nutrients around the body.

Heart

The heart is located inside the chest cavity of the greyhound along with the lungs. The heart in the greyhound is larger in comparison to other dogs of a similar size. This is partly due to exercise and conditioning, but there is also a genetic influence as greyhounds have been selected over time for athletic performance.

The heart is made up of mostly muscle and has four chambers. When the heart muscle relaxes blood enters the chambers, and when it contracts, a set of one-way valves ensure that the blood is pushed out of the chambers in the correct direction.



Blood is first pumped out of the right side of the heart to the lungs where it picks up oxygen, and then returns to the left side of the heart before being pumped out to the body to deliver the oxygen to the various organs, before returning to the

right side to complete the cycle again.

The rate at which the heart pumps is controlled by areas in the brain. The heart rate (beats per minute) increases when the needs of the body increase - such as during exercise or times of stress - and decreases at rest. The normal heart rate in a greyhound is around 80-120 beats per minute (bpm) and can increase to over 300 bpm in a race!

There are a number of ways to evaluate the heart and its ability to function properly. Veterinarians will listen to the sounds that the heart makes using a stethoscope. This gives them information about the heart rate and rhythm, and any variation in the normal sounds can indicate how well the valves in the heart are functioning. Abnormal sounds are called 'heart murmurs' and usually indicate abnormal blood flow, for example, a leaky valve. It is also possible to examine the electrical currents that control the beating of the heart using an ECG (electro-cardiogram) machine. This gives information about the actual mechanism that triggers the heart beat and can show signs suggesting certain abnormalities.

The heart shape and size can be evaluated with an x-ray, but the best information about size and shape is gained from an ultrasound examination of the heart - called an echocardiogram. During the ultrasound examination the valves can be observed, and it is possible to measure the thickness of the walls of the heart and the size of the chambers.

Blood vessels

This is the 'piping' that carries the blood around the body, between the heart and organs/tissues, and back to the heart.

Arteries carry blood away from the heart, and veins carry blood back to the heart. The capillaries are the tiny vessels that join the arteries to the veins, and are where oxygen, nutrients and other important things move out of the blood into the cells of the body, and waste products are picked up so that they can be transported out of the body.

The amount of blood delivered to any particular area or organ is controlled by a complex mechanism linked to sensors in the brain. When a greyhound runs, its muscles are suddenly doing a lot of work, and have a high requirement for energy and oxygen. The capillaries in the muscles open up allowing more nutrients and oxygen to be delivered to the muscle fibres. At the same time other areas of the body that are not 'busy' will have a reduced flow of blood as the body shifts blood to the areas that need it most.

The blood flow is also involved in the temperature regulation of the greyhound's body. When the body temperature rises, blood flow is directed to the skin and lungs to allow for heat to dissipate. When the body temperature falls, circulation to the extremities (e.g. feet) is shut off or slowed down to help maintain heat to the body core.

It is possible to assess heart rate by feeling for the increase in pressure that occurs in an artery as the heart beats and forces blood into the arteries (the pulse). One of the easiest places to feel a pulse is the large artery inside the thigh of the greyhound - the femoral artery. By counting the number of beats each minute it is possible to monitor the heart rate at rest, after strenuous exercise and also the recovery over time.

Blood

The blood of the greyhound can be considered a truly amazing thing. It carries oxygen from the lungs to the body where it is needed and picks up the waste gases (carbon dioxide) and takes it back to the lungs where it is excreted. Blood carries nutrients from the gut to the cells and picks up waste products and takes them to the liver and kidneys so they can be removed. It carries important chemical messengers such as hormones and is also involved in the first line attack on disease and infection.

The blood is made up of a liquid portion, the serum/plasma, along with red blood cells (involved in oxygen exchange), white blood cells (involved in immunity) and various hormones, nutrients, clotting agents, buffers, antibodies and enzymes. The levels of all of these things in the blood is constantly changing to meet the requirements of the individual, so blood, evaluation can often give us important clues as to the general health and well-being of the greyhound.

Blood tests

There are an increasing number of blood tests available, either as 'on-site' tests at your veterinarian's clinic, or at a veterinary pathology laboratory. Obviously, those tests that are done on-site give quicker results, but the veterinarian will need to have special machines to do this. For less common, or more complicated tests, the blood sample may need to be sent away for testing, with the results usually returning within 1-2 days.

Blood testing can give an indication of how the various organ systems are functioning, whether the body is

mounting a response to an infection, and the levels of the various electrolytes and waste products in the blood.

Blood tests need to be 'interpreted' to make sense of the results (which are raw numbers from an analyser machine) as sometimes a change in one area can affect other test results. The printed report from the blood test will have a set of reference ranges (reference values or reference intervals) that are considered the normal results for a greyhound, which will be different to other breeds of dog. Your greyhound's results will then be compared to these expected normal values, and any variations will be highlighted.

Some normal value ranges are quite large, and it is possible to have a 'normal' value that is close to the top or the bottom of the range that might be significant. Sometimes it is more useful to compare two results from different times from the one dog, rather than to compare the dog to the normal values. This way the changes to the various test values gives an indication of what is happening in the dog's body at that time.

13.4 Respiratory system

The cells of the body use oxygen for energy and produce carbon dioxide as a waste product.

The respiratory system of the greyhound includes all of the air passages (airways) and tubes that carry air (containing oxygen) from the nose and mouth to the lungs and waste gases from the lungs to the nose and mouth.

The lungs are responsible for taking oxygen from the breathed air and providing it to the red blood cells which

then provide it to the rest of the body cells (for example muscle or brain cells) where it is needed. The red blood cells are an exchange system - exchanging oxygen for carbon dioxide, which is then taken back to the lungs where it is expelled to the air.

Respiration is another word for breathing; breathing in is 'inhaling', while breathing out is 'exhaling'

Respiration is controlled by special areas in the brain that monitor the blood levels of carbon dioxide. These special receptors are triggered when the carbon dioxide levels rise, and the result is an increase in the rate and depth of respiration to expel more carbon dioxide from the body. Respiration is also involved in temperature control, with water being lost in the exhaled air. This is used as an evaporative cooling mechanism by the greyhound. If the greyhound gets too hot, the rate of respiration rises to increase the amount of evaporative cooling that takes place and hence the temperature of the dog will lower.

The respiratory system uses the concentrations of the various gases in the air to drive the exchange rather than selectively targeting oxygen. Because the exchange is not selective, other gases can enter the bloodstream - such as carbon monoxide from car exhausts or toxic substances from cigarette smoke.

The respiratory system is also responsible for generating sound. As air moves through the larynx (or 'voice box') it can be used to generate barks, whines and howls, and this provides an important part of the communication abilities of the greyhound. The larynx is also responsible for protecting the lungs

from food and fluid via the 'gag reflex'. If food or fluids move into the larynx, a response is triggered that leads to a cough or gag - the same as in people when 'something goes down the wrong way'. This protective mechanism may be altered when the greyhound is puffing hard after a race (with its larynx fully open), and it can mean that when offered a drink from the hose some water can get into the airways triggering a coughing spasm.

Finally, the respiratory system is also involved in assisting with the acidity (pH) levels in the blood, which need to be kept within a narrow range for maintaining health and wellbeing.

Carbon dioxide acts as an acid within the bloodstream, and acids will decrease pH. During and immediately after exercise, large amounts of lactic acid are generated in a greyhound causing a large decrease in the blood pH that is at its worst at around 5 to 10 minutes after a race (metabolic acidosis). The body responds by increasing panting not only to assist in reducing the large increase in body temperature, but also to reduce blood pH by expelling carbon dioxide with each breath.

Other things that may affect respiration

The rate of respiration can also be altered by the mental state of the animal. Animals that are stressed, frightened or anxious tend to breathe faster or pant, even when the weather is not hot. Some animals will have a similar response when excited and anticipating an event (another form of stress).

Too much barking or panting can change the pH of the blood and can upset the

blood levels of oxygen and carbon dioxide. This can be a problem with dogs who will not settle when travelling, or who bark constantly when they are kennelled for a race. This can lead to respiratory alkalosis (an increase in pH of the blood due to the excessive loss of carbon dioxide) which can then predispose the greyhound to other problems if they race, or trial hard.

Diseases of the respiratory system

Kennel Cough (also called Canine Cough)

Probably the most common respiratory disease in greyhounds is **Kennel Cough**. This can be caused by a number of infective agents including viruses (most commonly canine **parainfluenza virus** but also canine adenovirus, herpes virus, coronavirus and influenza virus) and bacteria (most commonly ***Bordetella bronchiseptica*** but also *Mycoplasma* spp. and *Streptococcus zooepidemicus* which can also affect people).

Kennel Cough is highly contagious and will quickly spread from one animal to another if they share the same air space. It is possible to vaccinate against the two major causes of this disease; parainfluenza virus and *Bordetella bronchiseptica*.

Speak to your veterinarian about the appropriate vaccination program. However, further detailed information on vaccinations is provided in **Booklet 7** in **Owner - Trainer: Trainer Unit 2**.

Signs that a greyhound may have Kennel Cough include a dry hacking cough for a week or so, and it may be lethargic or off its food. During this time, the greyhound should not be raced or trialled as they

will struggle to cope with the increased demands for oxygen and place other greyhounds at risk of disease. Any increase in respiratory rate can also trigger coughing spasms as the windpipes are inflamed and sensitive, and commonly results in pneumonia which can be fatal.

If you notice any coughing, it is important to isolate the affected greyhounds to try to limit the spread of the disease and seek immediate treatment.

It is possible for greyhounds to be infected and spread the disease to other dogs before showing any symptoms such as coughing or sneezing. This can present challenges in stopping the spread of the disease, especially in larger kennels. So, it is important that all greyhounds are up to date with their vaccinations, and any signs are brought to your attention so you can look at isolating the affected greyhounds and seek treatment.

In some cases, vaccination boosters (usually intra-nasal or oral) will be recommended by your veterinarian to limit the spread and severity of the disease.

Remember that coughing is a symptom of many diseases - not just Kennel Cough - such as tonsillitis, pneumonia and heart disease.

It is important to have the reason for any cough properly investigated by a veterinarian to ensure you are doing the right thing, and that any greyhound that is coughing gets the right treatment.

Tonsillitis

Tonsillitis is another common respiratory

problem. The tonsils are actually part of the body's defence system, responding to infection in the throat and mouth areas. When they are not fighting infection, they sit neatly in a little pouch (called a 'crypt') at the back of the throat and can barely be seen. But when inflamed they get larger, become red and swollen, and can usually be seen quite easily in the back of the throat if the dog allows its mouth to be held open.

Enlarged and inflamed tonsils can be quite painful, and the dog may gag or cough, especially as it tries to swallow. Some dogs may go off their food, often running to the food bowl as if they are hungry, but then being reluctant to eat. Tonsillitis may affect racing performance both because the infection strains the immune system, and because the inflammation obstructs airflow in severe cases. If you can see your greyhound's tonsils, consult with your greyhound veterinarian about an appropriate course of treatment

After a race

As a greyhound runs it not only has a huge increase in the need for oxygen, it also generates a lot of heat in the muscles. For this reason, the respiration rate after a race is very high as the body tries to not only ensure adequate oxygen levels are supplied to the body systems, but also to cool itself and reduce the metabolic acidosis created from the exercise.

It is very important that your greyhound is gradually brought up in fitness so as not to overload its system. Greyhounds that are out of condition tend to 'puff a lot harder' after a run, and often struggle to meet the demands of their body

which then can lead to other problems. After a run, the greyhound needs to be cooled down properly and nothing should be allowed to inhibit or constrict its breathing - such as a tight collar!

When the greyhound's breathing has started to settle it can be offered a drink of water but be careful not to squirt water into its mouth in such a way that it triggers the gag reflex or causes the greyhound to inhale water and cough. Not all greyhounds will want to drink so do not force them - they will drink when they are ready. It may be useful to time how long the recovery phase takes so that it then becomes possible to compare how the individual greyhound pulls up after each run. This is especially important as you step up the distance that the dog is trialling over as its fitness improves.

What do I need to do now?

Having now learned more about the intricacies of training the racing greyhound we hope that you are keen to join the ranks of Trainers within the industry as a Public Trainer.

Your now need to complete the online assessment in FastTrack.

For more information on the application process and the requirements, please contact GRV on 03 8329 1100.

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