The Pet Parent's Handbook To A Ketogenic Diet & Canine Cancer

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What is Ketopet Sanctuary and why was it founded?

Ketopet Sanctuary was founded in 2014 as part of a 501c3 non-profit organization called Epigenix Foundation. The mission of Epigenix is to validate the metabolic effects of nutrition on both human performance and disease.

Ketopet Sanctuary is a "Forever Home", rescuing dogs from being euthanized because they have cancer. Ketopet offers the highest standard of Veterinary care, as well as therapeutic modalities typically utilized in human cancer treatment.

Ketopet's mission is to validate the metabolic impact of a ketogenic diet in improving health outcomes for dogs with cancer. As the body of compelling evidence continues to build, the mission has evolved to also include the validation of a ketogenic diet as a nutritional program to prevent canine cancer.

While using a ketogenic diet as a standard of care for pediatric epilepsy and as an adjuvant therapy for brain cancer has precedence, Ketopet Sanctuary is the first organization to explore using a Ketogenic Diet to help dogs with cancer, at scale.

Notably, though using a Ketogenic Diet in Veterinary Oncology as part of the Standard of Care has not gained widespread adoption, it is now starting to receive more and more attention. As a result, many Pet Parents want deeper insight into what the potential is for feeding a Ketogenic Diet to their doggy.

A Ketogenic Diet is designed to induce nutritional ketosis as a metabolic intervention against cancer, alongside the Veterinary Standard of Care.

Resources:

Is Cancer a disease of metabolism, rather than a disease of genetics?

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3941741/

What does a Ketogenic Diet actually do to address Cancer?

http://www.sciencedirect.com/science/article/pii/S2213231714000925

Who is using a Ketogenic Diet to address Cancer?

https://www.charliefoundation.org/ketogenic-therapy/therapies-2/brain-tumor-cancer

Is a Ketogenic Diet right for my Best Friend?

Interestingly, the Ketogenic Diet utilized at Ketopet is not dissimilar from an Ancestral or Species appropriate diet. In other words, it is a raw diet, fresh meat based, higher in fat, moderate in protein and very low in carbohydrate. It does not include rendered or high heat processed fats or proteins, and does not include fruits or starches like corn, sweet potato or peas, and no grains like wheat. Additionally, one can validate the impact of a ketogenic diet by simply measuring a dog's ketones and glucose values, both before and after beginning the diet.

Resources:

What is the canine Ancestral Diet?

https://www.amazon.com/Unlocking-Canine-Ancestral-Diet-Healthier/dp/1929242670

What is Species Appropriate nutrition?

http://www.thewholedog.org/nutrition.html

What does a Ketogenic Diet actually look like when fed at home?

The key to inducing Nutritional Ketosis is ensuring that overall caloric density is controlled, and that macronutrients are distributed in such a manner that healthy fats are higher, proteins are moderate, and non-fiber (ergo, high glycemic load) carbohydrates are low.

Following are a few examples of what feeding your doggy a Ketogenic Diet at home could look like:

Nine year Old Chow/German Shepard mix weighing in at 60lbs with a Body Score of 6, moderate daily activity

MEAL 1 OF 2, DAILY

80/20 Raw Ground Beef 110grams

Coconut Oil 20grams

Fresh Raw Broccoli 6grams

Fresh Raw Red Cabbage 6grams

Total daily Calories (across 2 meals served) come in at 893kCal, with a 2:1 Ketogenic Ratio, at 15 Calories per pound

Daily Total | FAT:82grams | PROTEIN:38grams| NET CARB:1grams|

Four year old Dachshund/Chihuahua mix weighing in at 15 pounds with a Body Score of 5, high daily activity

MEAL 1 OF 2, DAILY

80/20 Ground Beef 40grams

Coconut Oil 6grams

Fresh Raw Red Cabbage 3grams

Total daily Calories (across 2 meals served) comes in at 308kCal, with a 2:1 Ketogenic Ratio, at 20 Calories per pound

Daily Total | FAT:28grams | PROTEIN:14grams | NET CARB:.5grams|

Resources:

Ketogenic lifestyle for humans and doggies

www.ketogenic.com

Ketogenic Recipes for humans

www.ruled.me

Wait, what's this Ketogenic Ratio thingy?

While not entirely intuitive, a Ketogenic Ratio simply expresses the following, as regards the distribution of macronutrients for a given meal or food:

FATgrams to PROTEIN+CARBgrams

You will note that the second half of the ratio (PROTEIN+CARBgrams) doesn't tell you how much protein or carb is to be served- that's right, it's up to you. Given that glucose (sugar/carbohydrate) is the preferred fuel source of many tumor types and the common basis for tumor metabolism (aerobic glycolysis), non-fiberous carbohydrates (ergo, high glycemic load) should be very low when using a Ketogenic Diet to address cancer.

Here's how various Ketogenic Ratios describe the percentage distribution of macronutrients by meal or food:

Ratio of Fat to Protein + Net Carbohydrates	% of Calories from Fat	% of Calories from Protein and Net Carbohydrate
0.5:1	53%	47%
1:1	69%	31%
2:1	82%	18%
3:1	87%	13%
4:1	90%	10%

Resources:

A well-considered take on a Ketogenic Diet for doggies

https://pettao.com/benefits-dangers-ketogenic-diet-for-dogs/

A Veterinarian's perspective on a Ketogenic Diet

http://www.theinternetpetvet.com/ketogenic-diet-to-treat-cancer/

How do I know if my doggy is in Nutritional Ketosis?

It's not too hard to validate if your doggy is in Nutritional Ketosis- a quick trip to your Veterinarian and a blood panel which measures Glucose and Ketones will tell you. Of course, one ketone/glucose measurement may not tell you everything you want to know, so measuring more frequently can be done at home with a PortaChek or Precision Xtra glucose/ketone meter.

A good indication that your pup is in ketosis would be observed by their blood Ketones ranging from .3mMol to 1.4mMol, and blood Glucose between 50mg/dL and 90mg/dL. Of course, these are very rough estimates but they can act as a handy barometer of your best friend's metabolism- .1mMol blood Ketones and a blood Glucose of 110mg/dL means your doggy is not in Nutritional Ketosis.

Hold on a sec, isn't Ketosis a bad thing?

Often times, Ketoacidosis is mixed-up with Ketosis. Ketoacidosis is an aberration of metabolism whereby Ketones are extremely high, in the presence of extremely high Glucose. Ketosis on the other hand, is when moderately higher ketones are in the presence of moderately lower glucose. Here's an example, which describes the difference between the two metabolic states:

Ketosis

.7mMol Ketones, 82mg/dL Glucose

Ketoacidosis

11mMol Ketones, 220mg/dL Glucose

Resources:

The Precision Xtra Glucose and Ketone Monitor

https://www.diabetescare.abbott/precision-xtra.html

How to measure Glucose/Ketones at home

http://www.sugarcats.net/sites/harry/bgtest.htm

If I am feeding my doggy a Ketogenic Diet, how do I know if it is affecting their Cancer?

Working with your Veterinary Oncologist to track disease progression (or lack thereof) will require imaging diagnostics such as X-Ray, Ultrasound and Computerized Tomography (CT) Scans to assess disease load comparatively, over time. Additionally, tissue pathology to identify, stage and grade your doggy's Cancer is crucial to gain insight into your furry friend's state of health.

At Ketopet, PET/CT imaging is used as a way to assess tumor response from dogs in ketosis. While PET/CT is not a common standard in veterinary medicine, CT is, and can be used to assess tumor response.

Crucially, even though PET/CT or CT provide excellent tumor imaging, they really don't help in implementing a ketogenic diet. Blood glucose and ketone readings, as well as paying attention to your dog's weight and body composition, offers a much more immediate barometer as to how well they are responding to a ketogenic meal plan.

Ultimately however, your Veterinary Oncologist will be able to offer the best insight as to how well your doggy is doing from a health perspective.

What else can I do to address my canine companion's Cancer?

Surgeries to remove or debulk your pooch's tumor load can be a critical factor in improving both survivorship and quality of life. As well, in some instances, Chemotherapy and/or Radiation can be powerful tools for addressing cancer, although side effects can be challenging to deal with. Carefully evaluating these options with your Veterinary Oncologist is a great place to start in managing your doggy's health.

As well, in the cases of B-Cell Lymphoma, the Avacta test can be a useful method of getting valuable insight into response to therapies.

While a ketogenic diet does have precedence in human medicine (it is the standard of care in pediatric epilepsy), it is a relatively new approach in Veterinary medicine and therefore, there is not a lot of explanatory depth in the literature. Hence, combining a ketogenic diet with standard therapies alongside other metabolic interventions, may offer your furry friend a better chance for a favorable health outcome.

Resources:

Side effects of chemotherapy for dogs

http://www.wvrc.com/veterinary-specialties/veterinary-oncology-wi/chemotherapy-general-information/

Side effects of radiation for dogs

https://www.dogcancerblog.com/blog/things-you-need-to-know-about-radiation-for-dog-cancer/

CT Scans for dogs

http://www.veterinarycancer.com/ct.html

Okay, I get all this- so how do I actually serve a Ketogenic Diet to my doggy at home?

Well, there is a little bit of math involved, but let's see if we can break this down in a simple fashion:

Firstly, pegging caloric density is the key- every dog's metabolism is a little different, as is their starting point- some dogs are lean, and some are well, a little fluffy. As a working point of departure, one can start at 15 calories per pound, and adjust calories up or down, based on body composition and weight, in response to the meal program. Begin by getting an accurate weight and Body Score from your Veterinarian.

So, if you were to feed, say, a 1.5:1 Ketogenic Ratio composed of ground beef, coconut oil and veggies, you would first want to know what the calories and macronutrient distribution for each ingredient are by 1 gram weight (you can divide the gram amounts of each macronutrient as listed on the back of each product package by the serving size in grams, to get their 1g equivalent):

	CAL	FAT	PRO	CARB	FIBER	* NET CARB
1g of 80/20 Organic Raw Ground Beef contains:	2.54	.2g	.17g	0.0g	0.0g	0.0g
1g of Coconut Oil contains:	8.6	1g	0.0g	0.0g	0.0g	0.0g
1g of Raw Organic Broccoli contains:	.34	0.0g	.03	.06g	.02g	.04g
1g of Raw Organic Red Cabbage contains:	.31	0.0g	.01g	.07g	.02g	.05g

* Uh-oh, what's this Net Carbs business?

Okay, given that Fiber is not metabolized, subtracting it from Total Carbohydrates makes sense, in terms of accurately assessing the metabolic impact of any given food. For example, Cabbage and Broccoli are a carbohydrate, but their Glycemic Load is very low, because they are highly fibrous. Fiber does not contribute calories because it is partially fermented into short chain fatty acids in your dog's large intestine. Hence, take this into consideration when composing meal programs, as these short chain fats provide dietary energy without the load of glucose that digestible carbohydrates provide.

Now, you will also want to know how much your doggy weighs- let's go with 30lbs. So, if you have these metrics down, then you can standardize your Ketogenic Ratio in relation to your 15 calories per pound by adjusting Fats, Proteins and Carbs accordingly by caloric density:

	CAL	FAT	PRO	CARB	FIBER	* NET CARB
60g of 80/20 Organic Raw Ground Beef contains:	152.4	12g	.10.2g	0.0g	0.0g	0.0g
7g of Coconut Oil contains:	60.2	7g	0.0g	0.0g	0.0g	0.0g
15g of Raw Organic Broccoli contains:	5.1	0.0g	.4	1g	.2g	.8g
15g of Raw Organic Red Cabbage contains:	4.65	0.0g	.21g	1g	.1g	.9g
TOTALS:	222.35	19g	10.81	2g	.3g	1.7g

So, let's check our math- if we feed two of the above meals per day, total caloric density would be 444.7kCal per day- divide that by your 30lbs dog and you get: 14.8kCal per pound- effectively 15kCal per pound.

Now, confirm your Ketogenic Ratio by dividing your FAT gram total of 19g by your PROTEIN + Net CARB total of 12.51g, which comes out to 1.5:1.

Hey, is this all my doggy can eat- where are the options???!!!

Why yes, alternate meats can be used! Chicken, turkey, lamb, venison, duck, and pheasant are great swaps. Additionally, spinach, brussel sprouts, green beans and cauliflower can be used as veggie options. Finally, MCT Oil, olive oil, red palm oil, cream and butter can be used as healthy fat sources. Saturated and monounsaturated fats are fine – you will just want to limit most polyunsaturated fats as they don't convert to ketones. You'll just want to calculate calories and macronutrients for those foods.

Resources:

Easily figure out macronutrient profiles for almost any food

http://www.fatsecret.com/calories-nutrition/

Is a Ketogenic Diet the cure for cancer?

No, it really isn't- there is simply not enough evidence to come to that conclusion. That said, there is a compelling body of case studies in both the human and canine worlds which demonstrate that a Ketogenic Diet does have a significant role to play in addressing cancer, and specifically, in mitigating disease progression.

Nevertheless, cases where hemangiosarcoma and mast cell tumors can be observed to halt their progression, or in the most favorable circumstances reverse completely, offer hope for both Veterinarians and Pet Parents. Given that Ketopet Sanctuary is a forever home, the long-term care of the doggies who have responded well to a ketogenic diet, will continue to teach us about what their experience is over an extended time horizon. Not to mention, we love playing with our furry friends and want their lives to be long and happy!

What does the future of canine health look like?

Encouragingly, there is a growing understanding by Pet Parents that the current standards for canine nutrition don't offer much in the way of addressing disease or long term health. A better understanding of the intersection of nutrition, metabolism and disease will be the key to helping our furry friends live longer, stronger, and more vibrant lives. Ketopet's mission is to defeat canine cancer via early detection, metabolic interventions, and the highest standards of Veterinary care.

The great news is that Pet Parents around the world, in greater and greater numbers, are taking a more active and informed role in the health and welfare of their canine companions.

*Please take care to understand that this E-book is not intended to diagnose or treat any disease, nor does it replace the expert medical care that your Veterinary Oncologist can offer your fur baby.

APPENDIX

Composing Ketogenic Meals, Step By Step

Information Needed Before You Get Started

You will want to gather the following information about your dog before we start:

Weight (in lbs.)

There are several ways you can determine your dog's weight. You can take him or her to your Veterinarian or (if you have had a recent appointment) they may have this information available over the phone. Additionally, if your dog is easily held and positioned, you can weight them at home.

Body Condition Score

Your dog's body condition score (BCS) is essentially how lean or overweight your dog appears. Your veterinarian will be happy to help you determine this number:

Activity Level

As well, assess your doggy's level of activity:

Sedentary: Inactive, and only moves to go to the bathroom or to their food bowl

Average: Moves frequently around the house, plays with housemates

Moderate: Going for walks several times a week

Active: Going for walks every day

Determining How Many Calories Per Pound to Feed Your Dog

Pegging caloric density correctly is the key to a sustainable meal program, and every dog's metabolism is a little different, as is their starting point. Some dogs are lean, and some are overweight.

Given your dog's weight, BCS, and activity level, you will want to determine if your pup needs to lose a little weight, is normal, or too skinny and needs to gain weight. Just like people, every dog's metabolism is different and some dogs require more calories than others. Fifteen calories per pound can constitute a working point of departure, and one can adjust calories up or down, based on response to the diet.

While following any given meal plan, your doggy may lose a couple of pounds, mostly water weight at the beginning, as a result of lowering carbohydrate intake. If your dog looks like they are losing too much weight too fast, simply readjust their meal plan, offering them higher caloric density.

	Too Skinny	Normal	Overweight	Obese
	(BCS 1-3)	(BCS 4-5)	(BCS 6-7)	(BCS 8-9)
Sedentary	16-17	15	15	15
Average	17-18	16-17	15	15
Moderate	17-18	16-17	15	15
Active	18-20	16-18	15	15

Okay, let's calculate how many calories per pound per day your doggies will need:

Example 1: Our German Shepherd Mix weighs 60lbs, has a BCS of 6 so they are a little on the overweight side, and they are sedentary. Being that the dog needs to lose some weight, the example below shows 15 calories per pound to start.

60 lbs x 15 calories per pound = 900 Calories (kCal) per day or 450 calories per meal (spread across 2 meals per day)

Example 2: Our Chaweanie Mix weighs 15lbs, has a BCS of 3 so they are on the lean/too skinny side, and are active. As a result, the example below shows 20 calories per pound to start.

15 lbs x 20 calories per pound = 300 Calories (kCal) per day or 150 calories per meal (spread across 2 meals per day)

Determine What Ketogenic Ratio to Feed Your Dog

What is a Ketogenic Ratio?

While not entirely intuitive, a Ketogenic Ratio simply expresses the distribution of macronutrients (fats, proteins, carbs) for a given meal or food:

FAT (in grams) / (PROTEIN (in grams) + CARBS (in grams))

Example 1: Daily Totals (Served across 2 meals) I CALORIES: 900.28 kCal | FAT: 80.70 grams | PROTEIN: 38.38 grams| CARB: 0.72 grams|

Fat: 80.70 grams / (Protein 38.38 grams + Carb 0.72 grams)

80.70/ (38.38+0.72)

80.70/39.10=

2.0 or a 2:1 ratio

Example 2: Daily Totals (Served across 2 meals) I CALORIES: 300.60 kCal | FAT: 27.00 grams | PROTEIN: 12.78 grams| CARB: 0.18 grams|

Fat: 27 grams / (Protein 12.78 grams + Carb 0.18 grams)

27/ (12.78+0.18)

27/12.96=

2.0 or a 2:1 ratio

A few other ways to look at the 2:1 ratio is:

1. To say that for every 2g of fat, you will serve 1g of protein and carbs combined.

2. 2/3 of the meal plan will come from fat (in grams) and 1/3 of the meal plan will come from protein + carbs (in grams).

3. Here's how various ketogenic ratios describe the percentage distribution of macronutrients by meal or food, which as you can see is a little different from the gram weight comparisons.

Ratio of Fat to Protein + Net Carbohydrates	% of Calories from Fat	% of Calories from Protein and Net Carbohydrate
0.5:1	53%	47%
1:1	69%	31%
2:1	82%	18%
3:1	87%	13%
4:1	90%	10%

You will note that the second half of the ratio (PROTEIN+CARB) doesn't tell you how much protein or carb is to be served- that's right, it's up to you. Given that the ketogenic diet is high fat, moderate protein, and low carb, it is easy to deduce that even if protein and carbs are added together most of it should be protein and only a tiny bit should be carbs. Additionally, given that glucose (sugar/carbohydrate) is the preferred fuel source of many tumor types and the common basis for tumor metabolism (aerobic glycolysis), carbohydrates should be very low when using a ketogenic diet to address cancer.

How Do I Choose The Appropriate Ketogenic Ratio to Feed My Pup?

This really depends on how dramatic a metabolic response is desired. Generally, a higher ketogenic ratio (4:1) can more quickly induce a deeper state of ketosis (lower blood glucose, higher blood ketones) than a lower ketogenic ratio (1:1). That said, high ratio ketogenic meal programs are not particularly sustainable over the long term as protein is so low (only 10% of caloric density comes from protein), so they are often used to induce ketosis, followed by a lower ketogenic ratio.

If your doggy does not have cancer, but you still want to feed them ketogenically, a .5:1 ketogenic ratio can make sense as a lifestyle meal program.

Determine How Much Food to Put in Your Dog's Bowl

> To figure out how much food your dog will need, you'll have to calculate the calories and macronutrients in your ingredients.

These next steps can get a little complicated and there is some math involved, but here's a detailed breakdown:

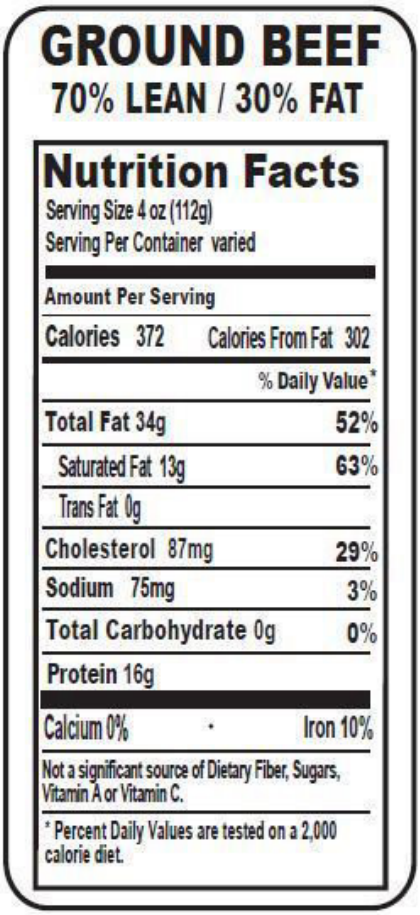
Example 1: Our Shepherd mix is going to get 15 cpp, 900 kCal per day and we are going to start them on a 2:1 ketogenic ratio

Example 2: Our Chaweanie mix is going to get 20 cpp, 300 kCal per day, and we are going to start them on a 2:1 ketogenic ratio

You just purchased 70/30 beef and some low carb fibrous veggies from the grocery store, but how many grams of protein does it contain? How much fat? What about carbs? What is the ketogenic ratio of these foods? And most importantly, how much do I put my dog's bowl?

First, you'll want to figure out what the calorie and macronutrient distribution is for each ingredient by 1 gram weight. You'll need to divide the gram amounts of each macronutrient (protein, carbs, fats) as listed on the back of each product package by the serving size in grams, to get their 1g equivalent:

Meat:



GROUND BEEF
70% LEAN / 30% FAT

Nutrition Facts

Serving Size 4 oz (112g)
Serving Per Container varied

Amount Per Serving	
Calories 372	Calories From Fat 302
	% Daily Value*
Total Fat 34g	52%
Saturated Fat 13g	63%
Trans Fat 0g	
Cholesterol 87mg	29%
Sodium 75mg	3%
Total Carbohydrate 0g	0%
Protein 16g	
Calcium 0%	Iron 10%

Not a significant source of Dietary Fiber, Sugars, Vitamin A or Vitamin C.

* Percent Daily Values are tested on a 2,000 calorie diet.

Fat: The label says there are 34 grams of fat in 112 grams of meat

$$34/112 = 0.30$$

Which means, there are 0.30 grams of fat per 1 gram of meat

Protein: The label says there are 16 grams of protein in 112 grams of meat

$$16/112 = 0.14$$

Which means, there are 0.14 grams of protein per 1 gram of meat

Total Carbohydrates (Carbs): There are 0 grams of carbs in the meat

Calories: The label says there are 372 calories in 112 grams of meat

372/112= 3.32

Which means, there are 3.32 calories per 1 gram of meat

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	1.00	0.30	0.14	0.00	0.00	0.00	3.32

What Does the Fiber Section in the Chart Mean?

Given that fiber is not metabolized, subtracting it from total carbohydrates is necessary to accurately assess the metabolic impact of any given food. For example, cabbage and broccoli are a carbohydrate, but their glycemic load is very low, because they are highly fibrous. Thus, we take the total carbs listed on the package, subtract the fiber to get our net carbohydrates.

Net Carbs: For meat this is pretty simple:

Total Carbohydrates 0 grams – Fiber 0 grams = 0 grams of Net (Non-Fiber) Carbs

Vegetables:

For vegetables, one can opt for those listed below, which represent a selection of low glycemic highly fibrous carb sources:

Brussel Sprouts, Green Beans, Cabbage, Broccoli, Asparagus

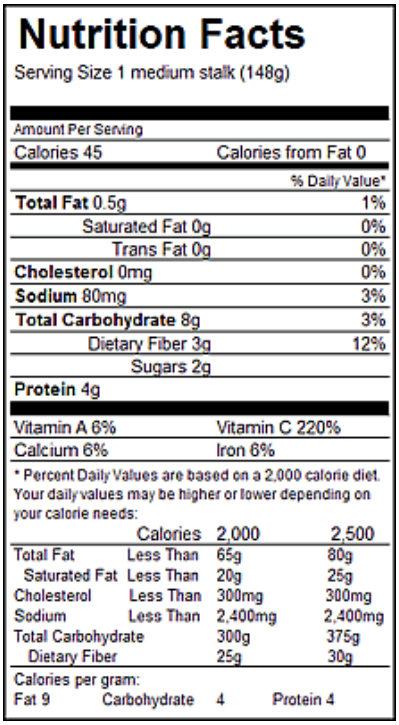
0.2 grams of veggies per 1 lb of body weight per meal, can act as a point of departure:

Example 1: 60 lbs x 0.2 = 12 grams of veggies per meal or 24 grams of veggies total on a daily basis

Example 2: 15 lbs x 0.2 = 3 grams of veggies per meal or 6 grams of veggies total for the day

Once again, every dog is different. If your dog likes vegetables you can always increase your amount. However, please do so with caution, as even though vegetables are low carb there still are carbs in them and they do add up. On the other hand, if your dog doesn't like veggies or is just getting used to them, you may want to start with less and then slowly increase them. You may also find that your dog prefers some greens over others, and you'll need to adjust types of vegetables along the way.

Moving forward with calorie and macro calculations, let's figure out the breakdown for broccoli just like we did with the meat portion of the meal.



Nutrition Facts

Serving Size 1 medium stalk (148g)

Amount Per Serving	
Calories 45	Calories from Fat 0
	% Daily Value*
Total Fat 0.5g	1%
Saturated Fat 0g	0%
Trans Fat 0g	0%
Cholesterol 0mg	0%
Sodium 80mg	3%
Total Carbohydrate 8g	3%
Dietary Fiber 3g	12%
Sugars 2g	
Protein 4g	

Vitamin A 6%	Vitamin C 220%
Calcium 6%	Iron 6%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 Carbohydrate 4 Protein 4

Fat: 0.5 / 148 = 0.00

Protein: 4/148 = 0.03

Total Carbohydrates (Carbs): 8 / 148 = 0.05

Fiber: 3/148 = 0.02

Net Carbs: 0.05-0.02= 0.03

Calories: 45/148 = 0.30

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
Raw Broccoli	1.00	0.00	0.03	0.05	0.02	0.03	0.30

Now that you have the macronutrients of our ingredients and how much veggies you'll need, you will want to figure out how many grams of meat we need to equal the calories your dog will need for the day.

Here's how to combine your calculations:

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	1.00	0.30	0.14	0.00	0.00	0.00	3.32
Raw Broccoli	1.00	0.00	0.03	0.05	0.02	0.03	0.30
Total Grams Per Day	**2.00**	**0.30**	**0.17**	**0.05**	**0.02**	**0.03**	**3.62**

Example 1: We need 900 kCal for the day and we know we need 24 grams of broccoli for the day

Since we know the amount of broccoli we can go ahead and multiply our nutrients by 24

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	1.00	0.30	0.14	0.00	0.00	0.00	3.32
Raw Broccoli	24.00	0.00	0.72	1.20	0.48	0.72	7.20
Total Grams Per Day	**25.00**	**0.30**	**0.86**	**1.20**	**0.48**	**0.72**	**10.52**

Example 2: We need 300 kCal for the day and we know we need 6 grams of broccoli for the day

Since we know the amount of broccoli we can go ahead and multiply our nutrients by 6

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	1.00	0.30	0.14	0.00	0.00	0.00	3.32
Raw Broccoli	6.00	0.00	0.18	0.30	0.12	0.18	1.80
Total Grams Per Day	**7.00**	**0.30**	**0.32**	**0.30**	**0.12**	**0.18**	**5.12**

Now that you've calculated your vegetables, you've got to figure out how much meat you'll need to add in order to equal the calories your dog needs. Here's what the totals may look like:

Example 1:

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	270.00	80.70	37.66	0.00	0.00	0.00	893.08
Raw Broccoli	24.00	0.00	0.72	1.20	0.48	0.72	7.20
Total Grams Per Day	**294.00**	**80.70**	**38.38**	**1.20**	**0.48**	**0.72**	**900.28**

As you see, we may not be able to get our calories exactly, but we want to get it as close as we possibly can.

Example 2:

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
70/30 Ground Beef	90.00	27.00	12.60	0.00	0.00	0.00	298.80
Raw Broccoli	6.00	0.00	0.18	0.30	0.12	0.18	1.80
Total Grams Per Day	**96.00**	**27.00**	**12.78**	**0.30**	**0.12**	**0.18**	**300.60**

Put all of the steps together now, and don't forget to check your math!

Example 1: Nine year old Chow/German Shepard mix weighing in at 60lbs with a body score of 6 (inactive)

Gather your dog's info:

Weight: 60 lbs

BCS: 6

Activity: Sedentary

Step 1: Determine your dog's caloric requirements:

15 calories per pound

900 kCal per day

Step 2: Determine our ketogenic ratio:

2:1

Step 3: Determine how much food we need:

Veggies: 24.0 grams per day

Meat: 270.0 grams per day

Daily Totals (Served across 2 meals) I CALORIES: 900.28 kCal | FAT: 80.70 grams | PROTEIN: 38.38 grams| CARB: 0.72 grams|

Double checking your math:

Calories per pound: 900.28 kcal/60 lbs = 15 calories per pound

2:1 Ketogenic Ratio: 80.70 grams Fat / (38.38 grams Protein + 0.72 grams Net Carbs)= 80.70/39.10=2.0

Dividing your meals into two (if feeding twice per day) and you'll get the following breakdown:

AM MEAL 2:1 Ketogenic Ratio @ 15 Calories Per Pound

Raw 70/30 Ground Beef: 135 grams

Raw Finely Diced Fibrous Veggies: 12 grams (10-15 grams for a range)

PM MEAL 2:1 Ketogenic Ratio @ 15 Calories Per Pound

Raw 70/30 Ground Beef: 135 grams

Raw Finely Diced Fibrous Veggies: 12 grams (10-15 grams for a range)

Example 2: Four year old Dachshund/Chihuahua mix weighing in at 15 pounds with a body score of 3, (active)

Gather your dog's info:

Weight: 15 lbs

BCS: 3

Activity: Active

Step 1: Determined your dog's caloric needs

20 calories per pound

300 kCal per day

Step 2: Determined your dog's ketogenic ratio:

2:1

Step 3: Determine how much food you need:

Veggies: 6.0 grams per day

Meat: 90.0 grams per day

Daily Totals (Served across 2 meals) I CALORIES: 300.60 kCal | FAT: 27 grams | PROTEIN: 12.78 grams| CARB: 0.18 grams|

Double Checking our math:

Calories per pound: 300.60 kcal/15 lbs = 20 calories per pound

2:1 Ketogenic Ratio: 27.00 grams Fat / (12.78 grams Protein + 0.18 grams Net Carbs)= 27.00/12.96 =2.0

Dividing your dog's meals into two and you'll get the following breakdown:

AM MEAL 2:1 Ketogenic Ratio @ 20 Calories Per Pound

Raw 70/30 Ground Beef: 45 grams

Raw Finely Diced Fibrous Veggies: 3 grams (2-7 grams for range)

PM MEAL 2:1 Ketogenic Ratio @ 20 Calories Per Pound

Raw 70/30 Ground Beef: 45 grams

Raw Finely Diced Fibrous Veggies: 3 grams (2-7 grams for range)

How to Feed Your Dog His or Her New Meal Plan

What will you need?

- Stainless steel bowls
- Kitchen Scale (ability to measure in grams)
- 1 Utensil (spoon) per ingredient to prevent cross contamination
- Meat (thawed and raw)
- Veggies (raw and make sure you finely dice them up or puree them)

How to feed your dog:

Step 1: Weigh your veggies

Step 2: Weigh your meat

Step 3: Mix together well

Step 4: Serve to your dog

Ketogenic Meal Plan Frequently Asked Questions

How often should I feed my dog?

Most Pet Parents like to feed their doggy twice per day. Alternatively, some dogs may like to eat more often and some dogs are happy with just one meal a day. If you decide to feed twice a day, you may elect to feed every 12 hours (say, 6AM and 6PM), or perhaps on a 9AM and 5PM schedule.

Is there anything else I should add?

You also may want to deliver calcium, potassium, magnesium, and other vitamins and minerals as well an Omega 3 supplement to help balance your doggy's meal plan. Additionally, you may want to add a prebiotic and probiotic fiber to your doggy's meals. Garden of Life Prebiotic Fiber and LivPro Probiotic Fiber, are good examples of optional supplements. Should you elect to use LivPro, you can source it by contacting Fritz Thomas via fthomas@mlfbiotech.com, 574-453-4191. Furthermore, there are any number of similar products on amazon.com.

How do I know if my dog is in nutritional ketosis?

It's not too hard to validate whether or not your dog is in nutritional ketosis. The most consistent method of checking for nutritional ketosis is to measure your pup's blood glucose and blood ketone levels on a daily basis. One option is to take your dog to your family Veterinarian and run a blood panel which measures blood glucose and blood ketone levels.

The most convinient option is to purchase a hand-held blood glucose and ketone measuring device and strips, such as PortaChek or Precision Xtra. While it's important to keep in mind that these tests give you only a snap shot of your dog's blood levels, they can act as a handy barometer of your best friend's metabolism.

It is important to measure both blood glucose and blood ketone levels together as each are an important part of determine if your pup is in nutritional ketosis. If your ketones are high and your glucose is low that tells one story, whereas if your glucose is high and your ketones are low that tells another.

Notably, there is a fairly significant difference in the distribution of glucose and ketones between humans and dogs, and even cats for that matter. Hence, while using a human calibrated glucose/ketone meter won't offer you the most perfect metrics, they are nevertheless a useful tool for assess what is happening metabolically.

Measurement 1: Blood Glucose 110 mg/dL, Blood Ketone 0.1 mM = Not Ketosis

Measurement 2: Blood Glucose 78 mg/dL, Blood Ketone 0.4 mM = Nutritional Ketosis

All right, so I've purchased a glucometer to test my dog's blood glucose and blood ketone levels, now how do use this thing?

What you'll need

- Precision Xtra Glucometer
- Precision Xtra Blood Glucose (blue) and Blood Ketone (purple) strips
- Paper Towel
- 28G Needle or Lancet

Step 1: Look to see if your dog's elbows are calloused. If they are, that will be the easiest place to check their levels.

Step 2: Gently hug and hold your doggy

Step 3: Put the strip in the meter

Step 4: Take the lancet and draw a small bead from the elbow or ear and place the ketone/glucose strip on the bead

Step 5: Wait for the beep and read the meter

*Here's an example: https://www.youtube.com/watch?v=6s1wqFBsbsI

How often should I measure my dog's blood glucose and blood ketone levels?

Starting out, you may wish to test your dog's blood glucose and blood ketone levels often (a few times a week) as you are transitioning and optimizing their meal plan. Once you observe consistent ketone/glucose numbers, you may elect to measure less frequently, only one or twice per week.

If I am feeding my dog a ketogenic diet, how do I know if it is affecting their cancer?

Working diligently alongside your Veterinary Oncologist, and using CT Imaging, standard and advanced blood panels as well as tissue pathology is a very helpful method of determining if any intervention is impacting your doggy's cancer in a positive fashion. Surgical resection or debulking of the tumor load can reduce the burden of disease, and in certain instances, immunotherapy, chemotherapy and radiation can constitute powerful interventions.

Most importantly, leveraging the knowledge and insight of your Veterinary Oncologist and Veterinary Radiologist along with consistent diagnostic work, can offer you the most timely and precise information about your doggy's disease.

How long can my dog be on a ketogenic diet?

As yet, there is no long-term data or feeding trials which answer this question definitively. That said, a 0.5:1 ketogenic ratio (53% of caloric density coming from fat, 47% coming from protein and carb) very closely mimics the distribution of macronutrients found in a prey model. Furthermore, some Pet Parents may elect to cycle their doggy in and out of ketosis on a weekly basis, by punctuating certain days of the week with a higher bolus of protein, which again, very closely mimics the metabolic cycle a doggy might experience in the wild.

What else can I do to address my canine companion's cancer?

Surgeries to remove or debulk your dog's tumor load can be a critical factor in improving both survivorship and quality of life. As well, in some instances, chemotherapy, immunotherapy and/or radiation can be crucial tools in addressing cancer, although side effects can be a challenge. Carefully evaluate all options with your Veterinary Oncologist .

Notably, eating Ketogenically can act as an adjuvant to Standard of Care, and in some instances, may amplify its effect, should the research of Dr. Adrienne C. Scheck be further validated in an animal model: https://www.youtube.com/watch?v=vMOhFmY8S-Q.

Controlling canine metabolism through nutrition is something that any Pet Parent can do at home, while still working closely with their Family Veterinarian.

Are there any other supplements that are safe for my dog on a ketogenic diet?

Carefully reading the ingredient deck of any additional supplements that are used including their macronutrient distribution and caloric density in your doggy's meal plan ensures that they will not dismantle the metabolic effect you are wanting to achieve. Notably, there are many supplements that have hidden carbs which can raise blood glucose levels. Additionally, Turmeric, Turkey Tail Mushrooms, and Metformin have been shown to have some anti-tumor effects in human studies, though much more work has to be done to validate these effects in a canine model.

Can my dog eat Ketogenically while on chemotherapy and/or radiation?

Pet Parents sometimes do elect to feed ketogenically while their doggy is on standard of care. It's worth considering however, that many Veterinarians are hesitant to feed an immune compromised dog a raw food meal plan. Working closely with your Veterinarian to come to a decision that makes sense for your doggy is the first step.

Troubleshooting the Ketogenic Meal Plan

What is 70/30 beef?

Meat is typically labeled by percentage of fat. You'll see 96/4, 90/10, 80/20 sometimes you'll even see 75/25 and all that means is the percentage of lean meat to fat content. Using 70% lean meat with 30% fat content makes things simple, because it is already a 2:1 ketogenic ratio- however, this is not a prerequisite.

I can't find 70/30 beef, so what do I do?

If you are unable to source 70/30 or 73/27 ground beef, you can titrate in additional amounts of fat into the meals to make sure you reach your desired ketogenic ratio. Also, you can use any protein source that your dog would like, such as lamb, chicken, turkey, duck, venison, etc. These protein options are often times leaner than 70/30 beef so just like using 80/20 or 90/10 beef, you may wish to add extra fats to achieve the desired ketogenic ratio you want to use.

Here are a few fat sources you can select from:

Animal Fat Sources: Lard, Duck Fat.
Monounsaturated Fat Sources: Avocado Oil, Olive Oil, Avocado Mayo.
Saturated Fat Sources: Coconut Oil, Red Palm Oil, Ghee, Kerry Gold Unsalted Butter, Unsweetened Coconut Cream, and Heavy Whipping Cream.

Rotating fat sources can also help prevent your doggy from developing an aversion to a certain fat.

*Tip: limit most polyunsaturated fats as they don't convert well into ketones.

Hence, when using a leaner grind of beef, say 80/20, here what adding additional fat into your ingredient list looks like for determining caloric density and the macronutrient profile. Let's say you can only find 80/20 beef and you decide to add coconut oil.

Based on label values, your calorie and macronutrients should look like this:

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
80/20 Ground Beef	1.00	0.20	0.17	0.00	0.00	0.00	2.54
Coconut Oil	1.00	1.00	0.00	0.00	0.00	0.00	8.60
Raw Broccoli	1.00	0.00	0.72	1.20	0.48	0.72	7.20
Total Grams Per Day	**3.00**	**1.20**	**0.89**	**1.20**	**0.48**	**0.72**	**18.34**

Example 1: We still need 900 kCal per day, 2:1 Ketogenic ratio, and we know we want 24 grams of broccoli

Add broccoli in and you get:

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
80/20 Ground Beef	1.00	0.20	0.17	0.00	0.00	0.00	2.54
Coconut Oil	1.00	1.00	0.00	0.00	0.00	0.00	8.60
Raw Broccoli	24.00	0.00	0.72	1.20	0.48	0.72	7.20
Total Grams Per Day	**26.00**	**1.20**	**0.89**	**1.20**	**0.48**	**0.72**	**18.34**

Now comes the hard part as you'll have to find the right amounts of both 80/20 beef and coconut oil to equal our 900 kCal, while still including enough fats to reach a 2:1 ratio. Again, this will take some trial and error.

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
80/20 Ground Beef	233.00	46.60	39.61	0.00	0.00	0.00	591.82
Coconut Oil	35.00	35.00	0.00	0.00	0.00	0.00	301.00
Raw Broccoli	24.00	0.00	0.72	1.20	0.48	0.72	7.20
Total Grams Per Day	**292.00**	**81.60**	**40.33**	**1.20**	**0.48**	**0.72**	**900.02**

Double check your ketogenic ratio:

Fat 81.60 grams/ (Protein 40.33 grams + Carbs 0.72 grams) =
81.60/ 41.05= 2.0

Your dog's meal plan:

AM MEAL 2:1 Ketogenic Ratio @ 15 Calories Per Pound

Raw 80/20 Ground Beef: 116.5 grams

Coconut Oil: 17.5 grams

Raw Finely Diced Fibrous Veggies: 12 grams (10-15 grams for a range)

PM MEAL 2:1 Ketogenic Ratio @ 15 Calories Per Pound

Raw 80/20 Ground Beef: 116.5 grams

Coconut Oil: 17.5 grams

Raw Finely Diced Fibrous Veggies: 12 grams (10-15 grams for a range)

Example 2: You still need 300 kCal per day, 2:1 ketogenic ratio, and 6 grams of broccoli

Food	Amount (grams)	Fat (grams)	Protein(grams)	Carb (grams)	Fiber (grams)	Net Carbs (grams)	Calories (kCal)
80/20 Ground Beef	77.00	15.40	13.09	0.00	0.00	0.00	195.58
Coconut Oil	12.00	12.00	0.00	0.00	0.00	0.00	103.20
Raw Broccoli	6.00	0.00	0.18	3.00	0.12	0.18	1.80
Total Grams Per Day	**95.00**	**27.40**	**13.27**	**3.00**	**0.12**	**0.18**	**300.58**

Double check your ketogenic ratio:

Fat 27.40 grams/ (Protein 13.27 grams + Carbs 0.18 grams) =
27.40/ 13.42= 2.0

Your dog's meal plan:

AM MEAL 2:1 Ketogenic Ratio @ 20 Calories Per Pound

Raw 80/20 Ground Beef: 38.5 grams

Coconut Oil: 6 grams

Raw Finely Diced Fibrous Veggies: 3 grams (2-7 grams for range)

PM MEAL 2:1 Ketogenic Ratio @ 20 Calories Per Pound

Raw 80/20 Ground Beef: 38.5 grams

Coconut Oil: 6 grams

Raw Finely Diced Fibrous Veggies: 3 grams (2-7 grams for range)

To save you a little bit of math, here is a handy cheat sheet if you want to switch your fats:

Animal Fat Sources:

Lard: 1x

Duck Fat: 1x

Monounsaturated Fat Sources:

Avocado Oil: 1.25x

Olive Oil:1x

Avocado Mayo:0.75x

Saturated Fat Sources:

Coconut Oil: 1x

Red Palm Oil:1x

Ghee: 1x

Kerry Gold Unsalted Butter:1x

Unsweetened Coconut Cream: 1x

Heavy Whipping Cream: 2x

Following is an example, should you run out of coconut oil and only have some ghee or whipping cream available. In the list, you will see the number by which to multiply your coconut oil values- as long as you already know how much coconut oil to add, you can quickly calculate your other fats.

Example 1:

Ghee would be 17.5 grams of coconut oil x1 = 17.5 grams ghee

Heavy whipping cream it would be 17.5 grams of coconut oil x2 =35 grams heavy whipping cream

Example 2:

Ghee would be 6 grams of coconut oil x1 = 6 grams ghee

Heavy whipping cream it would be 6 grams of coconut oil x2 =12 grams heavy whipping cream

My dog doesn't like beef, what are my options?

Alternate meats can be used! Chicken, turkey, lamb, venison, duck, and pheasant are great swaps. Thus, your meal plans may become as follows:

Example 1	2:1 Ketogenic Ratio, 15 calories per pound, AM Meal	70/30 Ground Beef	80/20 Ground Beef	Lamb	Chicken
	Raw Meat (grams)	135.0	116.5	114.0	132.0
	Coconut Oil (grams)	0.0	17.5	14.5	15.5
	Raw Finely Diced Veggies (grams)	12.0	12.0	12.0	12.0
	2:1 Ketogenic Ratio, 15 calories per pound, PM Meal	70/30 Ground Beef	80/20 Ground Beef	Lamb	Chicken
	Raw Meat (grams)	135.0	116.5	114.0	132.0
	Coconut Oil (grams)	0.0	17.5	14.5	15.5
	Raw Finely Diced Veggies (grams)	12.0	12.0	12.0	12.0

This is so much work, is there a way to make it easier?

One way to make the work easier is to prepare and freeze your dog's meals in advance. You can then thaw meals in the fridge the day before and they will be ready to go when needed. This also helps them last longer.

My dog is losing too much weight, what do I do?

As mentioned previously, if your dog is losing too much you will need to increase their caloric intake until the weight loss slows or stops. Typically, an increase 1 calorie per pound every other day, can be an effective method of slowly titrating up calories until your doggy reaches the weight target you have set for them.

What about the pathogens and bacteria in meat? Will my dog get sick or make me sick?

Yes, there is bacteria in raw meat. Worth considering, is that canine saliva contains lysozyme, an enzyme that lyses and destroys bacteria, but more importantly, an absence of plaque (typical of dogs that do not consume high carbohydrate kibbles) means the dog's mouth is no longer a hospitable place for bacteria to inhabit.

Should you or your Veterinarian be concerned about being licked by a raw-fed dog, you have several options. Teach the dog not to lick, or avoid being licked. If you are licked wash your face regularly, and your hands. Make sure you clean up the kitchen and the dog's bowls as you would do with handling raw meat that you cook for yourself. Additionally, only have the raw meat in the bowl for as long as it takes the dog to eat.

If your dog isn't interested in eating for some reason then make sure to put their food back into the fridge right away. This will limit the opportunity for bacteria growth. Keep in mind that poultry has a higher risk for salmonella and other bacteria, so choosing raw ground beef can help reduce this risk.

As always, make sure you are sanitizing your pet's bowls after feeding and regularly sanitize any surface used to eat, and make sure your hands are clean when handling all raw meats.

Can I cook the food?

Cooking food can increase caloric density by making it more bioavailable, as well as potentially adulterate the fats contained in the meats. Dogs do have the requisite gut bacteria and enzymes to naturally break down raw food. As well, dogs cannot digest cooked animal fats in the fashion that humans can, which could conceivably increase the risk of pancreatitis. Keeping fats and proteins raw, preserves the state in which your doggy would consume those constituents in the wild.

Why is the food measurements in grams?

It's important to be rigorous with your dog's caloric intake pursuant to inducing nutritional ketosis, so it is valuable to measure the food in grams. If you don't already own one, you'll need to acquire a digital food scale which will help you ensure that you are delivering the exact amount of food in your meal plan.

Are these food measurements correct? It doesn't seem like a lot of food

Yes, the measurements are correct. Please remember that 1 gram of fat has more calories (9) than 1 gram of protein (4); thus, even though it may not look like a lot of food in the bowl, it is very calorically dense.

Can I give my dog broth?

Typically, broths are nearly zero calories, and have zero carbs- make sure the broth does not contain onions.

My dog is ravenous and can't get enough food, what do I do?

A typical serving of kibble can in many instances range from 26 to 32 calories per pound. Overfeeding has a fairly profound impact on canine obesity in North American. Unless your doggy is already extremely lean, one can use 15 calories per pound as a point of departure, adjusting calories up or down based on weight and Body Composition Scores. Should your doggy be losing weight too fast and act extremely hungry, then you may have to increase their calories per pound in their meal plans. Keep in mind that doggies on prednisone can be observed to have increased appetite.

I have other dogs and my dog keeps getting their food, what do I do?

If your dog keeps getting in your other dog's food you may want to separate them during feeding times, or you may want to consider transitioning your other pups to low ketogenic ratio (.5:1) meal plan. This switch will not greatly affect their blood glucose and blood ketone levels if they decide to eat your other dog's food.

My dog has very loose stools since beginning the meal plan, how can I fix this?

When changing from a kibble based diet you many experience a short time when your dog has very loose stools. This is due to the sudden change their diet. Slowly cutting your doggy over to a ketogenic meal plan over the course of 5 to 7 days can help them to acclimate to the new food.

My dog is throwing up, what do I do?

Many Veterinarians will offer a form of Pepcid (the over the counter acid reflux medicine) for an upset stomach. Again, slowly cutting your doggy over to a new meal plan over the course of 5 to 7 days can help address upset stomach and vomiting.

Can I use ketone urine sticks instead of the blood meter?

Yes, Ketone urine test strips can be used, but they don't offer a specific number, which makes them less valuable in tracking ketosis. As well, once a doggy is keto adapted, ketones will no longer be present in their urine in the same volume as they might have been initially, so readings on urine strips become less useful. Measuring blood ketones and glucose offers the most accurate assessment of metabolic state.

My dog doesn't want to eat their meal, what do I do?

It is not unusual for a doggy to skip a few meals. Exercising your doggy just before feeding can incentivize them to consume their meal. However, should they miss 3 meals in a row, you may wish to switch up the protein, the fat, the veggies, and offer them a new taste profile. Additionally, you can try drizzling chicken broth, bone broth, or sardine juice over the food to help entice them to eat.

What about exercise?

Regularly scheduled daily exercise increases heart rate, burn calories, and is a big part of ensuring that your doggy retains a favorable lean muscle mass to fat ratio. Preferably, your doggy will receive some form of strenuous physical activity each and every day, be it running, swimming, agility work or simply playing fetch. Getting their heart rate up for an extended period (25-35 minutes) one to two times per day can suffice.

What treats can I give my dog?

Controlling calories is a big part of inducing and sustaining nutritional Ketosis. Adding extra foods/calories can dismantle your doggy from getting into nutritional ketosis due to spiking their glucose.

That said, there are non-caloric treats that can be offered such as a bully stick. As well, some Pet Parents will sequester a portion of the daily feeding amount to be offered as a treat. Finally, should your doggy have to take pills, simply embed them in butter or cream cheese.

*Please take care to understand that this E-book is not intended to diagnose or treat any disease, nor does it replace the expert medical care that your Veterinary Oncologist can offer your fur baby.