Feeding the Racing Greyhound

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The sport of greyhound racing has become more popular and competitive over recent years, with the breeding and purchase of finer, sprint bred greyhounds, improved race track facilities and design which have all helped to lift the standard of performance. It is even more important that nutrition is not a limiting factor to performance. A nutritionally adequate and well balanced diet is paramount to health, performance and adaptation of the greyhound to the physical and metabolic stresses of racing.
Although diets were traditionally based on fresh red meat and cereal meals, with disease risks of BSE and the rising cost of inspected meat in many countries, there has been a change in the staple diet for racing greyhounds to compounded dry foods formulated to partly or fully replace meat. As every trainer is looking for an 'edge' in performance to win, improvement in nutrition can help ensure optimum speed and competitive racing.

However, the 'art' of feeding greyhounds still remains one of the areas of animal nutrition still influenced by tradition and folklore, with many time honoured feeding practices.

The 'Science' of Feeding

Over recent years, there have been a number of extensive reviews on the traditional methods of diet composition and feeding practices of racing greyhounds. The racing diet for successful competitive racing has been refined since lure racing became the industry standard for grading wagering odds relative to body weight and performance.

Highly Digestible, Minimum Bulk Diet with Adequate Nutrient Content

In addition to maintaining health and vitality common to all canine species, greyhounds are a specific athlete with important performance related nutritional needs.
The diet must provide optimal and balanced proportions of carbohydrates, protein, fat and fibre to maximise energy density, while minimising gut weight and feed volume compatible with efficient digestive function and power-to-weight ratio. Greyhounds have the highest power-to-weight ratio of any athlete. Gut fill and body weight has a large influence on the speed and ultimate performance of a greyhound running over distances between 300-700 metres.

The traditional meat based diets with a total intake of 1000g daily containing an average of 50-70% fresh red meat by weight or 500-700g for an average 30 kg (66 lb) greyhound, combined with 30-50% of a low protein, low fat dry food or kibble (300 g daily) are still popular.
However, these feed combinations may be excessively bulky for greyhounds to consume, especially as it is often fed as a single meal daily. The actual dry matter content of raw meat in the fresh state is only 20% with water contributing the major portion of the weight and bulk.

The advent of low bulk, highly digestible extruded dry foods manufactured on a cereal and oil seed meal base, with high fat (20-30%) and high crude protein (20-30%) as the major energy and protein sources, theoretically distends the gastrointestinal tract to a lesser extent and are digested leaving a minimal bulk of stool.
Low bulk, complete feeds have not been well accepted in greyhound kennels because of a preference for traditional meat-based feeding practices, as well as the perceived higher cost of these dry foods on a per kilogram basis (Table 1). Dry foods processed by stream extrusion are designed to facilitate starch digestion, enabling a reduced feeding rate of 350-400g daily for a 30kg racing greyhound.

The negative aspect of a high protein, high fat, minimum bulk diet is that many trainers think the small bulk of food leaves the greyhound appearing hungry rather than full and content when fed once daily, as compared to a more bulky meat-based diet. The positive benefit of a low bulk, highly digestible diet is the lower stool bulk, which reduces kennel and turn-out clean up time and less faecal odour in kennels, when fresh meat is eliminated from the diet.
In countries with a warm climate, the amount of water consumed to maintain hydration can negate any weight benefit obtained from feeding low bulk, high protein and high fat dry foods.

Various studies have found that high protein dry foods may be detrimental to speed and performance. On average, a racing greyhound is able to run 0.1 metre/sec faster (about 2 lengths of the winning margin) over 500 metres when fed a moderate protein diet (20-25% crude protein) as compared to a high protein diet containing in excess of 30% crude protein.
These studies concluded that a dry food based diet, which contained 42% of the energy from carbohydrates, 33% from fat and 24% from protein, provided the best dietary balance to optimise speed and performance over a standard 500 metre race distance. However, greyhounds on this diet were slightly heavier in body weight than greyhounds fed a diet containing higher protein and fat, with a lower content of carbohydrate. This difference in body weight was attributed to a greater muscle bulk in greyhounds fed on the medium protein diet.

The traditional meat-based diet contains a higher level of carbohydrates provided by cereals, rice or bread. Another study suggested that greyhounds run faster race times when meat was added to a low protein and semi-lean diet, presumably because the meat provided extra fat as an energy source.

	Use	Energy (kcal ME)	Crude protein (%)	Fat (%)	Approx. daily amounts for a 30 kg greyhound
Group 1 Kibbles dry food	Meat-based diets	270	13	2-3	200-250 g daily mixed with 700 g medium 12-15% fat meat
Group 2	Minimum meat diets	290-300	17-20	8-10	250-300 g daily mixed with 500-600 grams of 12-15% fat meat
Group 3	Complete feeds	330-340	20-24	8-10	550-600 g daily, or 250-300 g mixed with 200-250 g medium 12-15% fat meat
Group 4	High-energy complete feeds	400	25-30	20-25	350-400 g daily

Table 1: Grouping of Dry Foods relative to Energy, Crude Protein and Fat content.

Provide an Economical and Palatable Ration

The prize money pool and wagering on greyhound racing as part of the code of racing in most countries is much lower than that provided by horse racing.

The cost of purchasing, housing, feeding and training a greyhound, although low in comparison to the purchase, upkeep and training costs of a horse, is actually higher in proportion to the return from prize money in most countries.

The high energy density of fat and the lower cost of freshly trimmed and rendered animal fat by-product of the beef, sheep, port and chicken meat industries, makes the combination of a fat-boosted minimum meat and commercial dry food diet more economical, as well as more palatable to racing greyhounds. Therefore, there is an increasing tendency to feed a minimum meat diet, higher in fat and protein, to reduce feeding costs.

Optimum Mineral, Trace-Mineral, Vitamin and Electrolyte Supplementation

The provision of nutritional supplements to correct low, imbalanced or inadequate levels in meat and cereal-based dry food rations is paramount to meet the elevated needs for mineral and electrolytes imposed on the musculo-skeletal and metabolic system by racing. When trained and fit to race, a sound greyhound can be successfully raced twice weekly. Adequate intake of minerals for bone development on a meat-based diet is particularly important to maintain skeletal strength.

It is estimated that the daily calcium intake needed by a sedentary 30 kg dog to maintain optimum skeletal strength is 3570 mg, compared to 5000-6000 mg daily for a greyhound in full race training. It is also recommended to add 20% more vitamin D than standard guidelines to dry food formulations; as cereal based dry foods, even with added calcium, have been associated with an increased incidence of bone fractures. The estimated requirement for most other minerals and trace-minerals is 2-3 times higher in a racing greyhound as compared to a resting dog. Recommendations for B vitamin intake and fortification of feed is at least three times higher than the standard for other breeds of dog, which reflects the higher metabolic rate during anaerobic exercise of a racing greyhound.

Demineralisation of skeletal and joint structures as a result of high-loading athletic exercise and cortisone-inducing muscle catabolism during exercise and respiratory evaporation of moisture due to panting, barking and strenuous exercise, can lead to increased losses of fluid and complementary electrolytes, particularly potassium. The diet must be fortified with a range of bone minerals, trace-minerals and vitamins to meet athletic demand and maintain body reserves, optimum metabolic function and racing soundness.

Maintain Immune Competency and Counteract Physical Stress

It is recommended that the ration provided for racing greyhounds contain additional nutrients such as vitamin A, vitamin E, vitamin C and selenium to counteract immune suppression resulting from higher circulating cortisol levels in greyhounds subjected to the stress of training and racing. This will help to maintain optimum resistance against disease and assist recovery from racing and injury.

Although greyhounds perform over relatively short distances in lure races, the effects of physical stress are often more marked than in horses or human athletes. Conditions such as diabetes insipidus (referred to as water diabetes or racing thirst) are precipitated by racing under hot or environmentally stressful conditions, or by the extreme physical exertion following a fall or interference in an effort to catch the race field. Cramping, which in the severe acute form is referred to as hypoxic or Exertional Rhabdomyolysis (ER), with muscle seizure under stressful conditions, is a universal problem in racing greyhounds. It is associated with chronic dehydration, an imbalanced electrolyte intake and excessive loss of potassium, high cereal starch diets and racing under cold conditions without adequate warm-up.

Maintain Adequate Hydration

Other conditions, which can be largely overcome by providing an adequate, balanced and well hydrated diet, include Exercise Hyperthermia, which can result from overheating under hot conditions and Exertional Rhabdomolysis related to severe over-exertion in a dehydrated greyhound. These can both be fatal within 48-72 hours unless intensive therapy is administered. Supplements of vitamin E, selenium and other trace-minerals, B vitamins and vitamin C are widely recommended in conjunction with a balanced, but low, sodium intake (greyhounds do not sweat) and adequate potassium supplementation in a moistened diet to ensure hydration. These measures will help maintain an active immune response, appetite and help to avoid dehydration.

Nutrient	Recommended Daily Intake (RDI		Practical guidelines for feeding racing greyhounds
	Resting	Racing	
Calcium	3570 mg	5000-6000 mg	Supplement meat-based diets to 75% of RDI, dry food diets to 30% RDI; essential in all young greyhounds in training for musculo-skeletal development
Phosphorus	2670 mg	5000 mg	
Magnesium	246 mg	800-900 mg	Add 50% RDI to the diets of nervous or cramping greyhounds or hot weather
Iron	20 mg	60 mg maximum	Add 50% RDI, especially to chicken or fish-based diets that are inherently low in iron
Copper	1.8 mg	5 mg	Add 50% RDI, especially to chicken or fish-based diets that are inherently low in copper
Zinc	21.6 mg	65 mg maximum	Add 50% RDI to dry foods if calcium is supplemented
Manganese	3.0 mg	6.0 mg	Add 50% RDI to meat-based diets
Iodine	0.36 mg	1.0 mg	Add 50% RDI to high carbohydrate diets to optimize metabolism
Selenium	20ug	45ug	Supplement with racing diets with full RDI daily
Sodium	330 mg	3000-5000 mg maximum	Do not add extra if more than 300 g dry food with 1% salt is fed; add 50% RDI to diet in hot weather
Potassium	2670 mg	4500 mg maximum	Add 50% RDI in hot weather, cramping, nervous greyhounds
Vitamin A (retinol)	2250 IU (0.675 mg)	3375 IU (1.0 mg)	Add 50% RDI to lean-meat diets
Vitamin D (cholecalciferol)	240 IU (0.06 µg)	260 IU (0.09 µg)	Add 50% RDI to lean meat diets, or 360 IU (1.2 µg) when calcium is included in a cereal-based dry food
Vitamin E (tocopherol)	15 IU (15 mg)	50-100 IU (50-100 mg)	Freezing meat destroys vitamin E; add 50% RDI to meat diets and an extra100% RDI in fat-boosted diets or high fat dry diets
Thiamine (vitamin B1)	600 µg	1.8 mg	Add at least 50% RDI to meat-based diets
Riboflavin (vitamin B2)	1.5 mg	4.5 mg	Add 100% RDI to fat-boosted diets
Niacin	6.75 mg	20 mg	Add 50% RDI daily when racing regularly on high energy diets
Pantothenate	6.0 mg	18 mg	Add 50% RDI to diets containing cooked foods (stews)
Pyridoxine (vitamin B6)	0.6 mg	2.0 mg	Add 50% RDI to high protein dry foods
Cyanocobalamin (vitamin B12)	15 ug	45 ug	Add 100% RDI to chicken or fish-based diets, which are inherently low in vitamin B12
Folic acid (folacin)	120 ug	360 ug	Add 50% RDI to all racing diets
Vitamin C	Internally synthesised	250-300 mg	Add 100% RDI when racing regularly, but not exceeding 300 mg daily

Table 2: Recommended Daily Intake (RDI) for a 30 kg resting and racing greyhound on a combined meat and dry food diet.

Food Hygiene

The other major problem to which greyhounds are commonly subjected is the consumption of highly contaminated meat containing potentially pathogenic Salmonella and E. coli bacterial species. The widespread use of 3-D (debilitated, diseased or dying) and 4-D (add an extra 'D' for dead to 3-D specifications) as a base for greyhound diets in the US, because of economic considerations, increases the bacterial challenge to the gastro-intestinal and immune systems, including the liver. Greyhounds often develop bacterial diarrhoea and associated dehydration when contaminated meat with a high microbial count is fed.

There is also the risk of antibiotic and other drug residues used to treat sick meat animals being excreted into the urine. These residues can be detected as prohibited substances on race day in greyhounds fed meat from animals treated with antibiotics and other drugs prior to slaughter or death. Meat derived from recently injured race horses should be avoided in greyhounds because of potential drug residues. The adoption of a complete dry food diet can help eliminate these risks in greyhounds raced on a regular weekly basis.

The diet must provide an adequate intake of ENERGY, PROTEIN, FIBRE, FLUIDS, MINERALS, ELECTROLYTES and VITAMINS.

Energy

Energy, with the exception of water, is the most important constituent in a greyhound's diet. It provides the calories (or joules) required to fuel muscle activity, nervous function and metabolic processes, maintain warmth during cold weather and provide muscle energy for panting during hot weather.

Studies have shown that the amount of muscle energy expended in each race (lasting 30-45 seconds), is only a relatively small (around 10%), compared to the total energy requirement to maintain body function and temperature (thermoregulation) each day. The greatest requirement for energy is for thermoregulation, particularly during hot weather when energy is used by the diaphragm and chest muscles as the greyhound pants to cool itself.

The Energy Equation: *Maintenance + Thermoregulation + Training + Racing + Behavioural Influences = Total Energy Need.*

If the ration contains more energy than is needed, the greyhound will store fat and gain body weight. Where energy intake is insufficient to meet total daily needs, the inadequate level of energy will initially decrease race performance, and then the animal will lose body weight and condition.

The energy supply and exercise level are interrelated, and can vary between individual greyhounds. Varying workloads and climatic conditions influence the amount of energy required in the daily diet to maintain optimum racing weight and performance. In a 70% meat based diet, meat provides about 50% of the ration's energy content. The remainder of the energy is provided by dry food and fat.

A racing greyhound requires extra energy during cold weather (below15ºC) to maintain its body temperature.

Handy Hint *The amount of energy is best increased by boosting the carbohydrate content, in the form of additional dry food, or by adding extra fat, such as lard, poultry fat or suet.*

Unlike other athletic animals, such as human runners and horses, that sweat to cool, the greyhound pants to cool itself during hot weather. Hot weather and high humidity also increase the energy expended for cooling as the animal pants more rapidly and forcibly. In many cases, hot conditions also reduce a greyhound's appetite.

Greyhounds raced during hot weather over 30ºC require up to twice the energy level in their ration, than greyhounds housed and raced under milder conditions (15-25 ºC).
Obviously, the greyhound cannot simply consume double the ration to meet these extra energy needs. It is best to add an energy dense food such as fat, to boost the energy level, without greatly increasing the overall volume or weight of the food the greyhound has to eat at each meal.

Behavioural Influences

Excitable, barking, hard walking, nervy, highly strung greyhounds that run their race before the start, often expend valuable energy resources in the pre-race period. This higher expenditure can be compensated for by adding 1-2 tablespoons of extra fat (eg lard, suet, meat trimmings or fresh cooking oil) to help make up energy shortfalls in these greyhounds. The extra fat in the diet, combined with electrolytes, can also help to reduce the risk of dehydration in this type of greyhound, because fats metabolise to contribute 107g (ml) of water per 100g fat used for energy.

Average Ambient Temp Range * Energy Need kcal/Metabolisable Energy (ME)	30kg (66 lb) Greyhound Dietary Adjustment
15-25ºC (60-77ºF) Temperate weather The basic diet must provide 1700 kcal per day to meet maintenance needs. Up to 2100 kcal in excitable, nervy animals.	Each tablespoonful (17g) of fat provides approx 150 kcal of energy to meet elevated requirements, without significantly increasing the bulk that has to be eaten.
15ºC dropping to 8ºC (60-46ºF) Cold weather. Each 1ºC drop below 15ºC down to 12 ºC, adds an extra 40 kcal energy need daily. Provide kennel heaters or rugs to increase comfort.	For each degree drop from 15 to12ºC, add an extra 15g (2 tablespoons) of dry food (20% protein, 8-10% fat). For each degree decrease below 12ºC, add 6g fat (1/3 tablespoon), as a high density energy source to reduce bulk.
26-30 ºC (70-86 ºF) Warm weather. Each 1ºC increase, add 130 kcal daily.	For each 1ºC rise, add 1 tablespoon of fat to provide energy and metabolic water to meet needs. Extra dry food at 1 cupful per 2ºC adds excess bulk and gut weight.
31-35ºC (88-95 ºF) Hot, humid weather. Each 1ºC increase, add 160 kcal daily. There is a limit to the amount of fat that can be added to the diet. Additional dry food will also provide fibre to trap water in the bowel as a reservoir against dehydration due to prolonged panting. An adequate supply of cold, clean water must be provided at all times during hot humid weather.	Add an extra 100g dry food (20% protein, 8-10% fat) to provide about 300 kcal energy to meet requirements to 32 ºC, in addition to the above 4 tablespoonsful of fat needed to meet requirements to 30 ºC. For each ºC above 32 ºC add an extra tablespoon of fat. For example, 34 ºC ambient temperature for 15 hours daily. Normal diet plus 100 g dry food plus 6 tablespoonsful of fat.

***Ambient temp, range for 15 hours per day or night.**

Table 3: Thermoregulatory Requirement of Energy

Useful Conversions: 20ml (1 tablespoon) or 17g fat or oil provides about 150 kcal metabolisable energy (ME). 100g (1 cupful) of 20% protein, 8-10% fat dry food provides 300kcal metabolisable energy (ME).

Energy Content of Foods

As mentioned above, only about 50% of the energy is provided by the meat part of the diet. Meat contains only about 4% carbohydrate, with most of the energy being contributed by the fat and protein. Cereal based dry foods contain around 50% carbohydrates, mainly from a cereal grain base. Many of these carbohydrates are in the soluble form, such as sugars and starch. The relatively small amounts of cellulose and fibre contribute very little to the energy content of the ration. While some energy is produced by fermentation of fibre in the bowel, it contributes little to the total energy intake.

Over recent years, dry foods have been formulated with added fat and higher crude protein to increase their energy density. It is always a good idea to compare various brands of dry food available for both energy and fat levels. The relative composition of the dry food is listed on the bag, and will give the energy content, crude protein and fat level contained in the product.

It is unwise to feed short chained, simple sugars (eg. glucose, honey etc) in a pre-race snack as an energy booster within four hours of racing. Studies have suggested that because these soluble sugars are rapidly absorbed, the concentration of blood sugar may become quickly.elevated after a meal. This switches on the secretion of insulin which acts to limit excessive blood sugar levels. Often this response can 'overshoot' and may depress blood sugar to a level lower than normal. This can tend to make a greyhound lethargic, and if raced within four hours, the animal may not be able to put in its best performance.
***Handy Hint**..Larger, more complex carbohydrates are contained in pasta made from durum wheat. These are more slowly digested and can sustain a longer energy release when a greyhound is traveling and waiting to race on race day. A cupful of partly cooked durum wheat pasta so that it is flexible, but not too soft, can provide a more efficient energy source for long distance races and coursing competition when compared to an equal amount of an extruded dry food, boiled rice or mashed potato.*

Protein

Proteins are made up to chains of amino acids, the building blocks of muscle, blood and bone protein. When meat or vegetable proteins are eaten, digestive action splits these food proteins into the individual amino acids. These amino

acids are then recombined in the greyhound's liver to form the proteins that make up the tissues, muscles and cells in the body.

Greyhound diets should contain about 15-20% high quality protein in the feed mix as it is fed to the animal ('as fed' basis) or 30-35% on a dry matter (dehydrated) basis.

Meat diets, where up to 700g (1½ lb) of meat is fed daily, provide up to 80-85% of the total protein requirements of the racing greyhound. Therefore, on these diets, a low crude protein (12-16% CP) dry food is adequate and will avoid excessive protein intake. However, if very lean meat is used, the dry food must contain adequate fat, or fat can be added to boost the energy level, particularly during hot or cold weather.

Generally, protein requirements are satisfied by a mixture of meat and dry food to give an overall average of about 17-20% crude protein on an 'as fed' basis. Excess protein can be used as an energy source, but it is inefficient compared to sugars and fats. As greyhounds become fit and ready to race, they use less protein as an energy source in muscles during exercise. However, where the energy level is boosted by fat, the relative protein content of the ration will be diluted because the fat itself does not provide additional protein to the overall diet.

Studies in human athletes have shown that during high speed sprints, metabolic damage can occur within the proteins in muscles and blood. This may eventually result in loss of muscle strength and size, due to the stress of repeated hard racing, with a reduction in power and performance. Over recent years, it has become popular to add a higher protein dry food to the first two meals after each race. This helps boost the protein levels to enhance the repair of muscle and other tissue.

Protein Digestibility

Studies have shown that digestibility of protein varies greatly depending on the origin and processing of the protein offered. Animal proteins, in meat and eggs, generally have a higher digestibility than the protein of vegetable origin in carnivorous animals, such as a greyhound.

When greyhounds are in early work the muscles often need building-up, whilst the body fat reserves need to be reduced. During this time, if a young greyhound needs to put on muscle mass, it is a good idea to boost the protein level in the diet by feeding a higher protein dry food for the first 4-6 weeks of training. After this time, a lower protein dry food with a minimum fat level of 10% can be provided to satisfy energy and protein needs. To obtain the most benefit from the extra feed in early training, the greyhound should be thoroughly wormed out.
Handy Hint *Simply substitute a 24% protein dry food for the regular 17-20% protein product for two meals, and top off with a lightly cooked egg, or 60g (3 tablespoonsful) of chopped liver, or 50g (3 tablespoonsful) of grated mature cheese, to boost protein after racing. (Refer to the relative feeds for details on preparation).*

Raw meat, such as beef or chicken, has a protein digestibility of up to 95%, but horse mean protein has the lowest digestibility of all common meat proteins (about 80% of beef). Vegetable proteins have a digestibility of about 80-85% and more protein is passed out in the stools of greyhounds fed on high dry food diets. Other factors such as cooking, particularly over-cooking of animal protein, reduces the digestibility and value of the protein. However, boiling of meat, when preparing a stew meal, does not significantly damage the protein content, but may help to increase the overall digestibility of the meat.

Low protein diets have been associated with poor liver function in racing greyhounds, with the development of anaemia and poor blood counts. On the other hand, an excessively high protein diet, while not directly affecting health in any way, is expensive and does not improve performance.
Handy Hint *Lightly cooking fish protein and raw egg whites for 1-2 minutes in boiling water can increase protein digestibility, as the heat destroys harmful substances that can reduce protein uptake and bind-up other nutrients in the feed. It also improves palatability.*

Elimination of excess poor quality protein metabolites through the kidneys is an energy-consuming process. It results in increased urinary ammonia and other wastes, water loss, and extra body heat production.

Therefore, there is no advantage in feeding high protein meals once a greyhound is racing regularly, except perhaps increasing protein levels for two meals after racing to help maintain muscle mass and aid recovery.

Fat

Fats provide a valuable source of energy, fluid and the fat-soluble vitamins, Vitamins A,D and of the diet. They also protect vital tissue and body membranes and are essential for optimum skin health and condition.

Over recent years, trainers and veterinarians have realised that an adequate level of fat in the diet is important for efficient digestion. Fat also has a very high calorific value, being two and a quarter times higher in energy when metabolised than carbohydrates or protein on a weight for weight basis.

Relatively small amounts of fat will boost the energy content of the ration dramatically, without significantly increasing the volume of the food the greyhound has to eat.
An overall fat level of 12-15% is considered to be most suitable for racing greyhounds. Lean meats contain about 10-15% fat, and dry foods range from 3- 30% fat Therefore, when very lean meat is combined with a dry food containing 3-8% fat, it is essential to add extra fat to the diet.

The feeding of extra fat to increase the energy density of the ration can also reduce the risk of dehydration, aid recovery and help maintain the greyhound at a more even body weight under hot conditions. Fat is the cheapest form of energy available. Fat trimmed from meat, or even suet or kidney fat, and polyunsaturated cooking oil (such as corn oil, safflower or sunflower oil) can be used as sources of fat, and are relatively inexpensive.
Vegetable oils contain essential fatty acids (lipids) which are important components of muscle cell structures and membranes, and are vital for optimum muscle function.
The Omega-3 fatty acids are involved in natural anti-inflammatory compounds in the body, and cold water fish oils in particular, have been useful in reducing inflammation in the skin and other tissues. Ideally, the ratio of Omega-3 to Omega-6 fatty acids in the diet should be 1 to 5-10 parts for optimum natural anti-inflammatory activity.

Fats also contain the valuable fat soluble vitamins A, D and E, and increase the palatability of the diet. However, animal fat and vegetable oils must be fresh, because if they oxidise or turn rancid due exposure to air, vitamins A and E are destroyed and the integrity of the fats(lipids) in muscle membranes may be compromised in racing greyhounds, which may result in a higher risk of cramping and reduced strength and stamina.
Greyhounds in training and exercised daily can tolerate relatively high levels of fat without apparent ill effects, in comparison with less active breeds of dog. However, to avoid digestive upsets, the fat level should be increased slowly over one or two weeks, and the body weight monitored regularly during this time.
Handy Hint *Vegetable oils, in particular, are prone to oxidation and turning rancid on storage once a container is opened. Refrigerate oils after opening, and do not shake bottles of oil, as trapped air bubbles increase the speed of oxidation and rancidity. Oils do not settle out on storage.*

It is most important to provide extra vitamin E when feeding diets boosted with fat and polyunsaturated vegetable oils in particular.
Vitamin E prevents uncontrolled oxidation of polyunsaturated fats into harmful peroxide and superoxide compounds in muscle cells. These compounds can interfere with the efficiency of muscle contraction and reduce performance.
Because vitamin E is involved in energy and metabolic pathways as an anti-oxidant, the diet of a racing greyhound should provide 50-75IU of vitamin E daily. Vitamin E should be supplemented in high fat diets at the rate of 1IU of Vitamin E per gram of additional fat or oil added to the diet, particularly where polyunsaturated or vegetable oil fats are being added to boost energy levels
Handy Hint For every tablespoonful (17g) of fat added to the diet, an additional 20IU of vitamin E should be supplemented above the normal supplementary levels of 50IU of vitamin E each day. Do not use cooking oil that has been used for frying food, or dripping from roasted meat, because burnt fat can contain harmful oxidised compounds that may accumulate in the liver of racing greyhounds.

Fibre

Greyhounds require about 5% fibre in their diet for efficient digestion in the large bowel.
Meat contains only small amounts of fibre, and most greyhounds obtain fibre from dry foods or vegetables. Greyhounds are unable to digest large amounts of fibre effectively, and this usually passes quickly through the gut and increases the volume of the stools.
Greyhounds fed on low fibre diets often suffer from constipation. They strain to pass small concentrated motions and may develop a craving to eat their own stools.
High levels of fibre on the other hand, not only increase the volume of the stools, but also hold more water in the bowel, resulting in laxative, large stools. Loss of water with excess fibre reduces kidney water excretion and may lead to increased risk of kidney problems, lowered absorption of calcium and a decrease in the digestibility of fats in the diet.
Regular checking of the consistency of the stools, and ease at which a greyhound empties out, is a practical way of assessing digestive function and the adequacy of the fibre and fluid levels in the diet.
Handy Hint *If small, concentrated motions are passed, fibre can be increased by adding extra dry food, a cupful of cooked vegetables or 1-2 tablespoons of wet wheat bran to the diet.*

Water

Greyhounds must be provided with an adequate supply of clean, fresh water at all times.
The amount of water required depends on the moisture content of the feed, the ambient temperature, the duration of exercise, the individual animals' drinking habits, dehydration state and general temperature. An excitable greyhound generally will not drink as much water as a quieter counterpart.

Greyhounds fed on a diet boosted with fat to correct dehydration will not drink as much water, because 'metabolic water' is produced during digestion of the fat content.

Greyhounds with a chronic state of dehydration will often drink little, if any, fresh water, because fluid and electrolyte loss from panting and exercise does not stimulate the normal thirst response.
Handy Hint The average greyhound will drink 250-400ml (1-1½ cupsful) of water per day in cool weather, and up to 750-1000ml (3-4 cupsful) daily during hot weather. Greyhounds prefer to drink cool, clean water, and will reduce water intake if it is offered in dirty bowls, or left out in the sun to warm up. Always locate the water bowl in a cool, shady place and clean it each day.

Higher fat diets, containing an additional 5% fat as a 'metabolic' water source and ensuring all dry food is soaked for at least 15 minutes before feeding, feeding stews or added vegetables to increase the fluid content of the diet, will all help counteract the reduced water intake in these animals. Electrolyte or body salt supplements added to the diet will help stimulate the desire to drink more fluids, so a constant supply of water must be available at all times.
Do not offer large amounts of cold water immediately after a trail or race, as it may cause stomach cramps and discomfort. Allow a greyhound to drink only 50-100ml from the wash bay hose after exercise.
Although it is often recommended to withhold water for up to 6 hours before racing, this practice should not be carried out during hot weather, or if a greyhound has to travel more than 30-40 kilometres to race. Although a large drink will increase gut water content and may exceed the animals racing weight limit, dehydration in an excitable, hard working greyhound during hot weather, is likely to adversely affect speed and performance by race time.
Handy Hint *Where a greyhound will not drink clean plain water, flavour it with 1 tablespoonful of honey, or 2 teaspoonsful of Marmite, or 1 crushed Beef or Chicken stock cube per litre of water, to entice the animal to drink.*

When traveling to a racetrack, take a supply of water from the home kennels in a clean glass bottle to avoid chlorine taste at racetracks or 'plastic' taste from storage containers. Any sudden increase in water consumption, particularly in a greyhound, passing large amounts of weak urine within 12-24 hours of a hard, stressful race, should be considered abnormal. In this case the condition of 'water diabetes' or 'racing thirst' may have resulted from the extreme stress of the race.

The 'Art' of Feeding

There is an 'art' to feeding greyhounds in knowing what the feed, when to feed and the likes and dislikes of individual greyhounds. In most cases it is based on experience or following the feeding practices of a successful trainer and even 'folklore' handed down over the years.

MEAT

The main components of meat are protein, fat and water. Meat contains some muscle energy in the form of glycogen, but it is generally low in energy providing carbohydrates. Muscle meat alone is deficient in many important minerals and vitamins. It is not a complete food for racing greyhounds without regular access to organ meats, such as liver and kidneys, bones and vitamin and mineral supplements. Dogs usually digest animal protein more efficiently as compared to vegetable protein, meat or meat by-products are considered necessary in the diet to ensure the most efficient absorption of food energy and protein in a racing greyhound.
Common questions that are often asked on the form of meat that is best fed to greyhounds include:

Q. Should the meat be minced or diced? A. Raw meat is a natural food for dogs and experience has shown that it is best fed coarsely minced, rather than cut in large chunks or finely minced to a paste-like consistency.
Handy Hint..*Chicken meat with skin should be freshly minced fresh prior to feeding. Do not mince chicken for storing, even freezing, without first removing the skin, as the skin can be contaminated with high levels of bacteria (eg Salmonella) that may cause gastric upset and severe illness.*

Q. Does freezing meat alter its nutritional value? A. If bulk meat is purchased frozen, it is much easier to store for longer periods. However, the cost of running refrigeration and time taken to thaw out meat prior to feeding should be taken into account, particularly if fresh meat is also readily available. Meat which has been frozen and then thawed, needs to be supplemented with vitamin E, a vitamin which is essential as anti-oxidant in the muscle cells and blood and it cannot be synthesised in the body, and must be provided in the diet. Vitamin E is largely destroyed by freezing.

Handy Hint *It is a good idea to chill meat prior to mincing because chilled meat is less likely to mash or paste during mincing.*

Q. Should meat be fed raw or cooked? A. Cooking can help to make meat more tender and attractive to 'picky' eaters. Over cooking at high temperatures (above 200ºC) by roasting and grilling, may denature some of the protein and fat and inactivates many of the vitamins. Whilst cooking may hasten the uptake of some of the protein and energy from the meat, it can lead to other problems. Roasting or grilling of fatty meat destroys some of the important amino acids, such as methionine, as well as vitamin A, Vitamin E and folic acid. These essential nutrients help to break down fat in the bowels, so when they are destroyed, extra fat is absorbed from the gut and may accumulate in the liver. Burnt (oxidised) fat forms harmful peroxide chemicals that can interfere with muscle and liver function, causing slow growth in puppies and poor performance in racing greyhounds.

Boiling meat in water at 100ºC in a stew is a lot safer, but it takes time to prepare the meals. If meat is suspected of being a little bit "off", boiling and cooking may help to reduce harmful levels of bacteria. However, very smelly, slimy, rotten meat, such as can occur in the case of 4D meat, should not be fed to greyhounds at all, as it can cause severe gastro-enteritis or a 'blow out' in a kennel of racing greyhounds within 12-16 hours. Even relatively low levels of contamination with bacteria that can cause gastro-enteritis and diarrhoea, such as Salmonella and E.coli spp,in a racing greyhound because they are often under stress and more sensitive to bacteria in the food as compared to other dogs, may not be destroyed unless the meat is boiled for at least 30 minutes. Chicken skin can carry a high level of contamination with Salmonella spp, and should not be minced in with the meat and stored before feeding, even by freezing as the bacterial toxins can lead to gastro-enteritis. Boiling to destroy Hydatid tapeworm cysts in mutton and other meat is also important. Where liver and kidney meat have not been inspected for Hydatid cysts at slaughter, then it must be carefully checked before feeding to check for cysts and other signs of contamination.

Handy Hint *If whole organ meat such as lungs, liver and kidneys are being fed in stews etc, slice them into very thin 2-3mm wafer slices to check for Hydatid cysts and abscesses . Do not mince whole organ meats without first checking for Hydatid cysts and other disease processes.*

It is best to mince offal type meats separately, and add them fresh as a "topping" to the meal.

Handy Hint *If commercial minced meat is purchased, it may contain preservatives, such as sulphur compounds, nitrates and nitrites (potassium nitrate or saltpeter), which can cause gastro-enteritis and diarrhoea in greyhounds. A check for these preservatives can be made by dropping a couple of drops of Malachite Green solution, that is used to test for the presence of nitrates and sulphur contamination in fish tanks, on to a teaspoonful of minced meat. If the Malachite Green immediately loses its colour, these preservatives are likely to be present in the meat.*

The Individual Meats

Beef

For many years, a traditional 700g (1½ pounds) of lean beef mince has been the basis for most evening meals, combined with 1½-2 cupsful of 12-16% crude protein dry food to make up the energy and protein shortfalls.

Beef can vary in its fat content, and this has to be carefully assessed when buying different batches of beef. In most cases, lean to medium beef with about 12-15% fat provides a better source of energy in a low protein dry food mix. It is very difficult to estimate the fat levels of beef which has already been minced. Where higher fat beef is used, the amount of beef fed can be reduced from 700g (1lb 8oz) to about 600g (1lb 5oz), as it will still contain sufficient energy and protein for a greyhound fed a standard amount of 12-16% crude protein dry food.

If the meat is variable in its fat content, the greyhound should be weighed every few days, and the amount of meat adjusted until the body weight of the greyhound stabilises at its ideal racing weight. If the beef is very lean, with hardly any marbling or streaks of fat, extra fat should be added to the diet.

Where very fatty meat must be used, the excess fat should be trimmed off. If the fat is relatively fresh, it can be frozen in freezer bags, each containing 3 tablespoonsful and used later as a fat supplement to very lean beef or horse meat. If excessively fatty meat is used (fat level above 20%) the amount of beef fed can be reduced to about 450g (1lb). In this case, extra protein must be provided by adding a 16-20% crude protein dry food, as the amount of protein relative to fat is lower in fatty meat.

Handy Hint *Fatty meat is useful for greyhounds that dehydrate easily, but the overall cost of feeding a greyhound is higher because of the wastage in fatty meat when excess fat is trimmed off. It is much cheaper to add extra fat to lean meat than purchase fatty meat. If fatty meat is fed to meet energy needs, add an extra cup (100g) of 20% protein dry food to provide adequate bulk and protein.*

If fatty meat is used, you should monitor the body weight of the greyhound twice weekly to ensure that the excess energy contained in the fat is not affecting the animal's racing weight.

Horse Meat

Horse meat is often substituted in part or full to replace beef, when beef it is not available or is more expensive. Horse meat tends to be more uniform in lean fat content (around 5% fat) than other meats, as the majority of unwanted or injured horses used for pet meat, are often in fairly poor condition.

Note: Horse meat can contain prohibited drug residues if a race horse is used as the source of the meat, and for this reason, many trainers prefer not to use horse meat for racing greyhounds, reserving it for brood bitches and retired greyhounds.

Horse meat is lower in the major components of energy, protein and fat, than standard lean beef.

Horse meat may contain slightly higher levels of calcium, iron, copper and vitamin E if horses have been supplemented with these nutrients. However, these nutrients will still need to be supplemented in racing diets. Normally horse meat is darker than beef and has a distinct, strong odour. In some cases, greyhounds accustomed to eating lean beef, will not accept horse meat without blending it with beef in step-wise change-over period.

Lean horse meat is extremely low in fat. In fact, there is a 35% difference in energy content of average quality horse meat, as compared to lean-medium beef which any trainers feed to their greyhounds.

When the low fat content and reduced digestibility of horse meat is considered, many trainers may not be feeding sufficient horse meat as a substitute for lean beef.

Handy Hint *A greyhound fed on horse meat may be able to maintain bodyweight on a relatively light exercise program. It may not obtain enough energy to meet the requirement for repeated racing. Feeding large amounts of horse meat can lead to a mild digestive upset, with sloppy stools and low-grade diarrhea, as it is often the cause of Red Meat Allergy in some bloodlines of greyhounds fed on raw horse meat. If the animal develops a sensitive gut when fed horse meat, it may have to be removed from the diet. Low fat diets also reduce overall digestion in dogs and can lead to low grade diarrhoea in racing greyhounds.*

As a guide, up to 1kg (2.2lb) of horse meat is required to contribute the same amount of energy to the diet as 700g (1½ lb) of lean beef. However, the addition of an extra 8g (1/2 tablespoon) of fat or oil per 100g horse meat will boost the energy level up to that of beef. Adding extra fat reduces the weight of horse meat needed to be fed and minimises the risk of loose bowels. As fat is a lot less expensive than the extra amount of meat itself, fat boosted horse meat may be cheaper than medium beef.

Although the protein digestibility of horse meat is lower than beef, normally a good quality dry food, containing at least 20% crude protein, together with horse meat, will meet the daily protein needs of a racing greyhound.

Handy Hint *When introducing a greyhound to horse meat, it is best to change the diet over at least 3-4 days by blending horse meat 50:50 with the meat currently being fed. This will help ensure acceptance and reduce the risk of digestive upset. Do not change the diet in the week before a race. Most trainers find that a 50/50 mix of horse meat and lean beef, totaling 700g (1½ lb), with about 30g (2 tablespoonsful) of added fat will meet the animals energy requirements and ensure that they perform well.*

Mutton and Lamb

Mutton and lamb are much higher in fat and energy than lean beef and correspondingly lower in protein.

Obviously, very thin or aged animals used for meat, will be much leaner than normal adult sheep. Sheep hearts are higher in protein and calcium than mutton, but lower in energy and fat. If cheap to purchase, mutton makes an ideal meat base for a stew for dehydrated greyhounds or as an after race meal.

Handy Hint *Do not feed rib bones from boiled mutton flaps in stews. Boiling these small fat bones makes them very brittle, increasing the risk of the bone shattering into sharp fragments that can injure the mouth and digestive tract. Always pick out these types of bone from cooked stews. Where neck brisket bones are used, the risk of sharp edges is reduced.*

Sheep tongues are higher in fat and energy than lean beef. On a direct substitution basis for energy, 700g of regular mutton is equivalent to 700g medium beef, depending on the fat content.

For greyhounds prone to dehydration, 700g of a 50:50 mutton/lean beef mixture may be of benefit. Although mutton does not normally cause digestive upset, some greyhounds accustomed to beef may not accept it readily. Sudden introduction to mutton may also cause soft runny stools, possibly due to its higher fat content. Therefore, it is best to mix 50:50 mutton with beef for a few days.

Handy Hint *Of all the red meat types, mutton is the least likely to cause gut allergies and associated loose stools. Mutton is often combined with 1½ -2 cups of rice, mashed potato or pasta to replace dry foods in an attempt to overcome digestive upsets.*

Chicken Meat

Chicken meat is an excellent source of protein, however, the energy contributed to the diet is relative to the fat content, which can vary widely.

Handy Hint *Where a greyhound is suffering from diarrhoea due to red meat allergy, a 50:50 blend of red meat(eg mutton or lamb) and chicken meat may help reduce the risk of gut upset.*

Chicken meat is a 'white' meat which is inherently low in iron (0.6mg/100g as compared to 2.3mg/ 100g beef), and it is also lower in copper and vitamin B12. These are important blood forming nutrients, and if chicken meat is not supplemented with iron and B-group vitamins, a greyhound may become anaemic within 2-3 weeks, and consequently, be unable to perform at its best.

Handy Hint *If a greyhound is changed to a completely chicken meat diet without a supplement of iron and blood minerals, over a period of 2-3 weeks, it will begin to lack stamina when finishing. Mixing in some red meat will not adequately boost the iron levels in the diet. A supplement of iron (around 20mg) and Vitamin B12(50ug) must be added daily to provide adequate iron and blood forming minerals.*

It is difficult to provide set recommendations on chicken meat because of its variable content of fat. As an example, if thigh or breast meat is fed, the fat content is likely to be between 2-5%. In this case, extra fat needs to be added to the diet. However, if the skin and underlying fat deposits (eg around the vent and tail) are also minced in with the meat, then the fat content may be as high as 15-20%, and will help to boost the energy content of the diet. When feeding chicken meat, try to purchase meat with a uniform fat content. Weigh your greyhounds regularly and adjust the amount of chicken to maintain a steady body weight. Obviously, in hot weather, extra fat is the best way to provide additional energy for panting to counteract the energy drain on the system.

Whole chicken mince containing skin should not be stored due to the risk of bacteria, such as Salmonella spp, being present on the skin of the bird when it is processed. It is best to mince whole chicken fresh each day, or remove the skin and freeze small portions of chicken meat and mince enough for one day at a time. Chicken meat must be carefully minced to avoid any sharp bones. Remove skin from chicken pieces if the mince is to be stored under refrigeration or even when frozen for later use.

Many trainers consider that 'red' meats, such as beef have advantages over 'white' meats, such as chicken or fish. For instance, many trainers claim that beef tends to produce a greyhound that is much 'harder' in the muscles and a lot more solid in its build. These trainers consider that chicken meat results in an animal with 'softer' muscles which often lacks stamina in a hard race. There have been no scientific studies to support these observations. However, it is important to supplement with iron, copper, cobalt and vitamin B12, as well as calcium, to racing greyhounds fed on chicken based diets.

Fish

If fish is available, it can be used to boost protein levels in the ration, and provide a change in taste. Fish is usually more expensive than other meats, and access may be restricted due to availability in inland areas or because of health regulations.

Fish can be segregated into 'oily' meat fish and 'lean' meat fish.

The most available fish is cold-water, lean meat type of fish, which store fat in their liver, rather than in their flesh. These include mullet, flathead, shark, cod, flounder, carp, stingray and other sea fish. Their flesh contains high levels of protein, (30-33%), but only 0.5% fat, so it contains only about half the energy of lean beef on a weight for weight basis.

Handy Hint *On an energy basis, up to 1400g of lean fish is equivalent to 700g of lean beef. The cost of fish is variable, and in most cases, it is too expensive to feed routinely in this amount. When feeding lean fish as the main meat in the diet, extra fat must be added to boost energy so the amount fed is not excessively bulky or expensive. For every 100g of lean fish, add 17g (one tablespoonful) of lard, meat trimmings, suet, or polyunsaturated cooking oil to make up the deficiency in fat.*

Oily types of fish, such as salmon, tuna and whitefish, contain higher fat levels in the flesh which greatly boosts the energy content. Therefore, to maintain energy levels without gaining bodyweight, only about 450g of these types of fish needs to be fed to replace the standard 700g of lean beef.

Fish is a 'white' meat, and is relatively low in iron and blood-forming minerals. Diets containing fish meat should be boosted with an iron supplement on a daily basis, as suggested for chicken meat based diets above.

Handy Hint *Fish is generally better accepted if the "raw" taste is removed by soaking it in boiling water, microwaving, or lightly grilling the fish before it is chopped up and mixed into the food. Fillets of fish, or whole fish, with the head taken off and gutted, must be carefully sliced to check and allow removal of small, sharp bones before the meat is offered in a meal.*

Note: Raw carp contains an anti-enzyme which destroys vitamin B1 (thiamine) in the gut. If greyhounds are fed this on a routine basis, they may become nervy, lose appetite and race poorly, unless a supplementary form of B1 is given. Carp should always be cooked by poaching in boiling water, or micro-waving on a high setting for 3-4 minutes, to destroy this substance (a thiaminase enzyme) before flaking it into the meal after checking for bones.

In some areas, ocean and estuary fish can contain high levels of fluorine, iodine, mercury and other toxic chemicals, and increased bacterial counts. It is best not to feed this source of fish to a greyhound as it may cause nerve or liver damage.

Being high in protein, fish, cheese and whole egg yolks provide a useful protein boost to the meal offered after hard racing. Feeding an after-race meal of 700g of fish and a high protein dry food will boost protein levels in the diet and may help to maintain muscle mass in a greyhound after a hard race.

Offal Meats

Heart, Kidney, Liver, Tongue

Offal foods are used as a partial substitute for muscle meat in the diet and can add variety and beneficial nutrients to the meal

Many trainers seek alternatives to fresh meat for economic reasons. In some countries, the availability of offal meat is restricted due to laws governing the slaughter of meat for pet or animal use to reduce the risk of spread of diseases such as BSE, brucellosis and hydatid tapeworms that can be transmitted to persons handling or eating the meat.

Beef tongue is regarded as the most direct substitute for standard lean beef, because it is higher in energy than liver, kidneys and heart.

Beef heart, on average, contains less fat than standard lean beef, and should be boosted by added suet, lard, fat trimmings or oil at the rate of 10g (½ tablespoonful) per 100g of heart meat.

Organ meats, such as liver, kidneys and spleen, although high in protein and other nutrients, can contain high levels of metabolic substances called purines. Excessive purines may accumulate in the liver and may reduce performance. Liver contains higher levels of many vitamins, such as A and C, and minerals, such as iron and copper as compared to lean beef, but it can also contain heavy metals and other harmful metabolites.

Handy Hint *As a general rule, tongue should not constitute the sole source of meat in the diet, and a blend of 50% tongue and 50% beef or other muscle meat is recommended. In the case of beef tongue, it is best to pour boiling water over the tongue to help strip off the outer rough covering layer, and feed only the internal meat or muscle layer chopped into thin slices.*

In some countries, where offal is readily available, lungs can also be used as a feed for greyhounds. However, lungs contain only about two-thirds of the energy level as compared to lean beef. Care should be taken to ensure that the lungs are fresh, and are free of abscesses, or other disease processes. Chopped lungs are suitable as a part meat substitute for meat in stews.

As a rule of thumb when feeding offal meats, add 100g (5 tablespoonsful) as a topping onto the normal diet of lean meat about once a week. Liver and kidney should be sliced very thinly to check for worm channels and tapeworm cysts.

Tripe

Cooked tripe is popular to break the monotony of a raw meat diet. **Tripe is lower in energy, protein and fat than beef and other meats.** Tripe contains about 30% of the energy contained in lean beef, and is low in fat. Tripe should be boiled to make it more digestible and mixed into a 50:50 ratio with other lean to medium fat meat, or higher protein dry food.

Handy Hint *If tripe is fed as a meat source in stews, extra fat needs to be added at the time of feeding. It is difficult to add extra fat into cooked stews because once cooled, fat tends to solidify on the top, and it may be difficult to re-mix into the stew. Therefore, the addition of 20g (one tablespoonful) of fat per 100g of tripe at the time of feeding, will help to boost the fat level (and energy content) to within the required range for a racing greyhound.*

Greyhounds relish the taste of tripe, but the preparation time is often not worth the nutritional benefit. Tripe is an ideal 'soft' food for a stew, or as part of the meal when a greyhound is recovering from an injury. Fresh or frozen tripe should be washed thoroughly before being cooked. Tripe can be cooked by boiling for 15 minutes or micro-waved in suitable container and cooled prior to feeding.

Meat Loaf

In recent years, a number of cooked and pressed, mixed meat loaves have become available as replacement for raw, whole meat in greyhound diets. Although they vary in quality and nutritional content, most trainers find that they store well and are convenient to feed.

Meat loaf is uniform in quality, easily stored by freezing, and often much more economical than cooking and blending the ingredients separately into the diet. It is an ideal basis for puppy diets, and many trainers feed it as part or total replacement for traditional meat and vegetables in racing diets with good success. A vitamin and mineral supplement, additional vitamin E and body salt supplement, should still be added to meals containing cooked meat loaf. Some have added calcium – check the ingredient listing.

Bones

Gnawing and chewing bones will help to clean the teeth, massage the gums, help relieve kennel boredom and provide a natural source of calcium.

Brisket bones contain soft "honeycomb"-like bone (cancellous) core, but only 3-5% calcium. They can be easily chewed by a young adult dog, such as a greyhound, without the danger of breaking teeth or being swallowed in large chunks, which can lodge in the bowels and cause a blockage.

Fresh, long bones are usually too hard for a greyhound to break up with its teeth. However, a large ox bone given once a fortnight is useful for a greyhound to gnaw on to fill in leisure time in the kennels. The bone can be discarded after 3-4 days, once it becomes smelly and the greyhound has gnawed off all the remaining bits of meat, and then place another fresh bone in the kennel a fortnight later.

Handy Hint *In most cases 250g (about ½lb) of brisket bones given at 7-10 day intervals between races, will provide a useful additional source of calcium for the racing greyhound, as well as help clean the teeth. It is unwise to feed bones on a more regular basis as their bulk reduces the energy content of the diet, and may increase gut and bodyweight. Do not give brisket bones within 5 days of a race as they reduce the energy intake and add additional gut weight.*

Gnawing a bone is also thought to improve digestion of the normal diet, as the salivary juices are swallowed and aid the digestive processes.

A calcium supplement, ideally given at a dose rate directly proportional to the amount of meat to provide 0.5g calcium per 100g meat, should be added each day to balance the diet, even when bones are being provided.

Cooked Stews

A cooked meaty stew is an ideal, well digested meal to provide additional fluids to counteract dehydration during hot weather, during a short lay off (freshen up) from training, following traveling or after racing.

Stews are useful during short rest periods between major races, particularly for a greyhound that is 'training off' that would benefit from a short lay-off from racing. A meaty stew should contain 50-60% chunky meat with 20% cereal grains, such as barley, brown rice, or stale whole-meal bread. The remainder can be made up of vegetables, such as chopped carrots, potatoes and celery, and water. In stews, the meat is only cooked at about 100º C during the boiling process until the meat is soft, which does not significantly denature the protein and oxidize the fat content.

Handy Hint *A large 2-3 litre sized stew can be cooked and prepared for 2-3 days in advance, stored in a refrigerator at +4-8ºC and then a portion warmed as required and added to the moistened dry food mix. Meal size portions of stew can also be stored frozen in plastic bags. Stews are an ideal after-race meal, boosted with high protein dry food, and a couple of lightly poached eggs as a topping to provide a well digested, higher protein meal to assist muscle recovery and correct dehydration.*

Do not add vitamin/mineral supplements prior to cooking stews. Wait until the stew has cooled down and then add the supplements just prior to feeding.

If fatty meat is used in stews, the fat will usually rise to the top of the stew as it cools. For best results, remix this fat into the stew prior to feeding to boost the fat levels to the amount required by racing greyhounds. Even with fatty meat, the amount of fat in a stew should not exceed 10% when mixed with vegetables, dry foods and cereal grains.

Canned Meat

There is a large variety of cooked and canned convenience foods available for household and non-racing breeds of dogs. Most of these foods do not contain enough energy density or protein for the racing greyhound. They are often too expensive to feed on a regular basis, but can make an ideal food for a greyhound after racing.

Canned foods are also useful for weaning puppies onto a meat loaf or raw meat based diet, as they find them very palatable and learn to eat the soft food without too much difficulty.

DRY FOODS

Dry foods were traditionally added to a meat based diet to make up the shortfall of energy and protein, provide additional fibre for digestion, and supplement calcium, minerals and vitamins. Dry foods boost the carbohydrate or starch content of the ration as an important source of energy for racing, because meat contains very low levels of carbohydrates and soluble sugars.

Over the last decade, there has been active research to formulate dry foods which better meet the needs of the racing greyhound. Some dry foods are formulated to supplement a meat based diet, while others contain higher levels of energy and protein, as a major or full replacement for meat in the diet.

Handy Hint *Although a meaty stew is preferred as an after-race meal (as recommended above), a 450g can of the highest protein dog food and 2 tablespoonful of cooking oil, mixed into 1½ cups of moistened, high protein (24-30% crude protein) dry food is a nutritious substitute.*

Meat Based Diets with Dry Food

The low protein dry foods (12-17% crude protein), are suitable for adding to a 70% meat based diet for racing greyhounds. However, they contain high amounts of starch and other complex and non-structural carbohydrates derived from cereal grains. A limit of 300g daily is recommended to reduce the risk of cramping in susceptible greyhounds. As the meat content decreases in the diet, the protein and fat content of the dry food should be increased accordingly. On a 50:50 meat/dry food diet, a 20% crude protein dry food should be used to satisfy energy and protein requirements.

The low protein dry foods are often low in fat (2-3%), and when lean meat is fed, up to 17g (1 tablespoonful) of fat per 150g of meat is recommended to boost level of fat in the meal to meet basic needs.

Complete Dry Foods Diets

Over recent years, there has been a much wider acceptance of dry food diets, mixed into a minimal meat for convenience and economy. Dry food is much easier to store, and on a cost per unit energy basis, is often cheaper than meat. Theoretically, a dry food containing 22-24% crude protein and 12-15% fat, can replace meat in the diet and provide adequate energy, protein and fat for a racing greyhound.

It is relatively cheap and easy to boost the energy content of a low fat dry food by adding 17g(one tablespoonful) of lard, chicken fat, meat trimming fat or polyunsaturated oil, per 100g of dry food.

The majority of dry foods contain adequate fibre, but the higher protein dry foods may not need to be fed in such large amounts as recommended on the label to maintain bodyweight and condition in greyhounds. In this case, greyhounds often seek extra bulk, and will be more likely to eat grass, or even to start to eat their own manure. If this occurs in one or more greyhounds in a kennel, it is best to bulk up the diet by providing one cupful of cooked vegetables, or two tablespoonsful of wet bran, or 2 cupsful of meaty stew poured over the top of dry food. The meaty stew will increase the acceptance of dry food and provides additional moisture.

Dry foods contain a maximum of 15% moisture, and they should be moistened by soaking in water for at least 10-15 minutes prior to feeding. This is particularly important for greyhounds that are prone to dehydration, as feeding moistened dry food reduces the dehydrating effect on bowel contents, retains more moisture in the bowel and provides a reservoir for absorption and replacement of fluid in the greyhound.

Handy Hint *Ensure that all dry food is dampened to a mushy, but not sloppy consistency before feeding. This is most important in greyhounds that are prone to dehydration, particularly during travelling, or hot weather. Add one cupful of water per cupful of dry food to start with, and then adjust the volume of water to achieve a suitable consistency.*

Warm water added to dry food with a fat content of 10% or higher, will help soften it more thoroughly. Cold water leaves the fat content more solid and slows the absorption of the fluid into the dry food. A beef or chicken stock cube can be mixed into half a cupful of water and poured over the dry food to increase its aroma and provide additional moisture.

If milk is used to moisten and flavour dry food, do not add more than one cupful daily to avoid gut upset due to the poor digestion of lactose – add extra water to ensure the dry food is moistened adequately.

Handy Hint *Top dressing the dry food with half a cup of meaty stew or gravy makes it palatable and ensures that supplements sprinkled on top of the meaty stew will be completely consumed.*

A supply of clean, cool water should be provided at all times when greyhounds are on a high dry food diet.

Dry foods often contain up to 1% salt (sodium chloride) as a preservative. Check the ingredient listing on the bag, and if the dry food contains over 0.8% salt, about 300grams of dry food each day will provide adequate salt. In this case, if more than one third of the total ration is made up of dry food, do not add extra salt. Excessive salt in the diet can increase the leaching of other electrolytes, such as potassium, through the kidneys. This can have a detrimental effect on performance and increase the risk of cramping.

Many dry foods formulated for greyhounds contain added vitamins and minerals, including calcium, as a complete feed for a racing greyhound. However, because of the fibrous structure of many dry foods, it is possible that calcium, iron and magnesium in particular, are not fully available because they are bound up in the fibrous portion of the dry food. There is also concern that the extrusion and baking temperatures used to from dry food particles, may damage vitamin D in the feed, even when it is added to the dry food to increase it to the RDI recommended for greyhounds. Reports suggest that there is an increased risk of skeletal related problems in young and racing greyhounds because the vitamin D intake is less than the optimum for absorption and regulation of calcium in bone stores A supplement of 250 IU of Vitamin D3 is recommended to help ensure that the uptake and control of calcium in the body is maintained on a fully dry food diet.

If dry food contains high levels of fat to boost its energy and palatability, it is unlikely that vitamin E included in the formulation would remain stable during storage. Because vitamin E is one of the key anti-oxidant vitamins to protect the lipids in muscle membranes, a daily supplement of 100 IU of vitamin E should be added to the diet to ensure enough vitamin E is available for optimum muscle protection and function.

Some dry foods are claimed to be formulated as hard granules to help clean the teeth as the dog chews. However, as they must be moistened before feeding, most are of no practical benefit for teeth care. Other dry foods or 'rusks' contain sodium hexametaphosphate that binds to the calcium in the tooth enamel to prevent plaque attaching and accumulating on the surface of the teeth.

VEGETABLES

Vegetables are a useful source of fibre and fluid, but in most cases, have a limited energy, protein and vitamin and mineral content.

There is no need to feed vegetables if the diet is balanced with meat and dry food and the animal is emptying-out easily with soft, well formed stools. Many trainers feed vegetables with dry food, others mix vegetables into meaty stews, and some do not feed vegetables at all. The availability of well formulated and high quality dry foods has reduced the need to feed vegetables to boost the fibre intake on high meat diets. Root vegetables such as carrots, potatoes and turnips provide some vitamin A. Some leafy types of vegetables, such as lettuce and cabbage, have a very high (90%) water content, and can help to combat dehydration. Spinach is often fed to provide extra iron, but the form of iron in spinach is poorly absorbed and should be limited to no more than half a cupful per day, because of the oxalate compounds in spinach. (see below).

By far the most nutritious vegetables are seeds or those containing protein or legume seeds, such as peas, beans, and soya beans. These are relatively rich in protein and are a good source of B complex vitamins, and in the case of soya beans, fat as well. However, one side-effect of the higher protein and fermentable fibre content of beans, is that they often cause greyhounds to produce a lot more fermentation gas (flatulence), and pass thicker, more smelly urine as protein metabolites are excreted. A cupful of raw soya beans should be cooked in water for 2-3 minutes in a micro-wave set on high until they soften before feeding to destroy a toxic factor (anti-trypsin factor) that can interfere with trypsin enzyme digestion of protein and cause loose bowels.

High meat diets with low amounts of dry food are often deficient in fibre. A low fibre diets can reduce the overall utilisation of food and also increase the risk of a greyhound eating manure, craving grass, and straining to empty-out. Feeding a cupful of cooked vegetables to provide fibre and fluid will often help overcome these problems, as well as assist in counteracting chronic dehydration, especially in a greyhound that is a poor drinker.

The decision to feed vegetables is a personal choice. Although the nutritional value can be questioned, vegetables do help to bulk up the meal and add valuable moisture, particularly during the warmer summer months. In most cases, 1-1½ cupsful of cooked vegetables mixed into the dry food are adequate for most racing greyhounds.

The vegetables fed should consist of both "energy" type vegetables such as rice, pasta or potatoes, and "protein" rich vegetables, such as peas or beans. This mix will provide a balanced nutritional profile, adding fibre and moisture, without bulking out the diet and diluting the energy concentration.

Excessive fibre contributed by vegetables in a diet can retain extra moisture and increase the bulk or volume of stools passed, diverting fluid excretion from the kidneys and may increase urine concentration and ammonia odour.

Handy Hint *The cooking water from vegetables can contain many water soluble minerals and electrolytes that are leached out during cooking. Allow it to cool, and use the cooking water to moisten dry food or biscuits, thus utilising these nutrients.*

However, water used to cook spinach should not be used to moisten dry food, because spinach contains chemicals, called oxalates, which are released into the water during cooking. Oxalates can bind up calcium in the small bowel and thus reduce its uptake. Oxalates retained in the cooked spinach have less risk, as they are not released until the spinach is digested in the large bowel after the small intestine from where the calcium is primarily absorbed into the body.

Although, it is claimed that vegetables absorb 'acids' from the stomach and can reduce the risk of "bile" accumulation in the small bowel of a greyhound in heavy work, this has not been proven scientifically. In a large greyhound, prone to putting on weight, a cupful of vegetables can bulk out the meal, replacing some higher energy foods.

Preparing Vegetables

There is no need to peel vegetables because the skins often contain extra vitamins and trace-minerals. However, it is always best to shell peas before cooking them. Raw vegetables, such as carrots and apples are nutritious, but these should be grated, as many of the larger chunks can pass through the bowels undigested if not softened by cooking.

Boiling vegetables for 15-20 minutes will destroy most of the beneficial vitamins. It is better to "blanch" them to soften, and then dice into small pieces prior to feeding. Do not add bicarbonate of soda (carb soda) as many vitamins are rapidly destroyed in the alkaline solution during cooking. Steamed or micro-waved vegetables are generally more nutritious.

If vegetables are not fed, wheat bran can be used to boost the fibre level in the diet. It contributes energy, protein, some fat and phosphorus. However, the phosphorus is partly in the form of phytic acid that may bind-up calcium. Therefore, ensure adequate calcium is supplemented when bran is added. About 10-20g(1-2 tablespoonsful) of bran per day is recommended for high meat diets where minimal amounts of dry food are fed, or vegetables are not included as a source of fibre and moisture. If the stools become excessively bulky and soft, reduce the amount of bran until they return to a normal consistency.

Handy Hint *Micro-wave cooking of vegetables is quick and saves on cleaning pots. Prepare a cupful of mixed, diced vegetables for each greyhound. Place the mix into a freezer bag, add a teaspoonful of water, 1 teaspoonful of cooking oil, and ¼ teaspoon of an electrolyte mix. Knot the bag to seal it, lay the bag flat, and punch a few holes in the upper surface with a fork to allow the steam to escape. Place in the micro-wave and cook on a high setting (700-1000 watts) for 3-4 minutes until vegetables are soft.*

There is no need to salt vegetables if more than 3 cupsful of dry food are given in the evening feed. The majority of dry foods contain up to 1% salt, and generally 2½ -3 cupsful provide sufficient salt to meet needs. However, there may be insufficient potassium to meet the elevated needs of a 'hard walking', excitable greyhound which dehydrates easily. A supplement of slow-release potassium will ensure an adequate intake of potassium in this type of greyhound.

GARLIC AND ONIONS

Garlic and onions are two related vegetables that are often included in small quantities and are thought to aid digestion, immunity against infection and worms, and general health. Greyhounds like the taste of garlic, and dry foods for greyhounds and other dogs may be flavoured with garlic oil, or imitation garlic essence.

It has been claimed that garlic fed daily helps control worms, fleas and all types of viral diseases in the greyhound. Studies have shown that there is little credence to this claim and regular worming and flea control should still be carried out.

Studies have also indicated that excessive garlic may in fact be detrimental to performance in greyhounds. More than one clove of garlic per day may reduce blood glucose levels, interfere with thyroid gland function, and affect the greyhound's general energy production and metabolism, as well as red blood cell synthesis. It is also considered that excessive garlic can affect the fertility of brood bitches and may lower the blood count in some greyhounds.

Handy Hint *A clove of garlic given daily to a greyhound is a useful appetiser, and may be used to keep a greyhound interested in its food when subjected to the stress of repeated racing.*

Onions are often added to stews to improve flavour and acceptance. Onions, like garlic, contain compounds (organic sulphites) that can have similar affects on blood glucose and thyroid function if fed in large amounts.

Limit the amount of onion to 10g or half a tablespoonful of chopped onion per greyhound each day, mixed into vegetables or stews.

EGGS

Eggs are a useful source of energy, protein, vitamins and minerals. Eggs generally cost more than other sources of protein and vitamins, but are a useful and palatable protein boost after racing. The overall contribution of eggs to the diet is limited by cost and the limit on the number of eggs that can be safely fed.

Eggs which are cracked, "blood spotted", or not suitable for human food are available in many areas. The nutritional value of an egg depends on whether the whole egg (eggs and shell), the egg itself (yolk and white), or the yolk alone is fed. Whole crushed eggs contain about 12% protein, 11% fat and 3.3% calcium. Egg yolks provide good quality protein (15%) and up to 31% fat.

There is a limit to the number of whole raw eggs that can be fed to a racing greyhound. Egg albumin (whites) contain a phosphate compound called avidin which can bind up biotin, a B-Complex vitamin, and reduce its absorption. Biotin is important for general metabolism and well-being, particularly health of the skin and strength and growth of nails.

More than four raw eggs daily for 3-4 weeks may cause a relative biotin deficiency. This can result in dry, scaly skin, hair loss, stiffening in the leg muscles and eventually reduced performance.

Egg yolks are rich in biotin, and feeding whole eggs is safer than feeding whites alone.

Cooking destroys the avidin that binds up biotin in the albumin (whites), so that cooked whites or eggs and whites, are suitable for greyhounds. Raw yolks fed separated from the whites provide vitamins, including biotin. Generally it is best to limit racing greyhounds to about two raw eggs with whites a day, although as many as six egg yolks can be fed as a valuable source of protein, fat and vitamins, particularly after racing.

Handy Hint *The easiest way of inactivating avidin is to simply crack a whole egg into a cup, then fill the cup with freshly boiling water. Leave for approximately one minute. This will heat the egg whites and denature most of the binding substance. The water can be strained off and the slightly cooked egg with the 'hazy' yolk poured directly onto the dry food.*

Overcooking eggs by boiling can damage some of the valuable protein and vitamin content. It is best to cook an egg only until the whites turn a milky white, which is sufficient to destroy the biotin binding substance.

Alternatively, separate the yolks and white of the eggs and cook the whites by immersing in boiling water, then mix the cooked whites and the raw yolks separately into the food. Cooked eggs can be mixed into the dry food or provided as a topping on the dry food.

Handy Hint *During digestion, eggs release hydrogen sulphide gas into the bowel, causing smelly flatulence. To avoid this problem, do not feed more than 4 cooked eggs per day to a racing greyhound.*

Whole eggs with shell can be used as a supplementary source of calcium and protein for racing greyhounds. Each whole egg with shell contains about 4.7g calcium, so two average sized whole eggs daily, should provide adequate calcium to meet requirements when added to a high meat diet.

Some special precautions must be taken before feeding whole eggs to greyhounds. The outside surface of the shell is often contaminated with bacteria, such as Salmonella and E.coli bacteria. Severe digestive upset, diarrhoea and even death can result if these microbes multiply in the greyhound's gut.

Cleaning by scrubbing and washing whole eggs and then sterilising for at least 30 seconds with boiling water will destroy most of the normal contaminants on the egg shell surface. It will also help to deactivate the avidin in the whites, without reducing the overall nutritional value of the egg.

It is most important that whole eggs be carefully washed, lightly scrubbed with a brush using detergent and water, rinsed thoroughly, and then put into a cup. The cup should be then filled with boiling water and left to stand for at least 2 minutes.

Most greyhounds dislike eating whole eggs with bits of shell, as sharp fragments can irritate the gums. Many greyhounds will gingerly lick and pick at a whole crushed egg placed on the food.

Handy Hint *Thoroughly pulverise and almost homogenise whole eggs after cooking them by placing them in a blender and then mixing the blended eggs into the feed. Do not store blended whole egg mix as Salmonella bacteria may multiply in the blend – feed only freshly blended whole eggs.*

CHEESE

Cheese is a useful after-race protein booster containing up to 25% protein and 33% fat.

Cheese is also a rich source of vitamins, especially vitamin A. It is roughly equivalent to fatty beef on a nutritional basis, and amounts up to 100g each day are safe to feed to a greyhound without causing digestive upset. Matured cheeses shredded over the meal before feeding are well accepted by greyhounds.

YEAST

Yeast is a very high protein (53-56%) source, and studies suggest that it contains various enzymes, nucleotides and other soluble nutrients which may assist digestion, as well as a range of B-Complex vitamins.

There are many forms of yeast available. Fresh yeast or baker's yeast should not be fed to a racing greyhound**. It is very poorly digested, and can lead to diarrhoea on high dry food diets where it ferments in the gut to cause bloating.**

Brewer's yeast, which is a dried form of yeast left after brewing, provides protein and B-Complex vitamins. However, it contains high levels of purines, or metabolic substances which can affect the greyhound's liver, which may adversely affect performance and general health. For this reason, it is best to limit yeast to no more than 15g (3 teaspoonsful) each day. Another form of feed yeast, called Torula yeast, is higher in protein and amino acids than brewer's yeast, but it is usually more expensive.

Many nutritionists recommend yeast as a valuable source of B-Complex vitamins. However, being a natural food, yeast contains variable levels of B-vitamins, some far in excess of a greyhound's needs, and others are inadequate. For instance, to meet requirement for vitamin B1, a greyhound would have to consume 1½ cupsful (250g) of yeast per day, but only 30g (1½ tablespoonsful) to provide sufficient folic acid.

Up to 10g (2 teaspoonsful)of yeast added to the daily ration can aid digestion by providing enzymes and nucleotides. In most cases, it is more economical to add a supplement containing yeast, fortified with minerals and vitamins to meet the specific needs of the greyhound, rather than adding yeast alone.

WHEAT GERM

Although wheat germ is one of the highest natural food sources of vitamin E that is available (100 mg/kg), a greyhound would have to eat 750 g (3 cupsful)of wheat germ each day to meet its requirement of vitamin E. Wheat germ contains

polyunsaturated oil that is readily oxidised during storage, reducing its own vitamin E content. Therefore, it is best to add a concentrated supplement of stabilised vitamin E to the diet.

HONEY

Honey is useful as an appetiser and energy food for greyhounds. Honey contains 80% sugar compounds and 20% water, and although greyhounds do not generally like sweet tastes, they can become accustomed to the taste of honey. Honey is often used to sweeten dry food for picky eaters. However, in many cases meaty broths, or reconstituted beef or chicken stock cubes, are better accepted because greyhounds prefer a slightly salty, meaty taste.

Over the years, honey has become popular as a high energy 'booster' food prior to racing. However, there has been much controversy over the use of short chain soluble sugars, such as in honey, within 6 hours prior to racing, because it can result in a peak of blood glucose within 15-20 minutes after feeding. Rapid elevations can result in increased circulating insulin hormone, which acts to decrease blood sugar and may produce a hypoglycaemic condition just prior to racing that may adversely affect performance. It is currently recommended that soluble sugars, such as honey or glucose, not be given within four hours of racing. However, this may be subject to change if controlled studies indicate a benefit.

Handy Hint *A remedy for coughs and low-grade tonsillitis can be prepared by adding three drops of10% PVP iodine solution, 5 ml (one teaspoonful) of warm honey mixed into 10ml half a tablespoonful) of glycerine. Give this by syringe over the back of the throat once a day for 5-7days, but no longer.*

MILK

Depending on its availability and cost, milk can be used as a source of fluid for greyhounds, particularly those on a low meat diet where cereal based dry food forms the greater part of the ration.

Milk is palatable to greyhounds, and is useful as a fluid in a breakfast meal (if breakfast is given), mixed into dry food for puppies and younger racing greyhounds. However, it is important not to suddenly re-introduce milk, or products containing milk powder, to older greyhounds that have not been given milk for 2-3 months. This is because they lose the ability to digest lactose or milk sugar once milk is withdrawn for 2-3 months. Excessive amounts of the lactose sugar in normal cow's milk cannot be digested efficiently, and cause low-grade diarrhoea or loose stools. To avoid this problem, introduce milk gradually over a period of 5-7 days. In most cases, there is no benefit in giving more than one cupful of milk each day to a racing greyhound.

If fresh milk is not available, reconstituted milk powders can be used. However, mix the milk to the same strength each day to avoid loose stools and diarrhoea. Do not introduce milk, or make major changes to the milk type or increase the volume fed, within 5-7 days of a race.

It is possible that some milk powders formulated for calves may contain growth promoting compounds that could increase the body weight of the racing greyhound. Therefore, carefully check the label, or call the manufacturer, to ensure that the milk powder does not contain added extras that may cause your greyhound to put on weight, or return a positive swab.

Handy Hint *Milk can provide a source of calcium with one cupful (250ml) containing 300 mg calcium and 230 mg phosphorus. However, a greyhound would have to consume about 3 litres of milk each day to obtain enough calcium to balance a meat-based diet. The maximum milk that an adult greyhound can tolerate without risking a lactose induced digestive upset, is 250-350 ml(1-1½ cupfuls).*

Basically, greyhounds do not need milk, but if milk is available, it is a palatable and appetising fluid to moisten dry food, particularly during hot weather, when every opportunity should be taken to provide the greyhound with extra fluid to reduce the risk of dehydration. Limit milk to 250ml (1 cupful per day), and add extra water to moisten dry food.

Handy Hint *Withdraw milk from the diet of a racing greyhound that 'froths up' in the throat after a race. Milk may encourage excess mucus production in some greyhounds, which froths up in the airflow and may cause choking during a race.*

Common Feeds and Feed Proportions

The racing greyhound requires a daily intake of the major nutrient classes of <u>carbohydrates</u>, <u>proteins</u>, <u>fat</u> (although fat can be stored, it increases body weight) and <u>fibre</u>, as well as <u>water</u>.

Major Nutrient	Provide	Dietary Sources
Carbohydrates (short, medium and long chain sugars)	Energy	Dry Food, vegetables (starch). Low in meat and milk.
Protein	Amino acids for body protein, Energy	Meat, dry foods, milk, eggs, some vegetables.
Fat	High energy Metabolic water	Meat, dry food, milk, extra fat/oils
Fibre	B vitamins & water reserve	Dry foods, bran, vegetables. Very low in meat
Water	Essential for body function and hydration.	Drinking water, meat, moistened dry food, milk, vegetables, metabolism of fats

Table 4: Major Components and Sources of Nutrients in Diet

What is the optimum balance between Carbohydrates, Protein and Fat?

Recent research in Florida USA has indicated that greyhounds run faster when meat is added to a low protein and fat diet based on kibble and biscuits.

These studies indicated that when greyhounds were fed good quality meat containing 10-15% fat performance was improved as a result of the increase in the energy intake and packed cell volume (PVC) of the blood.

Another research project found that greyhounds were able to run 0.1metres per second faster (about 2 lengths over 500 metres) when fed a moderate protein diet (20-25% CP) as compared to a high protein diet above 30% CP. **The diet blend that was linked to the increase in speed provided 42% of the total energy from carbohydrates, 33% from fat and 24% from protein. However, the greyhounds were slightly heavier in weight but this could be attributed to greater muscle bulk.**

Some authorities consider that the lower carbohydrate, high protein and high fat dry foods suited to racing sled dogs that use aerobic energy pathways, may not contain the required energy balance from carbohydrates, protein and fat for racing greyhound using predominantly anaerobic metabolism.

The USA study indicated that traditional diets based on meat with little dry food provide higher protein, often more fat, but are usually below the requirement for carbohydrate as a direct muscle energy store for galloping. It must be remembered that most American trainers feed only once daily at 10.00am due to afternoon racing, but provide small carbohydrate based pre-race meal or 'snack' about 6-8 hours before race start time.

How to Achieve the optimum Carbohydrate to Fat to Protein Balance for Performance

A proportion of 50% of meat by weight in the total diet has been shown to be of benefit in helping to improve overall speed in a racing greyhound. The ration ideally should contain a blend of meat and dry food to provide energy from an optimum ratio of carbohydrate, fat and protein. This important balance must be provided in a bulk that can be consumed easily without adding excess gut weight.

Traditionally, trainers have fed a carbohydrate-based meal for breakfast in the form of a 12-16% kibble. The traditional evening meal is based on lean meat and dry food, with additional vegetables if required.

A simple calculation (in the table below) based on the energy content of carbohydrates, proteins, and fats can be used to determine the balance needed between these foods to meet the average daily energy requirement for a greyhound in training under moderate conditions (15-25°C). Under cold conditions below 8°C, it is best to increase the carbohydrate content of the diet by 10%. During hot weather above 30°C, an increase in the fat content by 5-7% will help meet the elevated energy expended as a greyhound pants to cool.

A good quality dry food can be combined with a meat base to provide the energy intake in the optimum ratios between carbohydrate (CHO), protein and fat.

GREYHOUND BALANCED DIET

Energy Content provided by a ratio of :-		Carbohydrate(CHO)	40-42%
		Crude Protein	22-24%
		Fat	30-33%
Basic Ratio on per kg body weight basis			
	Breakfast	Kibble 12% crude protein	5g/kg bwt
	Main Meal	Lean Beef 10% fat	20g/kg bwt
		Dry Food 20% crude protein 10-12% fat	15g/kg bwt
		Omega 3/Omega 6 oil	0.5 – 0.75ml/kg bwt

The amount fed must be monitored to avoid excess body weight as the diet is very efficient in providing energy for exercise and excess will result in weight gain.

Greyhound Body Weight	25 kg	30 kg	32 kg
Breakfast Kibble 12% protein with milk or water	125g	150g	160g
Main Meal Lean Beef 10%-12% fat	550g	650g	700g
Dry Food 20% crude protein,10-12% fat	375g	450g	500g
Omega 3 – Omega 6 Oils One part Omega-3 to 3.5-5 parts Omega-6 oil	15ml increasing to 20ml	18ml increasing to 25ml	20ml increasing to 30ml

A slightly higher protein diet is beneficial to greyhounds racing on a regular basis

Notes:-

1. Where a greyhound requires extra energy to maintain body weight in hard work, increase the dry food by 50-100g per day, whilst still maintaining the optimum carbohydrate balance for energy.
2. Where an excitable greyhound becomes dehydrated in hot weather, add an additional 1 tablespoonful (17g) of fat (lard/suet, meat trimmings, copha) per 300g meat in the diet.
3. Where lean meat, such as very lean or trimmed beef, horse meat or chicken is used in place of lean 10-12% fat beef, add 1 tablespoonful (17g) of fat (lard, suet, meat trimmings, copha) to the diet to maintain the optimum energy balance with the correct CHO to Fat to Protein ratio for speed and performance.
4. Additional supplements of Vitamin E (100 IU daily), Vitamin C (max 250 mg daily) and iron (15mg daily) can be provided, along with electrolytes, including potassium 600mg daily minimum.

Notes