Feeding Miss Lilly

on feeding dogs a great, nature-inspired diet

revised edition

Dr Christine King

Cover photos: *The Splendid Miss Tiger Lilly* at 9 or 10 years of age. Many thanks to Danielle Sessler, our wonderful neighbor in Bellevue, Washington, for capturing the camera-shy Miss Lilly on film.

Thanks also to my sister, Joanne King, for her editorial assistance.

Please note: This book is primarily about how I fed my own dog, Miss Lilly. It is as much a story of our life together as it is a treatise on my philosophy and practice when it comes to feeding dogs.

There are many schools of thought on feeding dogs, ranging from 100% RMB (raw meat and bones) to 100% vegan (all plants, no animals), and from the entirely analytical (eating by numbers) to the entirely intuitive (going by feel). My approach considers each but lies somewhere in between.

As I will probably never get to meet your dog, I can't offer specific advice on how to feed her/him. I am simply sharing my experience of feeding Miss Lilly for the 15 years we lived together, and through the evolution in my understanding of how to feed dogs for good health.

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Foreword

The Splendid Miss Tiger Lilly — 'Miss Lilly' to her friends — was my own beloved mutt, and this book is about how I fed her, and the reasons behind my decisions. Miss Lilly died naturally in the spring of 2017, somewhere between 16 and 17 years of age. She was a foundling, so I don't know her exact age. I was told she was about 3 years old when I adopted her from an animal shelter, but I don't think she was quite that old. If she had been, then she was coming up on 18 years of age when she died.

I first published *Feeding Miss Lilly* in 2014, when she was in her early 'teens. I knew I'd later want to write an updated version which included the final years of her life, but it's taken me awhile to fully absorb the lessons I've learned from her, and from my mum, about the fine art of living and dying.

One thing is clear to me: how we eat during the main part of our life has a big impact on how we spend the final years of our life. Dying is inevitable; a decrepit old age is not.

But the more important lesson came as a surprise to me, and it comes from Miss Lilly herself: nothing is more important to a dog's health and well-being than a sense of being *loved.* Good diet matters; feeling loved and cherished matters more. So, *worry less and play more.* So says Miss Lilly.

I wrote the first edition of *Feeding Miss Lilly* while she was still alive, so it was written in the present tense. In this revised edition I write about her in the past tense as I incorporate some things I've since learned about feeding and caring for the dogs we love. I hope you enjoy reading this book as much as I've enjoyed living it and writing about it. Five years on, I still miss that stripey dog, but it's an absolute joy to write about her and our life together!

Contents

For Miss Lilly, Bella, Lexie, Olie, Underdog, Barnie, Mudbug, Mac, Socrates, Murphy Brown, Dudley, Ana, Nicholas, Fly Baby, Prince Harry, Tom Jones, Lucy, Zoe, Polly, Julie Andrews, CC, Brutus, Jake, Boy Dog, Girl Dog, and all the other dogs I have known and loved, and those I have yet to meet.

Introduction

Imagine if going to the grocery store to shop for yourself and your family is just a matter of going to the human-food aisle and selecting from the range of different flavors of dry or canned food: beef, chicken, turkey, lamb, fish, *etc.,* and these days the inevitable vegetarian and vegan options.

(Come to think of it, I've stood behind people in the checkout line whose shopping carts were piled high with boxes and bags and cans of processed human-food, with no fresh food in their carts at all...)

Even if such foods were "nutritionally complete and balanced," as is the absurd claim on most dry and canned pet-foods, what are the chances that you'd stay healthy for life on such a diet, processed to have a shelf life of months or years, and never eating any fresh food whatsoever? Certainly, one can *survive* on such a diet; astronauts do. But *thrive?* No.

Then, what on earth makes us think our dogs and cats can?

The simple truth is that most can't. I say "most" because you will come across animals who, despite such an unwholesome diet, seem to do OK. But in my experience, these individuals represent a triumph of good genes over bad diet (the George Burns effect, but with food instead of cigars[1]). Or, as is most often the case, they just haven't lived long enough yet.

For the most part, it's young dogs who still look good on these artificial diets. And when you take a closer look, these dogs are not without diet-related problems after all.

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[1] George Burns was an American comedian who famously smoked cigars, a habit he began when he was 14 years old. It's estimated that he smoked around 300,000 cigars in his lifetime. In his later years, he limited himself to four cigars a day. George Burns lived to be 100 years old, and died quietly at home.

Old too early, gone too soon

In veterinary medicine, 7 or 8 years is commonly accepted as the age at which dogs become "seniors," although it varies somewhat with breed, and mostly with body size. The large and giant breeds generally have shorter lifespans, so they reach their senior years sooner than the smaller breeds. (And it seems to me that the "senior" threshold has been creeping downward over the years as big corporations have increasingly taken over the pet-food and veterinary industries…)

For a species whose average lifespan should be 15 or 16 years at least, that's too early! It's like saying that humans should be considered seniors in their mid-30s. Perhaps that was true at one time (and it remains true in the minds of teenagers), but now that I've reached sixty, I object! I don't *feel* old!!

At first, I thought that this (to me) premature categorization of senior or geriatric was no more than a marketing ploy by the business experts and corporations that have insinuated themselves into veterinary medicine. Perhaps that's part of it. It certainly helps a practice's bottom line to talk owners of older dogs into running a "senior panel" of blood and urine tests every year, whether or not it's medically indicated. (Seldom do the results of these tests do much more than worry or depress the pet owner.)

But as I thought about it some more and looked more closely, I realized that dogs on the typical dog-food diets are indeed starting to break down and show signs of the customarily age-related diseases by 7 or 8 years of age, often much earlier. And sadly, many are dying before they even make it into their 'teens.

Diet and disease

You'll have heard the saying, "you are what you eat." Well, it is literally true. The food we eat is incorporated into our cells and tissues, becoming part of our bodies (which is what 'incorporate' means, *to embody*), for better or for worse. The food we eat is also incorporated by our microbial partners. In

this discussion of diet and disease, none are more important than the vast community of microbes that inhabit our digestive tract (our 'gut microbes').

Here's another one you may have heard: "you've got to put good things *into* your body to get great things *out of* it." I first heard that in a yoghurt commercial, uttered with a confident smile by an annoyingly vital young downhill skier; but it makes a good point. If we want to live long and healthy lives — not just long lives, but *healthy* lives — we need to eat well. We need to eat with *wellness* in mind. Not just "eat to live," but eat to be *lively!*

The reason we need to eat at all is because our cells are living, breathing, dynamic organisms. Even the extracellular matrix which forms the framework of our tissues and organs is constructed and maintained by our cells.

In addition to water and oxygen, cells require an energy source (calories, mostly from carbohydrates and fats) and various other nutrients (proteins, vitamins, minerals, *etc.*) for their daily functions and for their maintenance, repair, and eventual replacement.

In growing bodies, and thus in the pregnant and lactating bodies that support those little ones before and for a short time after birth, extra food is needed for growth, which is a well-controlled increase in the number of cells that compose the body.

But good nutrition is not just about taking in the required amounts of these nutrients, in the right proportions, for the species, life stage, and activity level. It's also about *not* taking in substances that could interfere with our cellular processes.

And it's about keeping our gut microbes happy. They are our partners in the extraction of nutrients from our food, and in the healthy functioning of our immune (defense and repair) system. But that's not all; I can't think of a single body system that is not affected in some way by our gut microbes, for better or for worse. They are truly our *life* partners.

lifespan, healthspan, and quality of life

Because our bodies are designed to be self-maintaining and self-repairing, and food provides most of the essential components for these processes, *theoretically* we could maintain a healthy body *indefinitely* on the right diet (and when provided with clean water, fresh air, and the other essentials of good health).

In the laboratory, cell lines can be maintained over many generations. (Those that are maintained indefinitely are given the rather creepy term, "immortalized.") *Practically,* however, our lifespans are *capped.*

Our *expected* lifespan is mostly determined by our species (*e.g.,* humans normally live decades longer than dogs) and to some extent by our family of origin. But our *actual* lifespan (how long we end up living) is really quite elastic, within the constraints of our species.

Accidents and brief illnesses aside, our lifespan is largely determined by our *healthspan:* how long we remain healthy. Our healthspan has genetic components, too, but it is mostly determined by how well we take care of our bodies throughout life.

Of the avoidable or correctable things that interfere with self-maintenance and -repair, and thus shorten our healthspan, poor diet is among the most pervasive (along with inactivity and chronic stress). In my experience, the most common dietary issues in dogs are these:

- *feeding a diet that is not appropriate for the species* — *e.g.,* relying on plant carbohydrates and plant proteins instead of animal tissues in the diets of carnivores such as dogs and cats

- *feeding byproducts* — waste products of the human food industry are cheap, but they may not be wholesome; for example, "chicken meal" for pet-food can legally be made from "4D" (diseased, dying, disabled, or dead) birds

- *feeding a highly processed and preserved diet* — pulverizing, extracting, extruding, pasteurizing, irradiating, or otherwise physically or chemically altering food changes the way the body and its microbes respond to it

- *feeding genetically modified (GM) ingredients* — in addition to the genetic modification itself (*e.g.,* insertion of *Bacillus thuringiensis* [Bt] genes into corn), GM crops may contain pesticides or herbicides that can cause harm

- *feeding potentially harmful nonfood substances* — the ones of most concern include bisphenol A (BPA) in plastics (*e.g.,* can liners) and carrageenan (a thickener that may cause or contribute to intestinal inflammation)

- *feeding a diet that contains readily oxidized fats* — oxidized fats are potent inflammatory substances; oxidized linoleic acid metabolites ('OXLAMs') from seed oils (corn, canola, sunflower, *etc.*) are of particular concern

That list pretty well describes conventional dog-foods (canned and kibble). Most of these products are well tolerated by most dogs — in the short-term. But over time, the likelihood, variety, and severity of disease all increase, particularly the degenerative (progressively worsening) diseases. The ones we most often think of as age-related in dogs include arthritis, heart disease, kidney disease, dental and periodontal disease, cataracts, senility, and cancer.

The reason these diseases are more common and more difficult to manage in older bodies is because the effects of the unhealthy components of the diet, environment, and lifestyle accumulate over time and progressively "gum up the works." The longer a pathway or process remains disordered, the more trouble ensues.

healthy aging

I once had a client with a sick cat tell me she believed that death is optional, that her cat need never die. I don't recall whether I said it out loud, but I do remember thinking, "good luck with that!" Because the simple fact is that, in this physical world, physical death is inevitable. Disease, however, is not.

It's often said that "old age is not a disease." I wholeheartedly agree; old age is a completely normal stage of life, and it culminates naturally in death.

It has also been said that "old age is not for sissies." Although it makes me smile, I must protest a bit at that one, because it's founded on the assumption that everything breaks down or wears out as we age, and that is simply not true. At least, it's not *universally* true. It may be a *common* experience, but it is not an *inevitable* one. We are not designed to break down and spend our senior years struggling under the weight of chronic disease.

There is a normal process that goes on in our bodies billions of times every day and which serves as a useful metaphor for healthy aging: *apoptosis,* also known as programmed cell death. (It's commonly pronounced "*ae*-pop-*toe*-sis" but the correct pronunciation is "apo-*toe*-sis"). The Greek word origin (*apo-* + *ptosis*) translates as "falling or dropping off," like the petals of a flower that is past full-bloom, or like autumn leaves. Normal, and timely.

In the body, apoptosis is a quiet, orderly process which occurs at the end of a cell's lifespan. There's "no muss, no fuss " (no inflammatory reaction, no pain, no distress signal); just cellular decline, cell death, and orderly disassembly and removal of "the remains." Under normal circumstances, that cell is then replaced by a healthy, new one.

That's how healthy aging should go, too: a quiet, orderly decline, death, and disassembly at the end of our life, making way for healthy, new life.

In aging research, this body-wide process is often termed *entropy.* In physics, entropy describes the progressive loss of order in a system over time. I prefer the concept of apoptosis here, but both terms are essentially describing the same process; and both mark it as normal and inevitable over time.

Entropy is inevitable as we age because we are inextricably woven into the world around us, our bodies operating as 'open systems', and life is messy. We cannot help being affected by the world around us, especially by the things we take in (air, water, food, thoughts, others' behavior toward us, *etc.*).

The important variable, then, is *time:* how well can an individual body *slow* or delay this inevitable decline?

In healthy aging, pathways of energy production gradually become less efficient, so the aging body slowly loses the vitality and verve it once had.

Pathways of cell replacement (an essential component of self-maintenance) become less efficient, so organs and tissues gradually comprise more older, inefficient, or defective cells than when the body was younger. As a result, the functional capacity of the organ or tissue, and even its size, decreases over time.

This explains the common functional disorders of old age, such as hearing loss, failing eyesight, reduced sense of taste and smell, decline in cardiac capacity, loss of connective tissue elasticity and thus flexibility, decrease in muscle mass and thus strength and stability, decline in mental agility, and so on.

Pathways of defense and repair also become less efficient, so the aging body gradually becomes more prone to infections and is slower to recover after illness or injury. These things are part of the normal aging process, and they often culminate in the illness that ends the life.

In my experience, it is common for healthy aging to terminate in a short illness that ends the animal's life in just a matter of days, or weeks at most.[1] All things considered, this is a good end. An even better end, and one I hope for myself, is when the aged body just stops in its sleep. (My great-uncle Frank managed to pull off that trick, so I have high hopes…)

When in the course of the individual's life this happens is what I'm most interested in here. Whether I'm thinking about myself, my own animals, or any others I care about, I want to extend the individual's *healthspan* in order to extend her lifespan, and her quality of life throughout.

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[1] In human medicine, pneumonia is called "the old man's friend" because it is so often fatal in elderly people.

unhealthy aging

In unhealthy aging, these age-related changes in structure and function begin to manifest or become a problem much earlier in life. For example, instead of first becoming noticeable at 11 or 12 years of age in dogs, they may start at 7 or 8 years. In addition, they tend to progress much more rapidly in these unhealthy bodies. In other words, unhealthy aging is characterized by both premature and accelerated decline.

More worryingly, mutations in the DNA that sometimes occur during cell replication[1] increase in frequency and are not addressed as vigorously when the immune system is compromised by old age or ill health. So, while cancer does occur even in the very young, it becomes increasingly common with age, and particularly with unhealthy aging.

Cancer is perhaps the ultimate in degenerative diseases, as it involves a fundamental and usually permanent change in the way the cell behaves. In other words, cancer changes the programming of the cell type involved. That's not to say that cancer is permanent, but rather that the organizational change in the particular cell line appears to be irreversible, at least in our present understanding. (The field of epigenetics has us rethinking a lot of our assumptions about cancer, including the irreversible nature of cell changes.)

Whether the mutation is a simple "copying error" or a deliberate attempt by the cell to find a way around a chronic problem in a particular pathway is not important here. The fact is that cancer represents a profound disruption in the body's ability to self-maintain and -repair, and thus to live long and well.

back to diet and disease…

Simply put, a healthy diet of species-appropriate, minimally processed, and chemically clean food helps extend the healthspan and thus the lifespan; an unhealthy diet does the opposite.

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[1] Cell replication, where a cell copies itself, is a normal and generally well-regulated component of self-maintenance and -repair. But it doesn't always result in a perfect copy — and if the copied cell is imperfect, then the imperfection may be copied.

A healthy diet helps slow and smooth the aging process; an unhealthy diet accelerates the aging process and makes it considerably less comfortable.

The problem many of us have with making this connection between diet and disease is that the consequences of an unhealthy diet can be insidious. There's often a lag between when a dog is started on a poor diet and when associated disease first appears. Sometimes that lag can be years long.

Even so, my experience with Miss Lilly and with various domestic animal species in my work as a veterinarian supports the connection between bad diet and poor health — and its opposite, good diet and better health. Often, just improving the diet can be enough to improve the animal's health and well-being.

Feeding dogs well

Loads of books and articles have been written about feeding dogs, and yet myths and misconceptions about how to feed dogs abound. Perhaps the most pernicious is that it's beyond the ability of the average person to do it well. I hear this concern often from dog owners who'd like to be making their dog's food but are too afraid to even try, for fear of getting it wrong.

Let me relieve you of that notion right now. Feeding dogs well is not rocket science. If it were, then dogs would have died out long ago. You don't need a degree in nutrition to feed yourself and your family well. The same is true about feeding your dog. You simply need to understand the basics, a few essential principles, and go from there. Given how much information is available already, I thought what might be most useful is for me to tell you how I fed my own dog, Miss Lilly.

Feeding Miss Lilly

Miss Lilly was a bitza (that's Aussie for mixed-breed dog: one that's made up of "bitza this and bitza that"). She looked like what would happen if you crossed a Greyhound with a Staffordshire terrier. She had physical

and behavioral characteristics of each, so I think that's pretty close. As I said in the foreword, I don't know exactly how old she was when we first met, but she lived with me for about 15 years, having arrived as a young adult.

I love mystery novels, but I don't like mysteries! When I start a new mystery novel, I read the first chapter or two, get to know the principal characters, and then flip to the end to see "who done it" and why. Only then can I go back to where I'd left off and enjoy the unfolding of the story. In case you're anything like me, I'll start at the end of Miss Lilly's life and then go back to the beginning and let the story unfold.

endings

When I published the first edition of this book, Miss Lilly was 13 or 14 years old. While she was clearly a senior dog, she was still bright, energetic, and playful. She would often race around like a puppy — going "crackerdog" as Mrs Pumphrey (of James Herriot fame) would say, or "doing the zoomies" as a friend says of her otherwise very dignified senior dog. At that point, Miss Lilly had been on a fresh meat & veg diet for about 11 years.

But as she continued to age, she slowly began to fade away. All of her normal processes gradually slowed down and became less efficient, and some of the age-related conditions common in senior dogs began to appear.

The first thing I noticed was that she gradually lost muscle mass, vitality, and stamina. While she still loved our long walks and our daily farm chores, and she remained an avid hunter until she died, over the last few years of her life she began walking more and running less, she tired sooner than she'd previously done, and she became content to wait for hours at the hole of some little creature rather than furiously digging it up right away.

She went on to develop mild cataracts and eventually had trouble seeing well in the dark, not wanting to go outside on her own after dusk (something

she'd really enjoyed as a young dog). She also became quite deaf toward the end, which was a bit of a blessing, as she'd always been very noise-sensitive.[1]

Most problematic was that she began showing early signs of canine cognitive dysfunction (the canine version of Alzheimer's disease), notably restlessness, neediness, and anxiety at night. As a result, her sleep–wake cycle became disrupted and she slept more during the day if I didn't get her moving.

In the last year or so of her life, she developed an arrhythmia (irregular heartbeat) and she started leaking urine while resting or sleeping, which was something that had been a problem when she was young, right after she'd been spayed, but not since. In addition, her skin and coat health gradually deteriorated, and she became more susceptible to parasites, particularly fleas.

But while she did develop arthritis, it was very limited; for example, it was confined to a single joint in a single toe in a single foot, and to a single intervertebral joint in an otherwise normal spine. In other words, her few arthritic joints were probably the result of localized trauma or a specific overuse injury, accumulated over a lifetime. I'll talk in depth about her teeth in Chapter 2, but I'll note here that she did not develop periodontal disease.

I was curious to see what would happen if I simply continued to feed her this nature-inspired diet and otherwise provide lots of love and companionship and the varied physical and mental activities of life on a small farm. In her senior years, we had goats and chickens on several acres of land, and for both of us our farm "chores" were a twice-daily delight.

What I found was that, while these age-related diseases still developed, they appeared much later in life than is typically seen in dogs of her size and presumptive breeds, and they progressed much more slowly or not at all.

Even more interesting is something I only touched on in the first edition…

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[1] Recent research in Finland found that noise sensitivity in dogs may have genetic roots that, in humans, are associated with age-related hearing loss. I discuss this study in my e-book, *The Highly Sensitive Dog*.

When Miss Lilly was 4 or 5 years old, a small, oval-shaped, hairless lump appeared on her left flank fold[1] shortly after we'd made our first trip across the US to relocate (from Raleigh, North Carolina to Seattle, Washington). It was a stressful time for both of us, as we moved from one temporary home to the next before finally finding a place we could settle. While it was exciting to plan and open my own practice for the first time, it also came to be one of the most frustrating and discouraging experiences of my life.

That move, which felt completely inspired and "meant to be" at the time, resulted in what would best be described as a profound spiritual crisis, and it very nearly ended in suicide. So began what I now think of as "the lost decade," a period of about 10 years in which I felt utterly lost. This back-story is important in fully appreciating Miss Lilly's lump…

I always meant to biopsy it, but I never quite got around to it (as the saying goes, "the cobbler's child goes barefoot"). To my very great surprise, it started to grow rapidly (yikes!) and then it disappeared just as rapidly (phew!), "eating" itself from its center outward and leaving only a small scar at the site where there was once a "mesa"[2] of pink, hairless skin. Based on its behavior, I thought at the time (and still do) that it was probably a mast cell tumor.[3]

The lump slowly regrew a few years later, but it remained fairly static for many years. It would become inflamed and the surrounding area would swell whenever we were chronically stressed, such as when we moved house or moved back across the country (to central North Carolina). It would then settle down again as our stress eased.

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[1] The flank fold is the fold of skin on the side of the dog's belly, between the ribcage and the hind leg.

[2] A mesa is a hill with a flat top and steep sides.

[3] Mast cell tumors are common in dogs and most often involve the skin. Mast cells are immune-system cells that are most prominently featured in allergic reactions, but are also involved in wound healing, immune tolerance, and defense against infectious agents. Of all the specific types of immune cells found throughout the body, only mast cells normally reside in the brain…

In effect, her lump was a barometer for our sense of well-being. Given what mast cells do for a living and the fact that they are part of the neuroimmune system,[1] it might be more accurate to say that her lump was a barometer for our sense of safety and security.

Several years after the lump first appeared, and shortly after our second cross-country relocation (refugees of the Global Financial Crisis which began in 2008), the nearby lymph nodes in her groin[2] and the matching ones on her right side became enlarged. But these too remained fairly static until shortly before her death 5 years later.

In the last few months of her life, the lump began to increase in size, and in her last few weeks it dramatically enlarged and became red and ulcerated. She also developed digestive problems indicative of further systemic spread.

I stood by, ready to euthanize her when the time came, but she managed even her death well. She got to complete her mission on her own terms.

If one needed to pin down her cause-of-death, it was probably this: a mast cell tumor which she managed to keep in check, with no treatment at all, for a dozen years or more, until her aged body couldn't manage it anymore.

Would she have lived longer if I'd removed it at the start, or treated her at any point along the way? Perhaps. But how interesting that she managed it herself for so long! And what would we have missed by me cutting away

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[1] The brain and spinal cord, collectively called the central nervous system (CNS), are separated from the rest of the body by a cellular barrier (blood–brain barrier), so the CNS has its own immune system, the neuroimmune system (NIS).

Mast cells are normal components of the NIS. In addition to their protective roles, they are involved in two-way communications between the gut (including its microbes) and the brain: the gut–brain axis. In fact, 'gut–brain–skin axis' more completely encapsulates the relationships between gut health, emotional well-being, and skin health.

[2] Lymph nodes are little organs that are primarily composed of lymphocytes, a particular type of immune-system cell. Lymph nodes are strategically located in various parts of the body, including the groin.

this part of her body or otherwise suppressing her expression of life's ups and downs in this way? Might I have forced this expression down another, less manageable and more destructive, path?

Looking back, I think she would have been better served by me attending more to my own physical and mental health. I may write about this further in another book, but while I loved her dearly and found great joy and comfort in her presence, for many years I struggled with bouts of severe depression that often spawned suicidal thoughts. Miss Lilly was my 'soul friend', my steadfast companion through all that darkness. But at what cost to her?

So, it's all the more remarkable that Miss Lilly was able to manage her own health so well. For all my shortcomings, the way we lived and ate enabled her to keep a commonly lethal tumor from significantly shortening both her healthspan and her lifespan. I remain humbled and awed by that.

Miss Lilly continues to teach me the tremendous power of living simply and eating well — and she reminds me still of the very great importance of enjoyment! *"More games, more play"* is her recurring lesson, and one she taught by splendid example. She really was a fun dog!

beginnings

Miss Lilly arrived as a stray in 2002. Except for her pendulous udder, she was a skin-and-bone life support system for about a million ticks. With her brindle coat and poor condition, she looked like a toast rack. According to her teeth, her behavior with other dogs, and her subsequent development, she was probably 12 to 18 months of age at the time.

I'm as lazy as the next person, so if I could have gotten away with it, I'd probably have fed Miss Lilly some type of dry dog-food for her entire life. I'd already begun my explorations in holistic medicine, but I was still pretty much stuck in the mindset of most dog owners. If asked "what do dogs eat?" I'd have replied "dog-food, of course." In fact, in vet school we were warned of the many "dangers" of feeding anything but scientifically formulated dog-

food, and that included feeding “human food” to dogs. Even today, vet students receive this same lesson — often sponsored by a pet-food company.

Fortunately for my edification, Miss Lilly didn’t tolerate either dry or canned dog-food. Not even the "all natural" and "organic" varieties. (And by the way, there's nothing natural or organic about kibble. Where in nature does such a thing exist? What organism made it? Some man in a white lab coat?!)

Miss Lilly brought with her a spectacular array of what I now know to be symptoms of digestive disorder, each one more colorful or odoriferous than the last: frequent vomiting, diarrhea, gurgly belly, foul-smelling gas from both ends, bad breath, mucky teeth and gums, itchy skin, chronic ear infections, low energy, restlessness, and a "dog smell." (I’ve since learned that truly healthy dogs don't smell "doggy" — except perhaps to cat people.)

No matter which of the dry or canned dog-foods I tried, her symptoms persisted. On the advice of some colleagues, I switched her to a grain-free, raw dog-food, and the light finally came on: her symptoms improved dramatically within the first day or two, and they were all resolved by the time we finished that first batch (about 10 days).

(By the way, not knowing any better, I made that transition from kibble to raw food abruptly: all kibble one meal, all raw the next. As I’ll discuss in Chapter 4, that’s not always the best thing to do. It worked out OK for us, but I attribute that piece of good luck solely to her youth.)

But, lazy bum that I am at times, and needing to stick to a tight budget, after a few weeks I switched her back to dry food. It was cheaper and I could get it at the grocery store when I did my own shopping. However, all of her symptoms returned — some of them with the first or second meal back on kibble. I was convinced! I promptly switched her back to the grain-free raw food and didn’t feed kibble as her basic diet ever again.

(Interestingly, she came to tolerate small amounts of kibble as her health improved. She especially enjoyed it when stolen from someone else’s bowl.

On her fresh-food, low/no-starch diet, her digestive system, and her body as a whole, became more robust and thus more tolerant — something I'll discuss later in the book.)

biting the bullet

When we moved across the country 3 years later and I couldn't find that particular raw food locally, I tried some other commercially made raw dog-foods, but with far less success. Some of them Miss Lilly didn't care for and refused to eat (they smelled weird to me, too). With others, her symptoms returned or she developed new problems, such as vomiting in the pre-dawn hours because the fat content of the food was too high for her.

I finally bit the bullet and started making her food myself — with much of the trepidation I often see in my clients when I recommend that they do the same.

And so began my adventures in home-making food for my dog. In the following chapters, I'll share what I've learned along the way, feeding Miss Lilly and monitoring the transition to home-made diets in my canine patients.

I've made many mistakes along the way, including accidentally poisoning Miss Lilly with garlic and nearly killing her with some contaminated chicken. Bless her, she kept on going despite my ineptitude, and she forgave most of my mistakes (although she continued to avoid really garlicky foods).

Lessons learned

What I've learned along the way can be summed up as this: Miss Lilly did best on a home-made diet of fresh meat & veg, mostly raw but some lightly cooked (particularly the veggies), with lots of variety.

Here are the essential elements, and the book in a nutshell:

1. Dogs are carnivores — but while they are true meat-eaters, they are carnivores of the somewhat more casual ('facultative') variety, so dogs

do well with some plant material (veggies, seeds, nuts) in their diets. Miss Lilly's diet had a meat-to-veg ratio of around 60:40 (*i.e.*, animals comprised about 60% of her total diet, and plants the rest). But her diet was grain-free and low/no starch, for reasons I'll discuss in Chapter 1. (I'll also explain the term 'facultative' carnivore in that chapter.)

2. Carnivores eat the entire animal — they eat most, if not all, of their prey, and dogs are no exception. So, the more body parts we can get into their diets, the better. Along the same lines, bones are an excellent source of calcium for dogs. (Yes, bones... don't worry, there's a whole section on feeding bones safely in Chapter 2.)

3. The more variety, the better — facultative carnivores eat a wide variety of foods, and again dogs are no exception. The more variety we get into the dog's diet, the less we'll need to supplement, and the fewer problems the dog will have with any one food. I fed Miss Lilly as many different beasts, body parts, and products (*e.g.*, eggs, milk, yoghurt, cheese) as I could manage, as well as lots of different veggies, seeds, nuts, and even the occasional piece of fruit. That's Chapter 3.

4. Carnivores eat their prey raw — and not always fresh. Dogs are well adapted to eating raw meat, even when it has a high bacterial load (although there are limits). I fed most of Miss Lilly's meat raw, although I was careful about handling and storing raw meat. But I fed most of her veggies lightly cooked in order to improve their digestibility and thus their nutrient availability for this carnivorous diner. These are the topics I explore in Chapter 4.

5. Carnivores are meal-feeders — dogs have a fairly large stomach for their body size, so they are adapted to eating one or two meals per day. I fed Miss Lilly (who weighed about 50 pounds or 23 kilograms) roughly 3 to 4 cups of this fresh-food diet each day, divided between a smaller breakfast and a larger dinner. Chapter 5 completes the main part of the book by answering this common question: how much of this food should I feed my dog?

I hope you find this book helpful, and by the end of it you feel well prepared and excited about making your own dog's food, even if you don't cook for yourself. (Although I also hope it inspires you to eat well yourself… ☺)

1. Dogs are Carnivores

When it comes to feeding dogs, perhaps the single most important thing to understand is that dogs are carnivores: they eat (in Latin: *-vorare,* to devour) animal flesh (*carne-,* flesh). They're not as strict about it as some other species, such as cats, but they are carnivores nonetheless.

Dogs are designed to eat other animals; not just muscle, but also the skin, bones, internal organs, and gut contents. That's their particular niche in the ecosystem, their assigned place in the web of life. I hated it when Miss Lilly killed other creatures, which she *so* loved to do, but it was natural to her. So, although I'm a long-time vegetarian myself (as I love to say, with mock horror, "I don't eat my patients!"), I fed Miss Lilly a meat-based diet.

Dogs are 'facultative' carnivores

Not all carnivores are created equal in their proclivities or nutritional requirements. Cats, for example, are described as 'obligate' carnivores, meaning that they are geared to rely solely on animal matter to meet all of their nutritional needs. In a word, they are *obligated* to eat other animals in order to thrive. In fact, they lack the digestive anatomy and physiology needed to make good use of much plant material.

Dogs are considered 'facultative' carnivores, meaning that they are true carnivores (flesh eaters), but they need not rely *solely* on animal matter to meet all of their nutritional needs. They can survive on other sources of food, such as plants and insects, for a time or as a supplement when meat is scarce.

Even so, it's important to understand that dogs are designed to get most of their nutritional needs from animal matter, not from plant matter.

but aren't dogs really *omnivores?*

I had a congenial but long-running debate with a vet friend over this point, as she insisted that dogs are omnivores (*omni-*, all or everything) because they will eat just about anything.

Omnivores are species that eat both animal and plant material as part of their natural diet. In fact, it might even be said that omnivores *need* to eat both animal and plant material to be healthy, as their systems are not particularly well adapted for either as their primary source of nutrition.

Pigs and chickens are familiar examples of omnivores. Humans are generally considered to be omnivores as well. We can be healthy on strictly vegetarian or vegan diets, but from personal experience it takes quite a bit of effort to ensure that we meet all of our nutritional needs from plant sources alone. (I once attempted a vegan diet… After a few weeks I wanted to eat my own arm off!) Deficiencies of certain vitamins and amino acids are both common and serious in people who eat no animal products whatsoever.

Bears are often cited as an example of an omnivore. However, the bears we most often think of when we think "bear" (*e.g.*, brown, black, grizzly) are *facultative carnivores.* Yes, they eat berries and other plant material, but if you were to offer a black bear the choice of venison or a calorically equivalent pile of berries, which do you think the bear would choose? The venison, of course — because bears are carnivores.

Facultative carnivores such as the North American bears eat plant material more as a matter of situational necessity and seasonal availability than of physiological/nutritional requirement. Overall, plant material makes up considerably less of their total dietary intake than animal material.

The same is true for the wild canids (wolves, coyotes, foxes, *etc.)* which are the closest relatives of the domestic dog.

no, they're really *carnivores*

There are some problems with the position that dogs must be omnivores because they will eat just about anything. For one, many dogs, Miss Lilly included, don't care for veggies or fruit; they have a particular appetite for *meat*. In fact, I had to "meat up" Miss Lilly's veggies if I wanted her to eat them. (I'll explain why I bothered feeding her veggies in Chapter 3.) Furthermore, as I'll discuss a little later, when I dropped the meat content of her diet below 50%, she was neither happy nor healthy.

But more generally speaking, that position is simply not supported by the dog's anatomy, physiology, and psychology. Terrestrial carnivores have several anatomical (structural), physiological (functional), and psychological (behavioral) features in common, and dogs are no exception.[1]

Perhaps most obvious is that the teeth and nails/claws of these carnivores are designed for capturing, killing, and devouring their prey. The facial structure and dental architecture of the average dog is clearly that of a predator. (We'll set aside the short-faced breeds such as the Pug for now.)

The eating patterns of dogs also are those of a carnivore: tear off a chunk of flesh or grab a big mouthful of food, chew it a couple of times (maybe), then swallow it almost whole, letting the digestive juices do the rest with this highly nutritious and digestible food.

In comparison, herbivores (*e.g.,* horses and cows) chew their food much more before swallowing it; and cows even re-chew it later! Unlike dogs, the herbivore's premolars and molars form a long, level grinding surface that acts like a millstone, crushing up fibrous plant material and mixing it with saliva before it is swallowed.

We omnivores have dental and eating patterns somewhere in between those of carnivores and herbivores.

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[1] Throughout this book, 'carnivore' specifically refers to carnivorous *land (terrestrial) mammals,* not carnivorous birds, reptiles, amphibians, fish, or marine mammals.

The hunting/chasing drive that is evident to various degrees in domestic dogs further supports their classification as carnivores. Many dogs, Miss Lilly included, have a strong drive to hunt, capture, and kill animals they perceive as prey.

In other dogs, this drive is latent or it has been channeled into related activities such as chasing (*e.g.,* Greyhound racing) and herding. Even the innocuous games we enjoy with our dogs, such as fetch and frisbee, may depend on the dog's prey drive. Cats can be coaxed to play games, too — as long as the game simulates hunting in some way (otherwise, forget it!).

To continue with external features, in most carnivorous animals, including dogs, the eyes are set fairly close to center on the face, in a way that allows visual acuity and depth perception (binocular vision) in front of the animal.

In contrast, the eyes of horses, cows, deer, and other prey species (most of which are herbivores) are set more toward the sides of the head, allowing an almost panoramic range of vision (about 350 degrees around in horses), because what they most need is to spot predators early enough to avoid becoming dinner.

As for the rest of the digestive system, in comparison to herbivores and even to omnivores, the dog's digestive tract is shorter in length and smaller in volume. The gut transit time (the time it takes for food to travel from mouth to anus) likewise is shorter. Related to all that, the digestive juices are geared toward the breakdown of animal proteins and fats (from muscle, organs, skin, bone, sinews, *etc.)* rather than plant starches, sugars, proteins, and fiber.

Perhaps a point of confusion that helps fuel the carnivore *vs* omnivore debate is that dogs are as much scavengers as they are hunters. Most facultative carnivores — dogs included — are *opportunists.* They're just as happy to feast on the smelly remains of someone else's kill as to hunt and kill the prey themselves. And dogs are just as happy to eat a discarded carton of cold French fries as they are the wonderful, healthy dinner their loving person so carefully prepared for them!

This brings me to another point that's often not factored in: *flavor*. Taste must be considered when looking at what dogs will eat. For example, not many dogs willingly eat kale on its own; yet sauté it with some bacon, and kale is their new favorite food. But is it then true to say that, because dogs will eat potatoes and kale under certain circumstances, they're omnivores?

Facultative carnivores do, by definition, eat some foods other than animal flesh. However, the dog's anatomy, physiology, and psychology clearly are all designed for seeking out and making use of *animal* material *primarily.* That makes them *carnivores,* not omnivores.

And finally, the notion that "dogs are omnivores" gives us license to feed dogs all sorts of cheaper food items, such as grains and various byproducts of the human food industry, rather than a diet based on wholesome, fresh animal products. That was not my friend's point, but it is an insidious consequence of proceeding on the assumption that "dogs can eat anything."

Feeding Miss Lilly

So, what all this means, and what my experience with Miss Lilly taught me, is that dogs do best when fed a diet that consists mostly of animal tissues (muscle, internal organs, bones, skin, *etc.*) and lesser amounts of vegetables and other plant materials.

meat–veg ratio

I fed Miss Lilly a diet of animal ("meat") and plant ("veg") materials that, overall, was about 60% meat and 40% veg, or a meat–veg ratio of about 60:40.

(Unless I specify otherwise, when I use the word *meat* I mean animal flesh: the usual cuts of meat, most of which are muscle, as well as internal organs and other animal parts. In other words, meat = animal matter.)

I tried her on the common commercial raw dog-food ratios of meat–veg that are between 80:20 and 90:10 (*i.e.,* 80–90% meat). I even tried the "paleolithic"

100% meat-and-bones diets (although such diets are neither biologically nor historically sound, given that domestic dogs are *facultative* carnivores who developed in close association with humans). However, Miss Lilly did best with a meat–veg ratio of about 60:40, as have most of my canine patients.

I never felt constrained by that ratio for every meal, though. Most of her meals were a blend of meat and veg, in that approximate ratio, but there were times when a meal was just a meaty bone, a deer heart, or scrambled eggs. Other times, dinner was some lentil soup I'd made for my vegetarian self. But overall, Miss Lilly got the bulk of her calories, protein, and other nutrients from animal sources, as is appropriate for her species.

For economical as well as ethical and environmental reasons, I'd dearly love to have kept the meat portion of her diet below 50%. I even played with that a little. However, in so doing I was rather forcibly reminded that my dog is a carnivore — anatomically, physiologically, and psychologically — and I should feed her as such.

When I tried her at less than 50% meat, she was hungry no matter how much I fed her, she was dissatisfied with her food and often refused what I gave her (or she ate around the veggies), her skin and coat started to get dull and flaky, and she lost both weight and vitality. In short, she was neither happy nor healthy on a diet that is more suited to an omnivore. (Couldn't resist beating that drum one more time. ☺)

Miss Lilly did OK when I keep her at around 50% meat (a meat–veg ratio of 50:50) — as long as I was meticulous with the meat quality, I fed her lots of variety of both meats and veggies, and I provided extra dietary fat (fed fattier cuts of meat, added butter or oil to her meals). But she did better with a bit more meat, particularly as she aged and became less efficient at maintaining a healthy muscle mass.

In preparing this update, I meditated on Miss Lilly's life and what points I should emphasize in this revision. One surprising (and even disconcerting) one was this: *feed more meat!* While I don't subscribe to feeding dogs and

cats vegan or even just vegetarian diets, I still feel conflicted about the use of meat (*i.e.,* that someone has to die in order for my dog to live). Even so, I vowed to listen to *Miss Lilly's Lessons on Life,* and she was very clear: feed more meat. So, next time around, I will feed a little more meat, at least 60% and probably closer to 70% meat. That should satisfy my dog's carnivorous nature and my need to preserve life where I can.

That said, I often recommend a diet that *initially* is 50:50 meat–veg in dogs struggling with serious illness such as heart failure, liver/kidney disease, or cancer, because the *veg* component can be very important in these bodies. At the same time, I emphasize *high-quality meats* and the inclusion of lots of organ meats (see Chapter 2).

high-quality meats

Sourcing high-quality meats, including organs and bones, was something I did routinely for Miss Lilly, as it helped me balance economy and value. It also helped me minimize my use of farmed animal products without compromising Miss Lilly's health and well-being.

To me, "high quality" when buying animal products means:

- *fresh* — ideally, food that is locally or regionally grown, and recently harvested or processed; or if frozen, then recently so
- *pasture raised* (*i.e.*, grass-fed) *or wild caught*
- *organic,* or at least raised with minimal use of synthetic antibiotics, hormones, anthelminthics (dewormers), and pesticides, all of which have a place in responsible agriculture, but not in my dog's food

The higher the biological or nutritional value of the food, the less we have to eat in order to meet our needs. And the more chemically clean or natural the food, the less metabolic work the body has to do in order to make good use of it and to deal with any potentially harmful substances it contains or that result from its digestion and metabolism.

All of this takes on greater and greater importance as the body ages. Conventional agriculture has long been a chemical-dependent business. The speed with which synthetic fertilizers, pesticides, herbicides, 'biologics' (vaccines, hormones, immunotherapeutics), and genetically modified (GM) organisms have been incorporated into our food supply has greatly exceeded our body's ability to cope in the short-term and to adapt in the long-term by devising metabolic strategies for dealing with these foreign substances.

The liver already has enough to do in dealing with the body's daily intake of food and the normal turnover of fluids, cells, and tissues. And even in a healthy body on a chemically-clean, species-appropriate, fresh-food diet, these metabolic processes slow down as we age. At some point, the liver may get so overwhelmed that it starts to act like a blocked toilet.

Daily intake of food containing unnatural substances greatly accelerates this decline because the liver has to divert metabolic resources away from its normal processes to detoxify these foreign substances. And that's all before we consider the detrimental effects of glyphosate (the active ingredient in the herbicide Roundup®) on the gut microbes.[1]

When I bought as much fresh, locally grown, pasture raised or wild caught, and naturally produced meat as I reasonably could, I was getting the most nutritional "bang for my buck." So, even though these products often cost more per pound than conventionally produced meat, I was still economizing in all of the ways I wanted to, including ethically and in environmental impact, without short-changing Miss Lilly.

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[1] According to Monsanto's US patent (US7771736B2), glyphosate is a *very* broad-spectrum antibiotic agent. Independent studies in animals have shown that the gut microbes are susceptible to glyphosate at concentrations commonly found in animal feeds, to the detriment of animal health, production, growth, and fertility.

Glyphosate is widely used in agriculture. Perhaps most alarming is its use as a "dessicant" (it is sprayed on crops before harvest to kill the leaves and thus make harvesting quicker and easier). As a result, glyphosate is detectable in all manner of conventionally produced foods for humans and animals, particularly those based on cereal grains and legumes.

Note that there were no grains or grain-based foods in Miss Lilly's daily diet. Some dogs do OK with a little grain in their diets, but many do not, mine included. Miss Lilly came to tolerate the occasional dog cookie (thank you, Uncle Walter!) or discarded hamburger bun by the side of the road (dog manna!), but she did best when I excluded grains and other starchy foods (potatoes, sweet potatoes, most legumes) from her daily diet. That, too, is species-appropriate.

What's the problem with grain?

Few foods are inherently and universally "bad," and the cereal grains are no exception.[1] Grains are not bad; they're just misused. Mostly they're overused. A lot. Even in human diets. And they just don't belong in any great amount in a carnivore's diet, not even that of a facultative carnivore.

The modern cereal grains (wheat, corn, oats, barley, rice, *etc.*) aren't even that great a food for herbivores and omnivores — at least, not in the large quantities we're typically feeding or eating. A lot of attention has been paid to gluten and other proteins in certain grains (*e.g.,* wheat) as a cause of disease, and rightly so. But in my experience, not enough concern has been applied to the *starch* content of cereal grains.

the up-side

Cereal grains have been deliberately selected over the centuries to be very high in starch. Compare, for example, the size of an oat or rice kernel with those of wild oats or wild rice, or with any other grass seed for that matter. The domestic kernel is much larger than its wild counterpart because its central portion is bloated with the starchy material that is turned into flour during milling.

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[1] By "grain," I mean the *cereal grains* (wheat, corn, oats, barley, rice, sorghum, millet, spelt, kamut, rye, triticale, *etc.*). Most grain-producing plants are members of the Grass family, and they are best called *cereal* grains, as grain simply means "small particle" (*e.g.,* grain of sand). Not all small seeds are cereal grains; for example, sesame, chia, buckwheat, quinoa, and amaranth seeds are not cereals.

The high starch content of cereal grains — 45% to 75% starch[1], depending on the crop — makes them quite calorie-dense (*i.e.*, concentrated calories), which is the whole point: grains are a compact form of energy that is easy to grow, harvest, store, transport, trade, and make into high-calorie food.

In addition, foods made with cereal grains are considerably less expensive to produce than foods made with high-quality animal products. There's value in that. However, there's also a down-side.

the down-side

Even though grains have been a significant component of human diets for thousands of years, genetically we still haven't fully adapted to using grains as a primary food source. The changes in diet which followed the domestication of grasses for the mass production of grain have not been accompanied by sufficient changes in the human genome to prevent the diseases commonly caused by high-grain diets — and we're omnivores!

Dogs and cats, being *carnivores,* are even less well adapted to using cereal grains as a major food source. Compared with wolves, dogs have made some genetic adaptations in this regard (especially in the gene that codes for pancreatic amylase),[2] but clearly not enough.

Gluten, lectins, phytates, and other plant molecules are implicated in the grain-related health problems, but *starch* may be every bit as problematic.

Starch is a carbohydrate-storage molecule that is made by plants. It is stored, among other places, in the seeds, where it serves as a little energy "backpack" once the seed has fallen to the ground. Sprouting, or germination, activates the enzymes in the seed that transform the starch into readily usable energy for initial root, stem, and leaf growth.

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[1] Source: equi-analytical.com/common-feed-profiles/

[2] For example, 'Diet adaptation in dog reflects spread of prehistoric agriculture' [doi: 10.1038/hdy.2016.48] and 'Dietary variation and evolution of gene copy number among dog breeds' [doi: 10.1371/journal.pone.0148899].

As an energy source for animals (and humans), starch must first be broken down into smaller sugar molecules before it can be absorbed by the intestine and used for energy production in the body. There are several different digestive enzymes involved in this process, and any one of them can limit the complete digestion, absorption, and utilization of starch.

Starch is also readily broken down ('fermented') and used for energy by the bacteria and other microbes in the gut.[1] Carbohydrate-fermenting ('saccharolytic') microbes are found throughout the digestive tract, including in the mouth, so to some extent there is always a race between enzymatic digestion and microbial fermentation of any starchy food.

The more starch there is in a meal, the more microbial fermentation will feature in its breakdown, because enzymatic digestion of starch is rate-limited: there's only so much starch a body can break down with its digestive enzymes in a given amount of time.

For example, in horses 2 grams of starch per kilogram of body weight is enough to cause spillover of starch into the large intestine.[2] There, it is rapidly fermented by the gut microbes. And that's in a *herbivore,* whose digestive system is *designed* to make use of plant material *exclusively.*

The trouble with the microbial fermentation of starch is that it yields lactic acid and carbon dioxide, both of which alter the environment within the gut, and not for the better. In sufficient amounts, the gas produced can cause bloating, cramping, or simply flatulence (excessive 'farting'). But a more insidious problem is that many of the other gut microbes are inhibited or killed off by the increase in acidity of the gut contents.

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[1] The 'gut' is generally considered to comprise the parts of the digestive tract that are located within the abdomen (belly): the stomach, small intestine, and large intestine (cecum and colon). That's what I mean when I refer to the gut. The 'digestive tract' as a whole includes every part from mouth to anus. The 'digestive system' may also include the liver and pancreas, depending on the context.

[2] 'Diet-dependent modular dynamic interactions of the equine cecal microbiota.' [doi: 10.1264/jsme2.ME16061]

The large swings in acidity and microbial stress/distress with each high-starch meal can cause persistent, low-grade inflammation and compromise of the intestinal barrier, a situation commonly referred to as 'leaky gut'.

Leaky gut is well named, because microbes and microbial products that are normally confined to the gut are absorbed into the bloodstream when the intestinal barrier is compromised,[1] taxing the liver, activating the immune system, altering brain chemistry (via the gut–brain axis) — in fact, affecting every organ and tissue in the body to some extent.

Cooking makes most forms of starch more digestible and thus more available to the body, although there are still some enzymatic steps required in order for cooked starches to be digested and absorbed. However, cooking still leaves some *resistant* starch that cannot be enzymatically digested; it can only be broken down by the gut microbes, with the aforementioned consequences when consumed in large amounts.

So, cereal grains — and in fact *any* starchy food — for all their legitimate calorie-dense advantage, are not all they're cracked up to be. Or perhaps it would be better to say that eating them is not without problems. What constitutes "too much" starch depends somewhat on the individual (as some adaptation does occur), but mostly it depends on the species.

dogs and starch

Being carnivores, dogs are not well equipped to make good use of dietary starch in anything more than small amounts. Dogs do produce some carbohydrate-specific digestive enzymes, but all-in-all their digestive secretions are geared toward getting most of their energy needs met from

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[1] A recent study in horses measured the numbers of intestinal bacteria found in the lymph nodes that drain the intestine (the mesenteric lymph nodes) and in the liver. Horses on a *high-grain* diet (49% starch) had 2–17 times as many bacteria in their mesenteric lymph nodes, and 10–35 times as many bacteria in their liver, compared with horses on a *high-fiber* diet (19% starch). These differences were statistically significant and they show that, even in a species adapted for an exclusively plant-based diet, a high-starch diet results in a leaky gut. [doi: 10.1111/jpn.13643]

animal fats, proteins, glucose (found in blood and tissues), and glycogen (a glucose-storage molecule found mostly in liver and muscle — *i.e.,* an *animal source* carbohydrate-storage molecule).

The dog's digestive system is simply not well adapted to making use of large amounts of starch, even after all this time living alongside humans. Sprouted or fermented grains may be better digested by dogs, as they are by humans. Even so, grass seeds don't form a significant part of the diet in wild canids, other than in the gut contents of their prey (where they have already been digested by enzymes and fermented by microbes), so we would be wise to follow suit when feeding our domestic dogs.

Most commercial dog- and cat-foods rely heavily on cereal grains or other starchy plants (*e.g.,* potato, sweet potato, tapioca, peas). That's mostly because starchy foods are relatively cheap and animal products relatively expensive to grow and process, and pet-food manufacturing is a business.

As for the "grain-free" label on some dry and canned foods, that's typically a crafty marketing ploy, because grain-free generally doesn't mean *starch*-free. While these foods are indeed grain-free, *most are not starch-free;* other starchy foods are used in place of the cereal grains.

Think of it this way: just as you can't make a cookie without using some sort of flour, you can't make a kibble without some sort of starch.[1] If the starch doesn't come from grain, it has to come from some other starchy food. But either way, it's not a species-appropriate food source for a carnivore.

We can blame the pet-food manufacturers only so far, though. After all, they're simply making a profit by providing us with what we say we want: a cheap and easy way to feed our pets. On the one hand, they've trained us to think that dogs are supposed to eat dog-food and cats to eat cat-food. But on the other hand, *we've* trained *them* to meet our demand for quick, simple, and inexpensive pet-foods.

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[1] Cookies *can* be made with nut flour (*e.g.,* almond meal), but they need a binder such as egg white if they are to be starch-free and not crumble in your hand.

One of the penalties we're paying for our over-reliance on cereal grains and other starchy foods is the epidemic of obesity and related metabolic and endocrine (hormonal) disorders, such as type II diabetes and probably thyroid and adrenal gland disorders as well, in humans *and* animals.

In addition to their effects on the gut, high-starch meals cause a rapid increase in blood glucose, which triggers the release of insulin into the bloodstream from the pancreas. In small amounts, insulin is not only beneficial, it's essential. However, repeatedly or persistently high levels of insulin are problematic. This dynamic — the need for moderation or balance, the Goldilocks effect — is a critical one, wherever we look in the body.

Another consequence of high-starch diets is the prevalence of chronic digestive disorders often grouped under the umbrella term 'inflammatory bowel disease' (IBD). Anal sac problems[1] could go here, too, although they more rightly belong with the chronic skin conditions, including persistent itchiness (atopic dermatitis) and ear infections (otitis externa), that we commonly see with a leaky gut.

In fact, I think we can lay many chronic inflammatory and degenerative disorders at the door of this ill-conceived dietary strategy. They include periodontal disease, osteoarthritis, heart disease, kidney disease, cataracts, senility, cancer — *i.e.*, the customarily age-related diseases.

In recent years, there's been an avalanche of research published on how our gut microbes influence not just digestion but our entire health and well-being. In short, what we eat can either make us well or make us ill — and make us "glad, sad, or mad" — because the makeup and activity of our gut microbes depend in large part on what we eat. (More on the gut microbes in Chapter 4.) It would be a gross oversimplification to blame every disease on a high-starch diet, but the evidence against high-starch diets is compelling.

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[1] Just for fun: anal sac disease was probably the underlying cause of Tricki Woo's baneful condition which Mrs Pumphrey referred to as "flop-bot" in James Herriot's book *All Creatures Great and Small.* Tricki Woo was overweight, being fed all manner of high-calorie human foods by the overly indulgent Mrs Pumphrey.

In my clinical experience and my adventures with Miss Lilly, these disorders can be improved, sometimes dramatically, simply by cutting out grains and other starchy foods. While age-related disorders may still develop over time, it is possible to delay their appearance and slow their advancement with a species-appropriate diet which, for dogs, includes little or no starch.

...same goes for legumes

By the way, similar arguments can be made about the overuse of beans, peas, lentils, and other pulses (the generic term for legume seeds) in the diets of dogs and cats (and humans).[1] Tofu and other soy products fit here, as they are made from soybeans.

Legumes are primarily used as an alternate source of protein in vegetarian and vegan meals. However, legumes may also contain quite a bit of starch (30% to 50% starch for many varieties of beans and lentils[2]) and other rapidly-fermentable carbohydrates (hence the gas!). Not as much as grains, but enough to cause problems when overeaten.

It's interesting that pea starch is commonly used in grain-free pet-foods...

Legumes are gluten-free; but in addition to starch, they contain several potentially troublesome molecules, including lectins and phytates, whose negative effects have earned them the label 'anti-nutrients.' *Anti-nutrients!* Harmful rather than helpful.

A disturbing link has recently been found between a particular form of degenerative heart disease (dilated cardiomyopathy, or DCM) and the predominance of plant proteins (especially legumes) in the dog's diet.[3] There are numerous factors involved in DCM, but legumes rate a mention.

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[1] Green beans and pea pods (*e.g.*, snow peas, sugar snap peas) are exceptions because their seeds are immature, so they are high in fiber and low in starch.

[2] USDA FoodData Central: fdc.nal.usda.gov/index.html

[3] 'Review of canine dilated cardiomyopathy in the wake of diet-associated concerns.' [doi: 10.1093/jas/skaa155]

Reliance on plant proteins is most common in vegetarian and vegan dog-foods, but legumes also show up in grain-free and novel-protein dog-foods, and "boutique" brands (small companies that strive to distinguish themselves in the crowded pet-food marketplace).

I did include some cooked legumes in Miss Lilly's diet, but never very much, not very often, and only for extra variety (a concept I discuss in Chapter 3).

Respect the genome

To wrap up this chapter, here's some of the best nutritional advice I've heard: *Respect your genome.*

I am an omnivore; my dog is not. I may choose to be vegetarian; my dog cannot — my dog *would* not! And even with my conscious decision to be vegetarian, it takes some deliberate food choices I'd rather not have to make (*e.g.,* inclusion of dairy products) to ensure that my diet meets all of my needs. In other words, my body reminds me *daily* that I am an omnivore.

Dogs are facultative *carnivores,* and we'd be wise to feed them as nature designed them. Mother nature devised carnivory, for what reason(s) I can only speculate. Regardless, carnivores are designed to eat other animals; and one might argue that those other animals are designed to be eaten, that being a prey species (food for others) is *their* assigned place in the web of life.

I've been interested in nutrition for many years now, but I don't even pretend that I know all of the constituents in a healthy, natural diet. In fact, I'm sure there are nutrients we don't even recognize or acknowledge are important yet. As the DCM–legume link illustrates, it is foolhardy for us to over-rule mother nature by insisting that our dogs eat a plant-based diet.

Replacing animal-source with plant-source ingredients in the diets of carnivores such as dogs and cats — whether for purely economic reasons (*e.g.,* conventional pet-foods) or for noble but misguided ethical reasons (*e.g.,* vegan pet-foods) — is a very good example of *hubris.*

Summary

* I fed Miss Lilly a fresh meat & veg diet that was about 60% "meat" (various animal parts & products) and 40% "veg" (veggies, seeds, nuts, *etc.*)

* she did OK with a meat–veg ratio as low as 50:50, but she did better at around 60:40

* next time around (with my next dog), I'll feed even more meat

* sometimes a meal was all meat, no veg; and occasionally dinner was a vegetarian meal; but overall Miss Lilly got the bulk of her calories, protein, and other nutrients from *animal* sources

* to get the most nutritional bang for my buck, I emphasized *high-quality* meats, organs, and bones — *i.e.,* fresh, locally grown, pasture raised or wild caught, and naturally produced

* while I didn't begrudge her the occasional dog cookie or stolen mouthful of kibble, Miss Lilly did best when her daily diet was grain-free and otherwise very low in *starch*

2. Carnivores eat the entire animal

In buying food and preparing meals for dogs, it's also important to realize that muscle meat is not a complete food for a carnivore. By muscle meat, I mean the usual cuts of meat that are eaten by humans. (The heart, liver, kidneys, and other internal organs may also be available, but in most grocery stores, butcher shops, and farmers markets, meat is primarily muscle tissue, with or without the bone.)

In contrast, wild carnivores will eat pretty much the entire animal, including the skin, complete with the hair/feathers and hooves/nails, along with the muscles, bones, tendons, ligaments, other connective tissues, blood, internal organs, and even the gut contents. In this way, the carnivore is getting all of its nutritional needs met in one neat package.

It's one-stop shopping: calories, protein (and its component amino acids), essential fatty acids, vitamins, minerals, water, and several other nutrients we're not in the habit of thinking are important (antioxidants, other cofactors involved in energy production, hormones, beneficial microbes, *etc.).*

Think of it this way: as we are what we eat, eating the entire animal is a very efficient way for a carnivore to maintain and, when necessary, repair its own 'animal'.

Of course, many species can maintain and repair their bodies using only plant-source nutrients. Horses, who are strict herbivores, do it every day. However, that is how their systems are designed.

In occupying the particular ecological niche that carnivores do, and thus having the food- and feeding-related anatomy, physiology, and psychology that they do, it is most efficient — and effective — for carnivores to meet *their* nutritional needs by eating other animals.

A diet consisting primarily or exclusively of muscle meat, while providing plenty of calories, protein, and some vitamins, minerals, and essential fatty acids, will be profoundly deficient in calcium, and marginal or grossly deficient in various other essential nutrients.

Adding bones, bone meal (ground-up bone), or another source of calcium addresses the calcium problem, but an all-meat-&-bone diet, when the meat is just muscle, is still an incomplete diet for a species designed to eat most, if not all, of its prey.

Feeding Miss Lilly

When I shopped for Miss Lilly, I bought as many different body parts as I could find that were of high quality (see Chapter 1). Muscle meat is easy to come by, as are bones, but internal organs can be harder to find.

In the US, the organ meats that are considered 'edible byproducts' include tongue, heart, liver, kidney, brain,[1] stomach (poultry gizzards, beef/sheep tripe), intestines ("chitterlings"), outer lining of the small intestine (sold as sausage casings), glands ("sweetbreads," mainly thymus and/or pancreas, but may include other glands), spleen ("melt"), and testes ("fries").

While your local grocery store, butcher shop, farmers market, or producer may offer only some of these organs, *any* you can buy will be good food for dogs and a great addition to the more widely available muscle meat.

marrow bones

In the first edition, I included marrow bones as an organ meat because bone marrow — the gelatinous material that fills the cavities within bones — is an organ. Bone marrow primarily produces red and white blood cells, platelets (cell fragments involved in blood clotting), and stem cells, so it is especially rich in nutrients.

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[1] The US Department of Agriculture (USDA) prohibits the sale of brains from cattle 30 months (2 ½ years) of age or older. [aphis.usda.gov; search BSE]

However, bone marrow from adult animals also contains a lot of fat, which can be a problem in dogs who are overweight or who otherwise need a fat-controlled diet, such as those with a history of pancreatitis.[1]

In addition, the marrow bones often sold as "soup bones" typically come from adult cattle, and their thick, outer walls are just too dense for most dogs. The honeycomb-like bone in the center of these large bones is fine enough for even small dogs to manage, but the outer walls can crack teeth, even after the butcher's bandsaw has cut the bone into manageable pieces.

I fed hundreds of these bones to Miss Lilly over the years, but they no doubt contributed to the dental damage I'll describe later. Next time around, I may use these bones to make bone broth, but I won't feed them to my dog, unless I get a dog the size of a small lion.

skin and related structures

In addition to those organ meats, I fed poultry, fish, and anything else I could find (*e.g.*, rabbit, deer legs, ham hocks), *with the skin on* whenever possible. Skin is actually an organ, and it is rich in collagen and other proteins.

While there may be some body fat stored under the skin ('subcutaneous' fat), the skin itself is low in fat. But that's more of a human hang-up. Animal fats are an important and *species-appropriate* source of calories for dogs. Fat need not be avoided; rather, its intake should be tailored to the dog's needs.

I'm also not averse to feeding the dried animal tissues that are sold as dog chews, such as rawhide, hooves, horns, snouts, and ears. These items all include some part of the body-surface structures or 'integument', which variously comprises the skin, the hair/fur/wool/feathers, the nails/hooves, the beak, and the horns (but *not* antlers, which are composed of *bone*).

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[1] Pancreatitis is inflammation of the pancreas, with some degree of 'autodigestion' of the pancreas. In dogs, a high-fat diet is one of the many recognized risk factors, as is obesity and the associated systemic inflammation. [doi: 10.1111/jvim.16437]

Not only do these treats keep the dog busy and help keep the teeth and gums healthy (more on this later), they expand the range of body parts in the dog's diet. I don't recommend feeding them every day, but a few times a week is OK (unless they came from China, in which case *never* is best[1]).

sourcing from farmers and hunters

When I wrote the first edition, I was living in an area that had some great natural grocery stores and farmers markets where I could usually find a range of pasture-raised animal products, including organs. In addition, deer hunting was popular there.[2]

As much as I dislike hunting as it's now practiced (more for sport than for sustenance), it is a fact of life in rural areas. Not wanting to let good things go to waste, it provided us with a wonderful bounty of wholesome meat.

In fact, deer season turned out to be an absolute boon for Miss Lilly, as the local processing plant discarded all of the internal organs, most of the bones, and such choice dog chews as the lower legs with the hair and hooves still attached.[3] What's more, the carcasses were so fresh that they were just one step removed from Miss Lilly having caught the deer herself.

I trimmed off and discarded the hard fat surrounding some of the abdominal organs, as I suspect it's the reason some dogs get sick when they gorge on entrails left in the woods by hunters. I also left the kidneys behind, in case they harbored the bacteria that cause leptospirosis.[4]

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[1] China has a poor track record when it comes to pet-foods. For example, in 2007 many dogs and cats died after eating pet-food made with vegetable (wheat, rice, or corn) protein imported from China that was contaminated with melamine. [fda.gov/animal-veterinary/recalls-withdrawals/melamine-pet-food-recall-2007]

[2] I was living in central North Carolina at the time. I moved back home to Australia in 2018. Here, kangaroos are our deer and 'roo meat is commonly used in pet-food.

[3] I'll discuss bones in more detail later, but for now I'll simply note that bones this size were probably too large for Miss Lilly, particularly in her senior years.

[4] Leptospirosis can cause liver or kidney failure and/or blood-clotting disorder.

For my efforts, I came away with more than my weight in fresh, grass-fed, organic, and species-appropriate dog food, all for free, and I got to spend time with a vet friend who was doing the same thing for her dogs. As gruesome as it may sound, we had an absolute ball!

The organs we collected included the liver, spleen, heart, lungs, larynx (voicebox), trachea (windpipe), and esophagus (gullet). The only reason we didn't collect any part of the gut is because it was too messy. The staff at the processing plant were very gracious and generous with us, so we took care to stay out of their way and keep their work area regulation-clean. The plant was USDA certified, as they handled venison for human consumption, so we were careful not to jeopardize their accreditation.

Had I the luxury of time and space, I would also have harvested at least the rumen, reticulum, and omasum, which are the three forestomach compartments in ruminants.[1] Also known as *tripe,* these organs contain the gut microbes that break down plant material at the start of the digestive process in these herbivores. So, not only is raw tripe a good organ meat for dogs, its inner surface may retain some plant-adapted microbes.[2] (More on the gut microbes and food-as-probiotic in Chapter 4.)

I fed some of the organs right away (refrigerated as soon as I got them home) and I froze or dried the rest.

By the way, I absolutely love my food dehydrator and used it a lot during deer season. Dried lung and liver make especially good dog treats that store well, and the larynx and trachea dry into very nice, crunchy chews that are a natural source of glucosamine and chondroitin (key ingredients in those

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[1] Ruminants are animals that ruminate, or chew their cud, such as cows, sheep, and deer. They have three chambers between their esophagus and their true stomach (abomasum). The rumen is the first and largest, and it is from here that ruminants belch up (eructate) a wad of grass or hay (the cud) to chew a second time.

[2] Tripe sold for human consumption has been scalded, washed, and then bleached to remove these microbes. The inner lining, with its grass stains, has also been stripped away. "Green" tripe is untreated and thus retains some of its microbes.

expensive joint supplements), being made almost entirely of cartilage. Mostly I made these cartilage treats for an arthritic dog friend. They were a hit!

My point in raising this somewhat touchy (and yes, OK, *icky*) subject of hunting is to encourage you to get creative if your regular meat suppliers don't provide enough range of high-quality organ meats and other animal parts to meet your dog's needs. The addition of organs and other tissues really is that important. You may have to play the hunter–gatherer beyond a routine trip to the grocery store, but you can find quite an assortment of animal parts if you cast the net a little wider.

And don't be afraid to ask the butcher, even in your grocery store meat department, what he or she can get for you. Although organ meats may be special-order items, and the USDA prohibits the sale of certain tissues from cattle,[1] organs are typically cheaper per pound than the usual cuts of meat, so it may be well worth asking your butcher to find some more of these organs for you — more range, and a more consistent supply.

Before we go on, an Italian vet friend reminded me that meat from wild boar (wild or feral pigs, male and female) must be cooked because the virus that causes Aujeszky's disease, also known as pseudorabies or "mad itch," is prevalent in the wild boar population and can be transmitted to dogs. This risk is also present in the US, along with the bacterial diseases leptospirosis, brucellosis, and tularemia. So, cook this wild meat well before feeding it.

omega-3 fatty acids

Omega-3 fatty acids are essential nutrients that are needed for the health and proper function of many different organs, including the skin, brain, eyes, and heart, and the immune system. In fact, I can't think of a single organ or body system that doesn't need them for optimal health.

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[1] Because of the risk for "mad cow disease" (bovine spongiform encephalopathy, or BSE), prohibited items from adult cattle include the brain, spinal cord, eyes, skull, spine (except the tail) and adjacent nerve tissue; and in cattle of all ages, the last part of the small intestine (ileum) and the tonsils.

Unlike omega-6 fatty acids, which are pro-inflammatory when consumed in excess, the omega-3s are generally anti-inflammatory. Better put, we need the omega-3s to ensure *well-regulated* inflammatory and immune responses.

These nutrients are called 'essential' fatty acids because they cannot be made by the body; it is *essential* that they be provided by the *diet.* Carnivores get them by eating herbivores, who get them by eating grass and other plants that are high in omega-3 fatty acids. Algae tend to be high in omega-3s as well, which is how most fish come to be rich in omega-3s: by eating algae or eating smaller fish that ate algae.

Not to get too technical, but not all omega-3 fatty acids are created equal when it comes to their efficient absorption and utilization by the various animal species. Carnivores don't make as efficient use of *plant-source* omega-3s, such as those found in flax seed, hemp seed, and walnuts, as they do of *animal-source* omega-3s. Here again, we see that carnivores best meet their needs by eating *herbivores,* rather than eating *like* herbivores.

Omega-3s are abundant in fresh grass but really low in stored forages (hay, straw, *etc.*), and they are inherently low in grains. So, the omega-3 content of meat is typically much higher in 100% grass-fed livestock than in those who were grain-fed or grain-finished (fed grain to fatten them in the last month or two before slaughter). As most livestock raised for meat are either grain-fed or grain-finished, most meats tend to be low in omega-3 and high in omega-6 fatty acids.

That's another reason I bought meat that was 100% pasture-raised or grass-fed whenever I could: so that I didn't have to supplement Miss Lilly's diet with omega-3 fatty acids. I wanted her to meet all of her nutritional needs from good food alone.

Whenever I had to choose between organic and grass-fed, I opted for grass-fed. There is currently no requirement for organically raised animals to have *any* fresh food in their diets, so "organic" diets may be highly processed and high in grains, and thus low in omega-3 fatty acids.

But sometimes I couldn't find grass-fed meat or it didn't fit the budget, so I had to use other sources of omega-3 fatty acids. That brings me to one last note on sourcing body parts in order to reconstruct or replicate the whole prey for our dogs the best we can. (Warning: it's about to get icky again...)

The organs with the highest concentration of omega-3 fatty acids include the brain, spinal cord, and eyes. These organs are a great delicacy for carnivores and are of high nutritional value. However, they are not popular food items in the US, so availability is generally limited to the brains of calves, sheep, goats, and pigs, and even they can be hard to find.[1]

The good news is that fish generally are rich in the specific omega-3 fatty acids that can readily be used by carnivores. So, although fish would not be a staple in the diets of most wild canids, I included fish in Miss Lilly's diet at least a couple of times a week. Sometimes I added fish oil to her diet as well, depending on what I'd been able to buy for her that week.

Some notes about feeding fish before we go on:

1. Fish is best fed *lightly cooked.* The raw flesh of many (but not all) types of fish contains thiaminase, which is an enzyme that degrades thiamine (vitamin B1). Thiamine deficiency may develop when raw fish is part of the daily diet; but cooking destroys this heat-sensitive enzyme.

2. In the Pacific northwest, cooking fish is also important to destroy the microbe that causes salmon poisoning in dogs (*Neorickettsia helminthœca).*

3. The nuclear power plant disaster in Fukushima, Japan, in 2011 resulted in extensive (and according to some sources, ongoing) radiation leakage into the Pacific Ocean. Even though radiation levels in seafood from the northern and central Pacific have been reported to be "safe" for human consumption, I still avoided fish from that region.

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[1] Some suppliers to ethnic markets or direct to customers may sell whole heads that include the brain and eyes. (That excludes adult cattle, of course.)

Ten years later, another earthquake damaged the ailing facility, and there are fresh concerns about radiation leakage into the Pacific Ocean. Avoiding or minimizing the use of seafood from that region once again seems prudent.

lean or fat?

When we were living in the suburbs, I made a point of buying mostly lean meats because Miss Lilly was a relatively sedentary dog. She had a big yard to romp in and friends to play with, and we took walks every day (as much for my benefit as for hers), but still she wasn't burning up a lot of calories each day. In fact, she got a little too plump while we lived there (as did I). And for a while, she was having some early-morning digestive upsets that were resolved only when I lowered the fat content of her diet.

But once we moved back to the country and Miss Lilly was a farm dog again, she returned to a healthy weight and I didn't have to worry about the fat content of her diet anymore. She did fine with the more fatty cuts of meat and the higher-fat ground or minced meats.[1]

That said, I still discarded the big wad of fat that's often found in the back end of chicken carcasses these days. (Another reason I preferred pasture-raised poultry is because it isn't nearly as fatty as shed-raised poultry.)

By the way, active dogs, whether working or sporting, generally need more calories for exercise than lean meats can provide. Dogs are designed to meet their calorie needs from animal fats and proteins (along with the glucose and glycogen found in animal tissues). So, in active dogs I usually advise not worrying about the fat content of the meat, and if necessary even adding some more animal fat to their diet in order to maintain their body condition and stamina. (Of course, fitness training is important for stamina as well.)

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[1] In Australia, ground meat is called mince or minced meat. The potential for confusion here is great, "mincemeat" being the sweet filling of fruit pies served at the holidays in the US, variously containing dried fruit, nuts, spices, and spirits. Throughout the book, I've endeavored to include both terms when mentioning finely-chopped meat, just to avoid any misunderstanding.

Bones

Raw bones are the most species-appropriate way of meeting a dog's calcium needs. But here is where I made perhaps my biggest mistake with Miss Lilly: I assumed that a mid-size dog could safely eat any size bone, even beef bones with their thick, dense cortex.[1]

The fact is, she *did* eat bones of all shapes and sizes, including beef bones, for many years without any apparent problems. When I published the first edition, Miss Lilly had eaten at least 1,000 bones, as she'd been fed raw bones at least twice a week for over 10 years at that stage. The points of her teeth were blunted, and some of her incisors were discolored, but her mouth still seemed to be both functional and comfortable. She continued to enjoy eating raw bones and she took to them with great relish.

However, as time went on she lost a few incisors and ended up breaking two premolars.

dental wear and breakage

When Miss Lilly was about 15 years old, she fractured one of her carnassial teeth — the pair of large, rugged teeth about halfway back in a dog's mouth that act like shears to cut off chunks of meat and crush bones. It was a 'slab' fracture on the outer side of her left upper carnassial (fourth premolar) tooth.

About a year later (at around 16 years of age), she fractured her right upper carnassial tooth in the same way. She also damaged the tip of her right upper canine tooth, exposing its sensitive pulp cavity.[2]

With what we know of stress fractures in racehorses and other athletes, these dental fractures likewise may have been the end result of repeated

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[1] The cortex is the compact bone that forms the outer walls of marrow-containing bones such as those of the legs, ribs, and spine.

[2] The pulp cavity is the hollow inner portion of a tooth, where the blood vessels, nerves, and other soft tissues of the tooth are located.

microtrauma to the tooth and its supporting tissues. The microscopic damage, and the structural stiffening that occurs in response, go unnoticed until ordinary forces exceed the capacity of the now-compromised structure, which suddenly fractures under even normal loads.

Given the advanced age at which these dental fractures occurred in Miss Lilly, it's likely that age-related impairment of her ability to maintain and repair her tissues was also at play. Like bones, teeth are living structures that are maintained, repaired, and responsively remodeled throughout life, although there are limits, as with any tissue.

An added factor, somewhat unique to Miss Lilly, was that she had a 'skewed bite'. Evidently, she'd sustained an injury to the left side of her face when she was a puppy, and it affected the development of her skull, particularly her upper and lower jaws, the plane of which was tilted slightly. She was also missing her right lower fourth premolar tooth when I adopted her. Nothing about her jaws and teeth was symmetrical.

These structural abnormalities would have affected how the forces involved in biting and chewing loaded her teeth and the bones of her jaws. What effect that had on the development of these dental fractures I can only speculate, but it is very interesting to me that these fractures occurred only when she was an old dog, and after consuming many, *many* bones over her lifetime.

dental damage in wild carnivores

Dental wear and breakage are common in wild carnivores. In a study of museum specimens spanning a wide variety of carnivorous mammals, more than 25% had at least one broken tooth.[1]

The most commonly affected teeth in the large carnivores were the canines (53% of broken teeth in lions); next most common were the carnassials (27%); and sharing third-place were the incisors and the small premolars (10% each).

[1] 'Incidence of tooth breakage among large, predatory mammals.' [jstor.org/stable/2461849]

In a separate study of lion skulls, the frequency and severity of dental wear and breakage increased with age.[1] In young lions (less than 6 years of age), only about one-quarter (24%) had dental damage, whereas 82% of older lions had damage of some sort, even though they were more experienced hunters.

Also of note in relation to Miss Lilly and her skewed bite, about 40% of the lions showed signs of major injury to the head or face which caused abnormal occlusal patterns (how the teeth fit together when the jaws are closed). These abnormalities often resulted in asymmetrical tooth wear.

Interestingly, though, relatively few lions with exposed pulp cavities in their damaged teeth also had pathology which indicated infection in the tooth or the surrounding bone. It is worth asking whether their raw, meat-based diet contributed to a lower rate of dental and periodontal infection than we typically see in dogs and cats on conventional pet-food diets with the same sorts of dental damage.

All that said, I wish I had done a better job of matching the size of the bone to the size of the dog. Bone size, or more accurately *bone density*, was not a problem — until it was, and then it was a big, painful problem.

A recent study of dental wear and breakage in lions, leopards, and hyenas in Zambia sheds more light on this issue.[2] All three carnivorous species consume animals that are at least as large, and often much larger, in body size, such as Cape buffalo, wildebeest, elephant, hippopotamus, and giraffe.

(Some less exotic and more appropriately *canine* examples are the hunting and killing of elk and moose by wolves, and of deer by coyotes. While generally a team effort, these kills are nonetheless impressive, given the differences in size and strength between predator and prey.)

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[1] 'Tooth breakage and dental disease as causes of carnivore-human conflicts.' [doi: 10.1644/1545-1542(2003)084<0190:TBADDA>2.0.CO;2]

[2] 'Naturally-occurring tooth wear, tooth fracture, and cranial injuries in large carnivores from Zambia.' [doi: 10.7717/peerj.11313]

In all three carnivorous species (lion, leopard, hyena), dental wear and breakage increased with age, as one might expect. But dental damage also increased with the amount of bone consumed from large or very large prey animals. In that regard, there were species differences related to feeding behavior (especially hunter *vs* scavenger) and regional differences related to availability of the preferred prey animals.

Of the three species, hyenas had more dental wear and higher rates of tooth breakage because they characteristically eat more bone than do lions and leopards. (Whereas 44% of leopards and 53% of lions had at least one broken tooth, the figure was 77% for hyenas.) All three predatory species hunt and kill their own prey, and all three will scavenge another's leftovers or eat the remains left by a human hunter, but hyenas are more apt to scavenge than the others, which leaves them with relatively less meat and more bone.

And even within the same species (*e.g.,* lions), the incidence of dental wear and breakage increased with the scarcity of the preferred prey animals.

This dynamic has been found in other wild carnivores, on other continents, as well: as large prey animals become more scarce, more of each carcass is consumed by the carnivore, including the large, dense bones that in more plentiful times may be left.

So, eating the bones of animals much larger than oneself is natural for these carnivores, because catching and killing such an animal is a nutritional bonanza that is well worth the energy expenditure and the risk. However, it comes at a price: increased likelihood of dental wear and breakage.

why I fed her bones

I gave Miss Lilly raw, meaty bones at least a couple of times a week, sometimes more often. I did this for several reasons:

1. *It enabled her to meet her calcium needs in the most species-appropriate way: by eating the bones of her "prey."*

Miss Lilly and other dogs I've watched closely got a lot of enjoyment from tearing the soft tissues (skin, muscle, tendons, ligaments, other connective tissues) away from the meaty bones I fed them. It seems to be such a *primal* thing for a dog. So, too, was eating or gnawing on the bone itself. These are species-appropriate behaviors that I'll discuss in more detail in a bit.

Fresh bone contains all of the minerals and most of the other nutrients needed to maintain and repair one's own bones (and teeth). Wild carnivores meet their calcium needs by eating the bones of other animals. Humans do (or have done), too. Even today, most indigenous peoples living ancestral lifestyles meet their calcium needs by eating the bones of small animals (mammals, birds, reptiles, fish).

As for the rest of us, bone meal powder or hydroxyapatite (the form of calcium-phosphate found in bones and teeth) is widely recommended for bone health in people needing supplemental calcium.

So, bone was the principal source of calcium in Miss Lilly's diet. I fed her fresh bones whenever possible and bone meal powder at other times.

On page 70 is a table that lists the basic calcium requirements for adult dogs, based on body weight. You'll see that it takes surprisingly little bone to meet a dog's daily calcium needs. For example, an adult dog Miss Lilly's size (around 50 pounds, or 23 kilograms) can meet her daily calcium needs with less than 2 level teaspoons of bone meal powder per day.

But what tables such as this don't tell you is that it's not necessary to feed exactly that amount every single day in order to meet a body's calcium needs. Calcium is a nutrient that the body meticulously stores and regulates, so as long as the dog is getting her calcium needs met over the course of, say, a week, then calcium deficiency is unlikely to occur.

A dog Miss Lilly's size would meet her calcium needs by eating 1.7 ounces (47 grams) of fresh bone *per week*. (See page 70 for the calculations.) That's not a lot of bone.

(Pregnant, lactating, growing, and very active dogs need more, but we're talking about the average pet dog here, for whom the basic or 'maintenance' requirements are adequate for good health and activity.)

Another thing these tables don't tell you is that calcium absorption is quite variable, depending on the body's calcium balance and what else is in the diet. For example, an excess of phosphorus, which is found in abundance in muscle meat and in cereal grains, increases the *need* for calcium and inhibits its *absorption* if calcium is not well supplemented.

So, we can tie ourselves in knots trying to get the numbers *just right,* but still be way off in meeting that body's needs at that time. These sorts of nutrition tables can give us a false sense of control.

I used to get all "het up" about how much bone to feed Miss Lilly and whether she was getting enough calcium. But once I noticed how her body self-regulated its calcium intake when given a chance, and I began to take my cues from her, I relaxed and became more adept at reading and meeting her needs.

With regard to her calcium intake, I noticed two key things that I continued to monitor throughout her life.

First, when I didn't feed her enough bones, she got all "shark eyes" when the bones finally come out. You'll know what I mean if you've ever seen Shark Week on the Discovery Channel. Regardless of how much fresh meat I fed her, Miss Lilly had that same expression when I offered her a fresh bone if I hadn't been feeding her enough bones.

Second, when I fed her too much bone — which was usually when I got lazy about feeding her a well-rounded and varied diet — her poop got hard, dry, pale, and crumbly. She even got a little constipated. And if the poop lay in the grass for more than a few days, it became white and chalky. That told me I was feeding her too much bone.

I didn't test her calcium regulation (which involves calculating the urinary excretion of calcium from blood and urine samples collected at the same time). However, she showed no signs of calcium deficiency throughout life, so I assumed she was getting enough calcium and in appropriate proportions to the other minerals and vitamins involved in calcium regulation (primarily phosphorus, magnesium, and vitamin D).

A year after her death, I took the opportunity to examine her skeleton for signs of joint and bone disease.[1] Her bones were remarkably strong and healthy, except for a couple of isolated joints with evidence of osteoarthritis, likely the result of past trauma (*e.g.,* a single small joint in a single toe in a single foot, but not in any of the others).

Evidently, Miss Lilly really had self-regulated well when I fed her a species-appropriate diet, which included bones at least a couple of times a week.

After all, that's how bodies are designed to function: we're born to be self-maintaining and self-repairing, for life.

2. Chewing on raw, meaty bones helped keep her teeth and gums healthy.

As I mentioned, Miss Lilly had a skewed bite, so she was set up to have dental problems. In fact, I was told by the vet who spayed her that she would probably need a "dental" at least once a year, for life.

A "dental" (routine veterinary dental care) in adult dogs and cats is mostly about removing tartar (mineralized plaques of food debris and bacteria) and addressing the almost-inevitable periodontal disease (inflammation and degeneration of the gums and other soft tissues surrounding the teeth). In addition, diseased teeth are evaluated for possible extraction or for salvage procedures such as root-canal surgery.

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[1] Yes, I know… But I'm a scientist, and my enquiring mind wanted to know. I still love her dearly and she continues to teach me, even in death. It was important for me to understand the consequences of the choices I'd made during her life, and it was a rare privilege to get to learn from her remains.

Miss Lilly never needed a "dental." Even when she broke a tooth and I got to have a thorough look at her teeth and gums, she had no signs of the periodontal disease that is so common in dogs in their middle years and beyond, who are fed conventional dog-food diets.

Not only does chewing on raw, meaty bones mechanically clean the teeth and gums, it stimulates saliva flow. Saliva has several functions and contains numerous substances that help keep the teeth and gums healthy. In addition to lubricating the mouth and helping to flush away food debris, chemical components of saliva help keep the teeth mineralized,[1] and chemical and cellular components defend against bacterial invasion of the teeth and gums. Furthermore, saliva has anti-inflammatory properties and growth factors that aid tissue repair and regeneration.

Even the anticipation of a meal gets the saliva flowing. Working on a raw, meaty bone to tear away the soft tissues and then gnaw on the bone itself continues the flow of saliva well beyond what occurs when a bowl of dry or canned dog-food, or even a home-made meal, is consumed in seconds.

Food-based dog chews such as rawhide, hooves, and horns also stimulate saliva flow for the time the dog is chewing on them, but they don't provide the calcium needed to meet the shortfall in a home-made, meat-based diet. That's why I preferred to feed raw, meaty bones for teeth and gum health.

3. The bones seemed to satisfy some primal need to "gnaw on her prey."

There was a certain enjoyment that Miss Lilly and most of her dog friends got from working on bones, which seemed to have nothing to do with the nutritional content. Most of her dog friends were on conventional dog-food diets which should have contained adequate calcium and other minerals, so those dogs should not have been going to town on bones because they needed calcium. Yet most of them tucked into bones as if they were starving.

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[1] Like bones, teeth are hard because they are primarily composed of mineral deposits, mainly an organized complex of calcium and phosphorus called hydroxyapatite.

But starving for what? It seemed to me it was some sort of basic need to act as nature designed them. I see the same sense of deep satisfaction when stall-confined or dry-lotted horses are let out to graze. It has little, if anything, to do with nutrition — although in a way it does, because food should be nourishing to the whole animal.

4. *Chewing on a raw, meaty bone kept her busy for hours.*

Chewing on a bone could keep Miss Lilly happily occupied for hours. That was no small thing when there was otherwise little for her to do during the day. Like most other dogs, she was an intelligent creature who loved to be fully engaged in life, and to have nothing to do is a kind of slow death. For this reason alone, I'm a fan of feeding dental chews to dogs without jobs.

5. *She occasionally buried and later unearthed the bone, in the process perhaps cultivating microbes that are important in making full use of animal material.*

Why is it that dogs bury bones, digging them up only once they're green and stinky? Might this be the canine version of sauerkraut or kimchi — microbially altered or "predigested" foods? It certainly seems to give dogs great pleasure. The most prized bones among the dogs I've lived with are unearthed bones that are so "ripe" I can't stand to be near them.

One reason dogs bury their bones might again harken back to the primal food-related behaviors of carnivores: burying the uneaten portion of a carcass can serve to hide it from other predators and scavengers, and thus keep it for later.

My "dogs are omnivores" friend and I would get a good chuckle out of watching her dog hide his bones from the other dogs, then spend the rest of his time checking on his cache, deciding that it's not safe enough, digging up his freshly buried bone, and then burying it someplace else, only to go through the whole process again. At least it kept him occupied and engaged his considerable mental faculties in a harmless and species-appropriate way.

But still I wonder why dogs often don't dig up these bones until weeks later, when they're really quite rotten. My working theory is that this strategy is a useful, not to mention natural, way for dogs to replenish their gut microbes when needed. It might also be a way of making the various components of the bone (especially the mineral deposits and dense connective tissues) more available, just as the aging of meat makes it more tasty and tender — which is to say, more appetizing, digestible, and thus nutritious.

The interactions between bodies and the microbes that live on us and in us, and on/in our food, fascinate me. I think there's much more to be learned about these relationships, and the simple thing of a dog burying a bone might instruct us as well as any scientific study.

The spectrum of gut microbes is very different between herbivores and carnivores. (Omnivores fall somewhere in between.) That's because each bacterial species or strain has preferred food sources: substances that the microbe is best equipped or adapted to use as its own source of nutrition, or that provide nutrients which are essential for that particular microbe.

So, the gut microbes of an animal who primarily eats plants will be those that are best suited to breaking down plant material. And the gut microbes of an animal who primarily eats other animals will be those that are best suited to breaking down animal material.

As another neat efficiency of nature, the predominant microbes on or in a presently or formerly living thing are typically the very microbes best equipped to decompose it — or 'digest' it, if you like — to break it down into elements that can then be used to compose or recompose something else. This is the process that's going on in a compost pile, and in the gut.

So, it's possible that burying a bone and leaving it for days or weeks in the relatively anaerobic (low-oxygen) environment of the soil does two things of physiological value to the dog: (1) it speeds up the microbial breakdown of some otherwise quite indigestible components of the bone, thereby making the bone more digestible, and (2) it cultivates and thus concentrates the very

microbes needed to make good use of animal material in the relatively anaerobic environment of the gut. Now, that's clever.

Another natural and efficient way of obtaining more gut microbes is by eating the feces of another animal. I even toyed with making an entire section titled "Dogs eat poop."

But between burying bones and eating dog or cat poop, I much preferred that Miss Lilly ate unearthed bones, no matter how stinky they were. Eating the feces of other carnivores might be a natural, albeit occasional, behavior in dogs, but it disgusts me, and I just can't get past it.

I didn't mind her eating horse poop or goat poop; in fact, that was probably a useful, not to mention natural, way for her to get the sorts of gut microbes necessary to make good use of the plant material in her diet. (Carnivores will usually eat some or all of the gut contents of their prey, thereby getting both plant nutrients *and* the microbes needed to break down plant material into a more useable form.) But carnivore poop? Eww!!

I much rather she ate the green, slimy, stinky bones she loved so much, her "dog kimchi." Not only did her breath not smell of dog poop afterwards, but she was at far less risk of contracting a parasitic, bacterial, or viral infection from the "cultured" bones than from eating dog or cat poop. (Funnily enough, her stinky-bone breath didn't smell bad for very long after she'd eaten one of those bones.)

It's interesting to me that Miss Lilly never once showed any signs of digestive upset from having eaten her buried bones. In fact, it seemed to be a self-medication or health-maintenance strategy she used to prevent or treat minor digestive upsets, in much the same way I use probiotics or live-culture foods (raw sauerkraut, yoghurt, kefir, *etc.*): as-needed, just to set things right.

Miss Lilly buried only some of her bones; most of the time she ate them fresh. But when she did bury and later dig up and eat her stinky bones, I was glad

to see it, because it appeared to me that she was practicing a survival strategy which evidently has been used by carnivores with great success for eons.

but aren't bones unsafe?

A lot of people freak out at the very idea of letting a dog eat a bone. There are some legitimate concerns, particularly in dogs with bad teeth and those who tend to gorge on their food, so I have some simple guidelines for feeding bones, which I'll discuss in detail in a bit.

One of the most common concerns I hear is that raw bones are "covered in bacteria!" I've already discussed why that can be a good thing, and I'll discuss the issue of potentially harmful bacteria on raw meat in Chapter 4, so I'll let this issue lie for now — except to say that if it really bothers you, then rinse the bone well under running water or drop it in a pot of boiling water for 30 seconds before feeding it. (Be sure to let it cool first.) That's what I did with any suspect bones, especially poultry (*e.g.,* turkey necks).

Perhaps the bigger concern for most people is the potential for the dog to swallow a chunk or shard of bone that blocks or punctures the intestine. With due care, that risk is very low. I fed Miss Lilly raw bones at least twice a week for 15 years without any such problems. And I have yet to encounter this problem in any of my patients when bones are fed with care.

Do such problems occur? Yes; ask any small-animal vet. But do they occur with such frequency or consistency that we should never feed bones to dogs? No, not in my considered opinion.

Raw, meaty bones are the most species-appropriate way for dogs to meet their calcium needs, as well as the other benefits I discussed earlier. With due care, bones can safely be fed to most dogs. Exceptions include those with serious dental issues and those in a very weakened or debilitated state.

In fact, I've noticed that, as the dog's experience with bones increases, the risk decreases. And just as importantly (but admittedly more nebulously), as the dog transitions from a conventional dog-food diet to a fresh meat & veg diet

and the dog's vitality, "digestive power," and nutritional good sense increase, bones become even less risky to feed.

A third concern is the possibility that the dog will break a tooth. Yes, that can happen, too, as I've described. Dental fractures are most likely to occur in already-compromised teeth, such as those weakened by periodontal disease or metabolic disease that affects bone metabolism. (In my experience, high-grain diets contribute to both.) Thus, I advise avoidance or extra care when introducing bones to the diets of dogs with bad teeth.

On the one hand, regularly including raw, meaty bones in the dog's diet is a great preventive against periodontal disease, and even a good treatment for mild to moderate periodontal disease. The mechanical action of chewing on a raw, meaty bone and its connective tissue cleans away surface debris from the teeth and from the little moat of gum (the gingival sulcus) around the base of each tooth where periodontal disease begins.

Also, as I've mentioned, chewing stimulates saliva production, which further cleans the mouth, is antibacterial and anti-inflammatory, and contains growth factors that aid tissue repair and regeneration. Furthermore, biochemicals in the bone marrow and other soft-tissue components of a raw, meaty bone help clean the mouth, prevent bacterial overgrowth, and encourage tissue repair.

But on the other hand, dogs with dental pain are less inclined to eat bones, so the benefits are missed if the dog won't touch the bone. That's just as well, because dogs with severe periodontal disease, tooth-root infections, or decay may have teeth that are so compromised that they are at high risk for fracture either above or below the gum, which requires veterinary dental treatment.

In such cases, chewing the bone didn't as much *cause* a problem as *reveal* or *expose* a problem. Even so, I can understand why someone who has just spent several hundred dollars or more on dental treatment is reluctant to feed bones to their dog, even if bones may be one of the most useful, not to mention natural, dental prophylactics we have for dogs.

All that said, here is what I wish I had done, and what I will do the next time around. (As I write this, I am still in that strange, airless limbo of being dogless. Hopefully, my next dog is already on the way.)

feeding bones as a calcium source

Here are my revised guidelines for feeding bones as a calcium source.

1. Match the size of the bone to the size of the dog.

Select bones that are small enough for the dog to easily crunch up without damaging any teeth. Miss Lilly was a medium-sized dog, so I should have limited the range of bones to animals considerably smaller than her, such as chicken, other small poultry, and rabbit. Their bones were well within the loading capacity of her teeth, even in old age.

As I mentioned earlier, wild canids her size bring down or scavenge much larger prey. For example, coyotes can bring down an adult deer when hunting in a pack. And domestic dogs all too often kill sheep, goats, and larger livestock. However, the goal here is to meet the dog's calcium needs with bones that won't damage the teeth.

There are a few different elements to this, including the size and shape of the bone, the density or hardness of the bone, the breed of dog and the power of her jaws, the age of the dog, and the dog's eating behavior.

With long, narrow bones such as the 'long bones' of the limb (legs or wings) and the ribs, the *diameter* of the bone is important: if the bone is small enough to fit between the carnassial teeth,[1] but large enough to have a thick cortex of dense bone, then those teeth could be damaged, particularly if they are already compromised.

[1] As a reminder, the carnassial teeth are the pair of large, rugged teeth about halfway back in the dog's mouth. The pair consists of the upper fourth premolar and the lower first molar. (There is one pair on the left and another on the right.) These teeth act like shears to cut off chunks of meat and crush bones.

These long, narrow bones can also get wedged across the roof of the dog's mouth, just like what can happen when a dog bites down on a stick. That never happened with Miss Lilly, but any small-animal vet will have stories.

Feeding big bones that are too large for the dog to fit between the carnassial teeth, such as beef soup bones or ham hocks, may sound like a good solution. However, it can result in damage to the incisor and/or canine teeth as the dog does what she can with the bone. That is likely how Miss Lilly damaged her front teeth. She made concerted efforts with these large bones and ate considerable portions of them, to the eventual detriment of some incisors and a canine tooth.

One piece of advice I've read is to avoid weight-bearing bones (*i.e.,* bones of the limb) because they have a denser cortex than bones in the rest of the body, such as the wings in flightless birds (chickens, turkeys, *etc.*), the ribs, and the spine (neck, back, and tail). But while that may be generally true or true in principle, there are too many common exceptions — or perhaps they're better called inconsistencies or size mismatches — for it to be a reliable guide.

The types of animals used as food for humans, and thus available for our dogs, range from small birds weighing less than 1 pound (*e.g.,* quail, pigeon) to large mammals weighing close to 1 ton (*e.g.,* cattle, bison). In addition, slaughter age ranges from newborn to mature; bone size and density likewise varies, even for the same bone in the same species.

Fairly large dogs such as foxhounds have fractured teeth on beef ribs because the cortex of a rib from a mature cow or steer is too dense for that size dog. By the same token, a chicken wing may be too large for a pocket-size dog. There are no hard-and-fast rules, no formulas, that I think are reliable.

My simple rule-of-thumb is this: *if in doubt, don't feed it*. Err on the side of caution and feed whole bones that are considerably smaller than the dog can comfortably manage. Also avoid feeding cut bones because it's likely that, if whole, the bone would be too large and *too dense* for the dog.

Actually, rule-of-thumb is a serendipitous choice of words there, because the width of the bones in my thumb (the narrower part between the joints) is a good measure of the size of bone that was suitable for Miss Lilly. Any long, narrow bone that is much wider than my thumb would be getting a bit too dense for her size.

Following are the bones I fed that, in retrospect, were a good size for her.

I fed Miss Lilly raw chicken wings at least once a week, as I regularly made a pot of chicken stew for her and I always removed the wings at the elbow and fed them raw before putting the rest of the chicken in the pot (see recipe in Appendix A). That was our "chicken day" ritual, and she *loved* it!

In addition, I often bought a tray of chicken wings, drumsticks, or thighs and fed them raw as a meal (not all at once, just a few at a time). I'd also feed raw chicken feet whenever I could find them. They were a real treat, and very inexpensive. With one notable exception (see below), Miss Lilly didn't have any digestive upsets from eating bone-in, raw chicken. She absolutely loved these raw, meaty bones and always asked for more.

Early on, I was feeding raw chicken backs, but I stopped including them after Miss Lilly got a bad case of 'gastro' (gastroenteritis). Given how chickens are commercially slaughtered and processed, there is much greater potential for contamination with gut contents in the little nooks and crannies of the back than on the wings, legs, and even the feet. Once I excluded chicken backs, feeding raw chicken was never a problem again.

Note that I always fed chicken bones raw, with the skin and other soft tissues still attached. I never fed cooked chicken bones, unless they'd been crock-potted for days (well, not quite, but cooked until they were practically disintegrating, which usually took 18–24 hours.) More on that in a bit.

I did feed turkey necks and occasionally turkey backs, but turkey thighs and drumsticks, and even the upper part of the wing, were getting a bit too dense for her, particularly the Thanksgiving-size turkeys (where bigger is better).

These bones were sufficiently small in diameter that Miss Lilly could easily fit them between her carnassial teeth, but they were hard enough that they could have contributed to dental wear and eventual fracture.

Same goes for most lamb, pork, and deer bones. In relation to Miss Lilly's size, these other animals were probably a bit too big, mostly because their bones were a bit too dense in relation to the size of Miss Lilly's teeth and the power of her jaws. She likely had some Staffordshire (bull) terrier in her because she had very muscular jaws and very powerful jaw muscles — more powerful, perhaps, than her teeth could withstand over time.

That said, oxtail was a good size for her. Being a gourmet food item, oxtail was only sometimes available and usually quite expensive, so I fed it only occasionally. Although they are beef bones, they are small, cylindrical bones with lots of cartilage and fibrous tissue (the intervertebral discs) at each end, and a great ratio of meat-to-bone; and they are not particularly dense. Miss Lilly would often swallow the smaller ones whole; the larger ones she would easily crunch up after removing and eating the meat. They too were a hit!

Smaller poultry, such as quail and Cornish hen, were a perfect size as well; but being gourmet food items, they were usually way too expensive and not always in stock. Even so, because they were an ideal fit for Miss Lilly, I'd keep an eye out and stock up whenever they went on sale and cost not much more per pound than chicken. Like oxtail, they were a marvelous meal, whole, and straight out of the packet.

Miss Lilly loved to chase rabbits and other furry little creatures, so at one point I went looking for a good source of rabbit for her meals. Not only did I have trouble finding it in grocery stores and markets, but Miss Lilly didn't much care for the smell or taste of farmed rabbit, so I stopped buying it, even though it should have been a perfect food for her. I stopped short of buying her the frozen rats and mice that are sold to feed pet snakes. I have my limits!

The very best thing she ever ate (according to her) was a dead squirrel she found on the road during one of our walks. We had to abandon what was

going to be a long walk because she couldn't wait to get it home. It was the perfect food for a carnivore her size, and as soon as we got home she settled down on the grass and ate the entire thing — hair, nails, bones, teeth, and all — uncharacteristically growling a warning not to take her prize when I came a bit too close. That was the only time she ever growled at me, so evidently Goodyear squirrel is particularly good 'dog manna'.

While I tried to find as many different sources of fresh bone as I could, I ended up feeding bone-in chicken as the main calcium source in her later years. The only problem with that was the lack of variety, something I discuss at length in Chapter 3. I made sure to buy organic or pasture-raised chicken whenever I could, so at least it was a relatively healthy source of meat and bone, but I would have preferred to feed her more variety.

I did feed her bone-in fish a couple of times a week, such as canned sardines, kippers, and occasionally salmon. However, Miss Lilly would not have met her daily or weekly calcium needs from the occasional fish I fed her.

2. Mostly feed meaty bones.

In my experience, meaty bones are safer to feed than trimmed or bare bones, perhaps because any sharp pieces of bone are buffered by the muscle and other soft tissue the dog eats before or with the bone. Eating meat and bone together may also slow down the digestive process, enabling the dog to more thoroughly process the bony portion. As I discuss a little later, Miss Lilly did occasionally throw up some small pieces of bone. This never happened when I fed her meaty bones.

If you're a little freaked out by all this, bear in mind that the dog's digestive system is that of a carnivore. Dogs are designed to consume the soft tissues *and* bones of their prey.

Here is a case in point: we had a Lab friend who was a real chow-hound. She was a glutton and would eat just about anything offered. One day, while I was supposed to be taking care of her, she swallowed an entire beef shortrib whole. I nearly died! She, on the other hand, was perfectly fine.

3. Mostly feed bones raw.

Not only is eating raw meat and bones a species-appropriate activity, but eating raw bones may be safer than eating cooked bones. Cooking changes the structure of proteins, and bones are composed of mineral deposits on an intricate scaffold of proteins. Yes, raw bone can crack and break into sharp pieces when a dog bites down on it, just as a living bone can be fractured under sufficient force. However, raw bone fractures along fairly predictable planes; with cooked bone, all bets are off.

Particularly when cooked 'high and dry' (high heat, dry cooking method, such as grill or frying pan), cooked bone can become more dense and brittle as its protein structure shrinks and its water content decreases. In addition, cooking inactivates the enzymes in raw bone that may aid its digestion. However, cooking method and duration both matter.

Small bones that have been slow-cooked in liquid for many hours at low heat (*e.g.,* in a crock pot) may become so soft that they crumble when handled, posing less risk than feeding raw bones. But this approach doesn't work well for larger bones or even for the denser portions of small bones.

In fact, a common method of cleaning bones for use as anatomical specimens is to boil the bones until all of the flesh falls off or can easily be stripped away. The bone, as hard as ever, is then dried and mounted for display.

(Speaking of boiling bones, I want to say a few words about bone broth as a source of calcium for dogs on home-made diets. Although bone broth may be delicious and nutritious, its calcium content is inconsistent — other than being consistently *low*. Bone broth is not a reliable way of meeting the dog's calcium needs.)

I once slow-cooked an entire chicken in a crock pot until its bones were soft. Although most of the bones became crumbly and easy to break up, the joint ends of the long bones remained firm and thus a potential obstruction hazard. The stew, now really concentrated, smelled very savory, and Miss Lilly

practically inhaled it, so I know for sure that those bones did not get chewed. And as I discuss in Chapter 4, cooking meat for that long is not ideal.

When I did cook a meaty bone for any reason, such as to disinfect the surface or to make the meal more savory, I used a 'quick dip' approach: briefly scald or brown the outside of the meat, leaving the bone inside warmed but still essentially raw. Miss Lilly loved it!

4. Dogs throw up.

Very occasionally, Miss Lilly threw up some small chunks of bone. Typically, she did it when she'd overeaten bone or she'd eaten it too quickly because she was hungry or because another dog was nearby. So, when it happened I considered it my fault: I wasn't being responsible about when, where, and how much bone I fed her. She never did it twice in a row. In fact, I probably need only one hand to count on my fingers how often it happened in our 15 years together.

Vomiting is a common sign of illness in dogs, but it is also one of the normal mechanisms dogs use to keep their digestive systems healthy. Dogs throw up items that are irritating or otherwise potentially troublesome; they'll even vomit or regurgitate simply from overeating.

One way to distinguish between vomiting as a sign of illness and vomiting as a normal response to mechanical irritation is to see what happens next. Sick dogs still look sick after throwing up, whereas healthy dogs are back to normal within moments. They'll even go back to eating what they just threw up!

5. Keep some bone meal powder on hand.

There were times when I couldn't regularly feed Miss Lilly bones for some reason, such as when we were living in an apartment or staying with friends. During those times I'd add bone meal powder to her food to make sure she got enough calcium.

Being simply bone that is dried, crushed (turned into meal), and then pulverized, bone meal powder is the most species-appropriate source of calcium for dogs on home-made diets who don't get bones.

The basic or maintenance calcium requirements for adult dogs who are neither pregnant nor lactating (producing milk to nurse her puppies) are summarized in the table on page 70 according to the dog's weight. I gave Miss Lilly 1 rounded teaspoon of bone meal powder each day when she wasn't getting any bones. If I was making a week's worth of her food at a time, I'd multiply that by 7 and stir it all into the pot.

As with meat, the *quality* of the bone meal matters. I would always buy *human food-grade* bone meal powder from a natural grocery store or other responsible supplier who'd done their homework — not from a garden center, hardware store, or agricultural supplier. The quality of bone meal powder is only as good as its source, so choose a product that is approved for human consumption and that has been tested and is guaranteed to be low in lead, other heavy metals, and bacterial contaminants.

If using another source of calcium, such as microcrystalline hydroxyapatite (a purified or synthesized form of the mineral complexes found in bones and teeth) or a marine-source (seaweed) calcium supplement for humans, use the daily calcium requirement *in milligrams (mg)* for the dog's weight and give as much of the product as necessary to meet the dog's needs.

It's safe to round up or down a little, so don't drive yourself crazy trying to feed *exactly* the amount in the table. It is possible to feed too much calcium, but the greater "sin" may be to feed too little and risk calcium deficiency developing over time. It depends, in part, on what other sources of calcium are in the dog's diet.

Also bear in mind that the figures in this table are the basal or maintenance requirements for an adult dog who doesn't do very much — the "walking around" amounts. The daily calcium requirement increases a little with

activity level, so working and sporting dogs may benefit from a bit more than that listed for their weight in this table.

Incidentally, the dog's daily calcium requirement can be given all in the one meal or split into two meals if the dog is fed twice a day. I usually added it to just one of Miss Lilly's two meals per day unless I'd made a big pot of stew that lasted a week, in which case I mixed in the week's worth of calcium.

As for inorganic forms of calcium, such as calcium carbonate or ground limestone, stick with the organic — *i.e.*, biological — forms if you can, as calcium complexes made by another organism are generally better absorbed by your canine organism.

Egg shells are an exception. I'm not a fan, as the principal form of calcium in egg shells is calcium carbonate, which is not a particularly bioavailable form of calcium in mammals. Also, if the shells aren't ground to dust, their hard, crystalline structure can be irritating to the digestive tract.

dental chews and entertainment

For reasons I've already discussed, I won't use or recommend bones as dental chews or entertainment again. Dogs love 'em, and I can hear dogs everywhere sighing a disappointed *"Awww…,"* but what price the dog's dental comfort and function over time?

There are three different options that I like instead and which can be blended for a full range of benefits:

1. Dried 'soft tissues' (an anatomical term) that are sold as chews or treats, such as rawhide (which is skin), tendons and ligaments, ears, snouts, and "pizzle" (bull penis, also called a "bully stick").[1]

[1] Dried tails are also sold as dog chews or treats. It's important to bear in mind that the tail comprises *bone* as well as soft tissues (muscle, tendons, ligaments, *etc.*). That may not be a problem, as long as the size and *density* of the bone is appropriate for the size of the dog. This is particularly important with kangaroo tails, which contain weight-bearing bones.

These tissues don't include any bone but they contain enough collagen that, once dried, they are tough without being hard, so there is minimal risk of dental wear or breakage, unless the dog already has very diseased teeth.

2. Hooves and horns *(but not antlers).* Hooves and horns are composed of keratin, which is the same structural protein that comprises our fingernails and toenails. (Hair is also composed of keratin, and the outer layer of the skin is also rich in keratin.)

Although hooves and horns *feel* hard when they are dry, they are softened by moisture, such as water or saliva. They do not pose the same risk to healthy teeth as bones do.

Note that *antlers are composed of dense bone,* not keratin, so they are every bit as risky as bones when it comes to dental wear and breakage, perhaps even more so given their size and shape. Antlers also have very little odor, so they are not particularly appealing to many dogs.

An added value of hooves and horns is that they are hollow. They are the keratin sheath of the bones they encased in the living animal. They can therefore be filled with a tasty or smelly substance, such as peanut butter, cream cheese, or anchovy paste, to entice a reluctant dog to give them a try.

3. Large hunks of raw meat, such as a slab of beef heart or a whole lamb heart. Unlike most other organ meats, the heart contains enough connective tissue to make it a really good workout for the teeth and gums.

Many other muscles do the same, as long as the pieces are large enough. The more "sinew-y" cuts of meat (often sold as "stew meat" because it's so tough) are particularly good in this regard, and they're less expensive than the more choice cuts.

An added value of this approach is that muscle meat, whether it be heart or one of the 'skeletal' muscles (*i.e.,* ordinary muscle meat), is rich in taurine and carnitine. These two amino acids are often lacking in home-made diets

that skimp on meat. Deficiency of these nutrients is implicated in heart disease involving the heart muscle itself, including dilated cardiomyopathy (mentioned briefly at the end of Chapter 1).

Feeding large hunks of raw meat is perhaps my favorite dental strategy. In addition to being species-appropriate and nutritious (I could make a whole meal for Miss Lilly out of a deer heart), the connective tissues that run through the meat clean and exercise the teeth and gums.

When I'd fed all of the deer hearts I'd stored in the freezer during deer season, I'd order a box of whole beef hearts from the butcher. This was the least expensive way of buying heart, and of buying beef in general. However, I would have to buy at least 20 pounds (9 kilograms) — which was 4 or 5 whole beef hearts — at a time. I'd cut the hearts into large pieces, enough for a whole meal, and then store them in the freezer. (I was blessed to have access to a second freezer for all of my dog food.)

Many a time I watched with pleasure as Miss Lilly grabbed a slab of thawed heart with her canine teeth, pinned it to the ground with her front feet, and then got it between her carnassial teeth and used them as nature designed them: to shear off chunks of meat that are small enough to be swallowed whole. She got such delight and satisfaction from these meals — and talk about easy to prepare!

The carnivore thing again…

This chapter is really all about how I attempted to re-create or replicate the entire animal for Miss Lilly. It was not as difficult or as fraught as I might have made it sound (although admittedly I have a high threshold for blood and guts). It even became a bit of an adventure, sourcing various beasts and body parts, and getting to know the farmers and butchers (and a few hunters) who were helping me feed Miss Lilly.

Something I've noticed in recent years among a few of my holistic colleagues is an increasing aversion to using animal products in the diets of dogs and

even in those of cats. There is a small but growing movement away from using animals as food under any circumstances, and thus the promotion of all-vegetarian or all-vegan diets for dogs and cats. I discussed the matter of dogs as carnivores in Chapter 1, but it's worth revisiting here.

Ethically, I am sympathetic with the vegetarian/vegan pet-food movement; I wish nobody had to die in order for my dog to live. However, in our deep discomfort with carnivory, our sympathy lands squarely with the "hunted" (the food animal), sparing none for the "hunter" (the omnivore or carnivore). We are choosing sides where nature does not.

The system of carnivory on this planet is a completely natural part of life on Earth, and it is how life cycles, how life continues indefinitely. Life feeds itself as it feeds on itself.

Our dogs are the direct descendants of canids who are true carnivores. The handful of genetic studies comparing wolves with domestic dogs show that dogs have made some adaptations to human-selected and human-centric diets, but not many, and not enough for them to do well on diets more suited to humans than to dogs (*e.g.,* the typical commercial pet-foods).

I feel obligated to honor our dogs' shared genome by feeding a diet that hews as closely to their ancestral diet as I can manage under all of the constraints of modern life. This chapter describes how I went about it when feeding Miss Lilly, and how I currently understand it. That may change in time, with greater insight and wisdom. But what won't change (enough) in our lifetimes is the dog's genome, which is that of a carnivore.

Daily calcium requirements for the average adult dog

Body weight		Daily Ca requirement[1]	Bone meal powder[2]
10 lb	4.5 kg	400 mg	½ tsp
20 lb	9 kg	680 mg	1 tsp
30 lb	13.6 kg	920 mg	1 ¼ tsp
40 lb	18.1 kg	1,140 mg	1 ½ tsp
50 lb	22.7 kg	1,350 mg	1 ¾ tsp
60 lb	27.2 kg	1,550 mg	2 tsp
70 lb	31.7 kg	1,740 mg	2 ¼ tsp
80 lb	36.3 kg	1,920 mg	2 ½ tsp
90 lb	40.8 kg	2,100 mg	2 ¾ tsp
100 lb	45.4 kg	2,270 mg	3 tsp
120 lb	54.4 kg	2,600 mg	3 ¼ tsp
140 lb	63.5 kg	2,920 mg	3 ½ tsp

[1] Daily calcium (Ca) intake for maintenance, in milligrams (mg), for the average adult dog. From *Nutrient Requirements of Dogs and Cats,* National Research Council (NRC), 2006.

Note that it's not simply a matter of using X mg of calcium per pound (lb) or kilogram (kg) of body weight. Big dogs require relatively less calcium per pound or kilo than small dogs because the requirements are based on 'metabolic' weight (body weight, in kg, to the power of 0.75) rather than actual weight, so the calculation for calcium is 130 mg/($kg^{0.75}$).

[2] One level teaspoon (tsp) = approximately 2.7 grams (2,700 mg) of bone meal powder. Bone meal is only about 30% calcium, so 1 level tsp of bone meal powder contains approximately 810 mg of calcium (2,700 mg x 0.30 = 810 mg).

A 50-lb dog with a daily calcium requirement of 1,350 mg needs a little less than 2 tsp (1 rounded teaspoon would do) of bone meal powder per day if it is her primary or only source of calcium.

Fresh bone is only about 20% calcium, so to figure out how much fresh bone it takes to meet a dog's *weekly* calcium needs, multiply the daily calcium requirement by 7 and then multiply that number by 5 (as calcium makes up only about $1/5^{th}$ of the weight of a bone). For example, 1,350 mg/day x 7 days = 9,450 mg or 9.45 grams of calcium *per week;* multiplied by 5, that's 47.25 grams of fresh bone per week.

Summary

* carnivores eat pretty much the entire animal, so when I shopped for Miss Lilly, I bought as many different body parts as I could find: muscle, various organs, skin, and bones

* whenever I could, I fed poultry, fish, and other animal parts with the skin still on

* local farmers and hunters were a great source of fresh, local, and naturally-raised animal products which supplemented what I could usually find at the grocery store

* I fed fish (cooked) a couple of times a week to make sure Miss Lilly was getting enough of the essential omega-3 fatty acids that are appropriate for carnivores

* I fed meaty bones (raw) at least a couple of times a week to meet Miss Lilly's calcium needs, keep her teeth and gums healthy, and generally satisfy her carnivorous nature

* I never minded when Miss Lilly buried her bones, digging them up and eating them only once they were really stinky; in fact, she seemed the healthier for it

* next time around, I will do a better job of matching the size of the bone to the size of the dog, only feeding bones that are small enough to be crunched up without risking tooth damage

* dried 'soft tissues' (rawhide, tendons/ligaments, ears, *etc.*), hooves and horns, and large hunks of meat make great dental chews and entertainment for dogs without jobs

3. The more variety, the better

Variety is another essential element to how I fed Miss Lilly. Facultative carnivores typically eat a wide variety of foods. Wild canids primarily eat other animals — mostly other mammals, but also birds, reptiles, amphibians, fish, and insects. In addition, they eat eggs and some plant material (grass, seeds, nuts, berries, *etc.)*.

Although there is a certain "make do" aspect to some of these secondary food choices, there is a distinct survival advantage to even being *able* to make do with alternate food sources. If one's nutrient requirements are too strict or limited to only a few food sources, then an interruption in the supply of that food can be disastrous. So, the ability to use a wide variety of foods, both animal and vegetable, is a very smart strategy for facultative carnivores.

Fortunately for us dog owners, it also means we have a broad range of foods from which to draw when feeding our dogs. That makes shopping for our dogs less challenging and more economical, which makes it easier for us to meet all of our dogs' nutrient needs well.

Advantages of variety

The more variety there is in the diet, the easier it is for a body to meet all of its nutritional needs from food alone, which was my goal with Miss Lilly. When we eat a well-rounded diet consisting of a wide variety of species-appropriate foods, nutritional deficiencies and excesses are less likely to occur, so there is less need for supplements. That's biologically *and* financially advantageous.

Variety further helped me economize without short-changing Miss Lilly because buying a wide assortment of foods, some of which were very inexpensive, meant that I could more often afford to buy small amounts of the expensive items that would otherwise have been out of the question.

avoiding food sensitivities

There's another practical advantage to feeding lots of variety: it dilutes the effects of any "problem" foods. When feeding a dog who has multiple food allergies or an otherwise very sensitive digestive system, there are two basic strategies one can follow: (1) feed a very restricted diet and never deviate from it, or (2) feed a very diverse diet and never feed any one thing too much (neither too often nor in too great an amount).

The first option is the one most people choose; it's simple, and it completely avoids the "problem" foods, which seems like the obvious thing to do. But in my experience, you'll have far fewer problems, and far better success overall, with the second option. There'll be less risk of mishaps — such as the dog getting into the garbage or a well-meaning person giving the dog a forbidden food — because the dog's digestive system will become much more *tolerant* and *resilient* on the diverse diet. By all means, avoid the most problematic foods initially, but otherwise get as much variety into the diet as possible.

Miss Lilly arrived with a variety of food sensitivities (grains, lamb, pork, *etc.)* and she remained somewhat prone to digestive upsets, but after being on a fresh meat & veg diet for a couple of years, she could eat all of the previously forbidden foods, as long as I continued to feed them in moderation and as part of a diverse diet. I've seen the same thing over and over again with my patients as well.

even so ...

Even so, the diet must still be based on *species-appropriate foods.* It bears repeating that dogs are carnivores, and they do best when fed as such — which means that *animal materials are primary* and plant materials secondary.

Feeding dogs should not be about what we can get away with, but rather what are the best and the most species-appropriate foods we can provide, given all of the constraints under which we're operating, including quality, availability, storage space, time, and budget.

Feeding Miss Lilly

When I shopped for Miss Lilly and prepared meals for her, I had a few basic principles I followed in making sure she got as much variety in her diet as I could manage.

1. Many different beasts & body parts

I'd buy as many different animal-source foods as I could find, while still keeping within my budget. That meant buying as many different *species* of animals and as many different *parts* of the animal as I could — in other words, as many different beasts and body parts as possible.

Depending on what looked good and fit the budget that week, Miss Lilly's diet variously included:

- mammals — beef, lamb, deer (venison), pork, goat
- poultry — chicken, turkey, duck, quail, Cornish game hen
- fish — fresh or frozen white fish (cod, flounder, whiting, *etc.*), canned sardines, kippers, salmon
- eggs and dairy products (cheese, yoghurt, kefir, *etc.*)

Re: the mammals. Miss Lilly didn't like or do well on bison (buffalo) in one commercial raw dog-food we tried, so I didn't include it. Besides, given her size and presumptive breeds, the small to mid-size mammals were more appropriate for her. (If she'd had her way, squirrels would have been her primary food source.) The same goes for the large birds such as ostrich and emu — not to mention that those meats were prohibitively expensive!

Re: the poultry ...and speaking of cost, I included some very expensive choices in that list because I occasionally found quail or Cornish game hen on sale for not much more per pound than chicken. Those little birds were a great treat for Miss Lilly, because I could hand her the whole thing and let her crunch it up and eat it as she would a bird or small mammal she'd caught

herself. And such an easy meal to prepare (just open the bag)! So, it pays to keep an eye on even those items that ordinarily are out of the question.

Re: the fish. Miss Lilly *loved* canned fish: sardines, kippers, salmon, tuna; she loved them all. But I worried about the mercury and radiation levels in the large fish near the top of the food chain (tuna, swordfish, salmon, *etc.*) and about bisphenol A (BPA, a chemical with several toxic effects) in the plastic linings of many canned foods, including canned fish.

I kept a (BPA-free) can of sardines or kippers on hand for "emergencies," such as running out of Lilly-approved food before grocery day, and as a supplemental source of omega-3 fatty acids, but I was mindful that there's a trade-off to using these convenience foods. I also kept some white fish (*e.g.,* cod, flounder, whiting) in the freezer and cooked it "to order" when I wanted to feed Miss Lilly some fish.

As I discussed in Chapter 2, when I bought meat for Miss Lilly, I was not just looking for muscle meat but also for internal organs (hearts, livers, kidneys, gizzards, *etc.),* bones, skin — as many different parts of the animal as I could find. It's worth repeating that the more variety I kept in her diet, the better she did, and the fewer problems she had with foods she'd had trouble with in the past. When fed occasionally and in small amounts, she came to tolerate and really enjoy those previously off-limits foods.

The same goes for dairy products. Just a little, now and again, was well tolerated and much enjoyed. (Notice a pattern here? I was feeding for both physiological and psychological well-being. More on variety from a psychological perspective in a bit.)

variety in meals

When I first started home-making Miss Lilly's food, I was feeding the same meal (*e.g.,* chicken & veg) week in, week out, until she got tired of it. Then I'd switch to something else (*e.g.,* beef & veg) until she got tired of that. At least, that was my interpretation of her eventual refusal of what, up until that point, she'd been eating just fine.

It may have been that her needs changed in some small but significant way I hadn't appreciated. Or maybe, as I now see it, the single-animal-source feeding plan wasn't a completely satisfying diet to begin with, so it was never meeting all of her needs.

I wonder, too, if these things aren't just two sides of the same coin. While taste is an important determinant of our food preferences, I'm convinced — from paying more attention to *my* body as a result of my adventures with Miss Lilly — that taste preferences and nutritional needs are intertwined.

Anyway, one evening I went to a veterinary seminar on food therapy from a traditional Chinese medicine perspective, and I immediately made some changes. My head was swimming by the end of the presentation, but there were two ideas I took away that became very helpful in feeding Miss Lilly and advising other dog owners. One was the importance of variety for supporting all of the organs and functions of the body. The other is something I'll discuss in the next chapter on raw *vs.* cooked foods.

The very next day, I began a routine of trying to get as many different beasts and body parts into the pot as I could that week, as well as a wide assortment of veggies, beans,[1] hard-boiled eggs — anything I could think of or lay my hands on that looked good and fit the budget. The improvement in Miss Lilly's appetite and vitality was immediate. She loved her food and never tired of it — no doubt because it was never quite the same from one potful, or even one mouthful, to the next.

During that time I was really busy, so I was making up a week's worth of Miss Lilly's food at a time. I'd make up a big soup pot full of mixed meat and veggies once a week, usually on a weekend. Half went in the fridge, to be used first, and the other half went in the freezer for later in the week. I generally don't like to keep meat-based items in the fridge for longer than 4 days, even cooked, so this plan worked well for us.

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[1] I didn't feed her a lot of legumes, but in this phase of our life I often emptied a can of black beans into the pot when I was making up a week's worth of food for Miss Lilly. The beans were "diluted" by everything else in this "everything stew."

Still, I felt I could be doing a bit better for her. In particular, I wanted to be feeding more of her meat raw (which is something I'll discuss in the next chapter), and that didn't work so well with the "prairie in a pot" approach I'd been taking. So, I began making her meals fresh each day, as I was doing for myself.[1] I wasn't eating the same thing day in, day out, yet I was feeding my dog that way. It didn't make sense anymore, and I could no longer kid myself that I was doing the best I could for her.

What I did from that point forward was make something different for her every day or two, while keeping every meal very simple and easy to prepare.

In case you're feeling a bit nervous about making meals for your dog, I've included some of my tried-and-true, dog-approved "recipes" in the back of the book, along with some notes on the thought processes behind them. The notes are actually more important than the recipes, because once you understand the *why*, it's far easier to remember the *what* and play with the *how,* adapting the specifics to fit your particular circumstances.

As you'll see, not every meal is "nutritionally complete and balanced" — but neither are yours and mine. When we eat a well-rounded diet of fresh, wholesome foods, we get all we need over the course of the day or the week, rather than with every amorphous mouthful of pre-programmed glop.

In animal nutrition, the daily nutrient requirements are generally derived from experimentally creating gross deficiencies or excesses of single nutrients and then seeing what happens to a group of animals thus fed. The results are then used to calculate approximately how much per day of the nutrient it takes to prevent signs of deficiency or excess in the average animal of that species, body weight, life stage, and activity level.

However, these detailed tables lead us to believe that we must take in the precise amount of each nutrient every day, when in reality the body has

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[1] I like to cook, but mostly because I love to *eat.* And I love to have control over what goes into my meals. I cook for the pleasure of the meal, rather than for the pleasure of cooking. Most of my meals are quite simple and easy to prepare.

a variety of mechanisms for harvesting nutrients from our food according to present needs and for storing nutrients that are not immediately needed.

The "eating by numbers" approach to food has its place, but it's also a sad commentary on how far we've drifted from our innate ability to take good care of ourselves and our animals, and how much we've come to rely on Science to tell us what to eat and otherwise how to live.

Anyway, instead of feeding several different meats at a time, I began to feed a different beast or body part every day, or every couple of days if there were leftovers. That way, Miss Lilly got lots of variety over the course of the week, and I could feed her meat either raw or cooked.

I still like and recommend the "prairie in a pot" approach for those who are too busy to be making something different every day or who have multiple dogs to feed, and for those whose dogs can't tolerate raw food. It's still a good way of getting lots of variety, of beasts and body parts, into the dog's diet.

Although I must say that, looking back at all the ways and things I tried over the years, Miss Lilly did the best and enjoyed her food the most when I made her meals fresh each day, as I still do for myself. I suspect it's because I was better able to notice and respond to small changes in her needs when I paid this sort of attention to food choices, both when shopping and preparing meals for her.

To see Miss Lilly looking so well in her senior years and enjoying her life so much was worth the effort. In fact, I'm so convinced this approach was the healthiest I could take for her that I didn't begrudge the time or the expense. I had long ago decided that I'd rather spend the time and money on good food than spend it on medical treatment, trying to treat something that (a) might have been prevented and (b) is an increasingly uphill battle in an aging body. The emotional toll of learning that your beloved animal has a degenerative illness is also something to be factored in.

When I first started feeding Miss Lilly a fresh meat & veg diet, I decided to make her my "guinea pig" and test my hypothesis that eating this way would keep her both healthier and alive for longer than if she'd been on a conventional dog-food diet. Although I have no way of knowing what her lifespan would have been under someone else's care or even under my care but on a conventional diet, I do know that her health and vitality were consistently poor on the conventional dog-foods and dramatically better within days of starting on a fresh meat & veg diet. And that was when she was a young dog!

One last comment about my part in all this: I used to think that I was too busy to feed her this way (fresh meals every day). But the truth is that I just wasn't willing to make eating well — for my dog or for myself — the priority it needs to be if we're to stay healthy for life.

It seems ridiculous now that I felt I was too busy to feed myself properly. How on earth did I think I could keep that up?!

The simple answer is that I wasn't thinking; at least, not beyond the next hurried meal and all the "important" things on the perpetual To-Do list.

2. Lots of colorful veggies

The same principle of including lots of variety also applied to the plant portion of Miss Lilly's diet. I mostly stuck with the leafy greens (spinach, cabbages, kale, chard, bok choy, beet greens, *etc.),* carrots, broccoli, bell peppers (capsicums to us Aussies), zucchini, and other high-fiber, low-starch veggies with lots of color.[1]

I also tried to go with what was in season locally. Not only does it add to the variety quotient and help keep us in tune with the seasons, but in-season food is the freshest, and it's generally the least expensive as well.

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[1] As a broad brushstroke, color = antioxidant potency in fruits and vegetables. "Eat the rainbow" is good advice for humans; so, too, when preparing meals for dogs. That means using a variety of red, orange, yellow, green, and blue/purple veggies.

I occasionally fed her a meal that included legumes (peas, beans, lentils, *etc.)* but legumes didn't form a large part of her diet. Oily seeds such as sesame and sunflower seeds are mostly lost on dogs, as they don't chew their food very much, but sometimes I'd make a meal for myself that included these seeds and that also served as the veggie portion of her meal that night.

When whole, raw seeds have a fibrous or waxy coating that protects the germinal portion inside. (Seeds are the next generation of the plant, so they are well protected.) For the seed to be of nutritional value to an animal or human, the coating must be broken open in some way, such as by chewing, cooking, or grinding. The same goes for raw nuts (most of which are actually seeds, peanuts being a notable exception).

I use tahini (ground sesame seed paste) and nut butters myself, but although Miss Lilly liked them, they were a bit too expensive, for too little nutritional gain, for me to use them in her diet as I do in mine.

Miss Lilly didn't care for fruit, although she'd occasionally eat a dried fig, but she did like nuts. In fact, I couldn't eat nuts without her wanting some, so we had a little ritual where we'd share a handful of nuts a couple of times a week. (I eat nuts more often, but I wouldn't always share them with Miss Lilly.) Given her carnivore's dental architecture and eating habits, she didn't make good use of nuts, so nuts were more of a treat, a *social* ritual, for her than a dietary component. More on the value of treats in a bit.

"meating up" the veg

Miss Lilly was a true carnivore. She loved meat and didn't care for veggies, so if I expected her to eat them, I'd have to "meat up" her veggies, like the mothers of little kids may need to hide the broccoli in the pizza sauce.

Why did I bother? The point of including veggies and other plant-source foods in Miss Lilly's diet — when she wasn't inclined to eat most of them — was that they are an excellent source of highly bioavailable vitamins, minerals (both major and trace minerals), fiber, essential fatty acids, antioxidants,

beneficial microbes, and cofactors we may not yet know about. These "minor" nutrients can make the difference between health and disease.

Plants are also an excellent source of structured water. 'Living water' is the concept that sprang to mind as I read *Cells, Gels and the Engines of Life*.[1] This vital component is lacking in dry pet-foods (kibbles) and dehydrated meals (*e.g.,* freeze-dried foods).

Were she to be catching her own food and eating the entire animal, Miss Lilly would have been getting all of these nutrients from her prey (which would have gotten them from its plant-based diet). But as her opportunities to hunt in order to feed herself were necessarily limited, it was up to me to provide those nutrients the best I could.

There were a couple of ways I'd meat-up her veggies. The first was by steaming the veggies until they were just fork-tender (more on that in the next chapter), allowing them to cool a bit, and then mixing in the raw meat (usually ground or minced) and any other flavorings I may have been using. (More on seasonings in a moment.)

If I was feeding her fish or other meat that I wanted to cook, I'd lightly steam the veggies and the fish together, to flavor the veggies with the fish. (It was always a hit!) Or I'd sauté the meat first and then throw the veggies in to lightly cook in the meat juices.

The second was to whizz up the veggies (frozen, raw, or cooked) in a blender or food processor, and then mix them well with the meat. This method got around the problem some dogs (*a-hem!*) have with the texture of certain veggies when they're left in sizeable pieces.

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[1] *Cells, Gels and the Engines of Life — a new, unifying approach to cell function* is a book by Gerald H. Pollack PhD, a professor of biomedical engineering at the University of Washington. His biography states: "We study water. Our recent discoveries have shown that water has four phases, not three. … We are exploring the role of the fourth phase [the gel phase, or structured water] in all of nature, particularly in human health." [engr.washington.edu/facultyfinder/gerald-h-pollack]

According to Miss Lilly, green peas, carrots, broccoli, bell peppers, and various other textured veggies are all poisonous to dogs. I'm pretty sure they're not, but I grew tired of stepping on them when I went into the kitchen. If I didn't flavor them well or atomize them somehow, she assiduously spat them out onto the floor or left them pointedly in her bowl. ("Dogs are omnivores"? Not this one!)

I did my best to listen to her body's needs via her food preferences, but I also know that she was the healthiest and happiest when I supplemented the meat portion of her diet with a variety of veggies. Every time I got lazy about her meals — which generally meant leaving out the veggies — her health and vitality declined. I also noticed an uptick in aggression toward other dogs when her diet was almost all meat.

brain health

I mentioned in the Introduction that Miss Lilly began showing some early signs of cognitive dysfunction (the canine equivalent of Alzheimer's disease) in her early 'teens. The most striking (and wearing!) symptom was anxiety at night. Being consistent about feeding veggies every day — *i.e.* making sure I stuck with the 60:40 meat–veg ratio she'd done so well on — helped.

The years during and after the global economy collapsed in 2008 were very stressful for us, and we had to move house a number of times. Miss Lilly's behavioral problems began not long after we'd made our eighth move in two years. Evidently, I'd finally exceeded her ability to cope. (Mine, too, as it happens.) One of the consequences of all the stress and busyness of moving, setting up a new home, and starting over in a new place was that I got slack about her diet. It's so much easier to give her a hunk of meat or a tub of chicken livers than to prepare a meal of meat & veg.

So, in addition to buying some night-lights, making sure she was active during the day, and feeding more fish oil, I made sure I was feeding a good assortment of colorful veggies every day. The improvement was immediate — in part because we were both finally able to get a good night's sleep, but

also because she was getting more antioxidants and anti-inflammatory nutrients in her food.

The structural and functional changes associated with canine cognitive dysfunction (CCD) and Alzheimer's disease are complex, and there is still no consensus on some aspects. As a broad overview, they may best be described as the brain's unique way of responding to chronic inflammation and oxidative stress. Over time, the chronic neuroinflammation results in neurodegeneration, which in our present understanding is irreversible.

But early in the course of disease, addressing the inflammation and oxidative stress can slow and even halt progression, and facilitate whatever repair the aging brain is still capable of achieving. The signs of CCD are encapsulated in the acronym DISHAA: Disorientation / social Interactions / Sleep–wake cycles / House soiling, learning, and memory / Activity / Anxiety. Miss Lilly showed a few of these signs, but they progressed very slowly, if at all; and she developed none of the others.

I also think that the veggie portion of her diet helped by keeping her gut healthy. Disorder in the gut's microbial population is implicated in a wide variety of chronic inflammatory and degenerative diseases in humans and animals, including various neurodegenerative disorders. Miss Lilly was well adapted to a diverse and fresh meat & veg diet, so suddenly making a big change, such as leaving out the veggies, would inevitably change her gut microbes — and evidently not for the better.

The association between veggies and health was always both direct and immediate with Miss Lilly. So, lesson learned — again! Even though they were the lesser part, veggies were an *essential* part of a healthy diet for Miss Lilly. Fresh, colorful, and diverse complements to the meat portion.

3. A variety of sources

When shopping for Miss Lilly, I tried to buy foods from a wide variety of producers and even from a variety of areas, although primarily from within the US and locally or regionally grown as much as possible.

Local is best when it's of good quality, but not all locally produced food is good. Shopping wisely still takes careful scrutiny of how the food was grown. Being a strict "locavore" can also limit what's available for much of the year.

On the one hand, the less time, fuel, and money it takes to get food from the farm to my kitchen, the better for all. And usually, local foods are the freshest, which has a big impact on their nutritional value.

But on the other hand, buying foods from several different areas ensures that local or regional soil deficiencies or defective farming practices have less of an impact on our overall diet. The topsoils in my area were deficient in several essential minerals (major and trace minerals), so it took some diligent soil management to grow really great food there.

Because I wouldn't get to know the producers of most of the food I bought, I hedged my bets and bought some foods from outside the area in addition to local foods.

Another consideration for me was whether to support local agriculture exclusively or also support small farms and farmers elsewhere. I opted for a mix of both.

4. A variety of seasonings

In addition to lots of different meats and veggies, I used culinary herbs, spices, and other seasonings (*e.g.,* vinegars, soy sauce, ketchup, salt, pepper) when feeding Miss Lilly. I mostly used them for flavor, but it's worth noting that most of the herbs and spices we use in cooking have some medicinal properties that make them useful in helping to preserve good health.

Typically, their use in the *treatment* of disease requires much higher doses than we find palatable in our meals, but in the amounts we most often use for flavor or color, they might have some *preventive* value when eaten regularly. The more scientists research the components of traditional diets (*e.g.,* Mediterranean and Indian cuisines), the more preventive health benefits

they're finding (*e.g.,* lycopene in tomatoes, antioxidant and anti-inflammatory pigments in turmeric).

It's been said that we eat with our eyes. I'm more inclined to say that we eat with our tongues, and our noses have a lot to say about it, too. First and foremost, I want to eat what smells and tastes good. From what I've observed, dogs do the same.

Of course, we can only surmise what dogs find appetizing, from observing what they prefer to eat. What I observed of Miss Lilly is that she loved many of the same flavors I do (Italian, Indian, Mexican, Chinese, *etc.).* She even loved the hot curries and condiments my Indian friends made that were too hot for me. She'd lick the bowl clean and ask for more of those hot, hot curries with the wicked little green chillis. Remarkable!

She didn't "eat anything" as some food-crazy dogs do, and as proponents of the "dogs are omnivores" view would have us believe. There are certain foods that I love and she hated. (And *vice versa,* I must say!)

As for those dogs who will eat anything, every one I've known and observed up close has been on a commercial dog-food diet, typically a dry-food diet, and they go nuts when presented with real food instead of the amorphous vomitus of some machine that was programmed by a nutritionist in a lab coat who wouldn't dream of eating that way himself! But I digress…

I used various seasonings when I prepared food for Miss Lilly because she appeared to really enjoy those flavors. This enabled me to get her to eat plant foods for their nutritional benefit that she would not have chosen to eat otherwise. Sneaky perhaps, but it worked.

As I couldn't provide the whole prey for her, I got as close as I could and supplemented her diet with other whole-food sources of nutrients. Using seasonings helped me do that and provide meals that left the bowl licked clean every time.

5. The occasional treat

I believe in treats — but not as training aids or as rewards of any kind; just as some occasional, enjoyable thing. I treat myself (probably a little too often if truth be told) and I enjoyed giving Miss Lilly treats. But I also believe that if it's given every day, then it's not a treat; it's part of the dog's diet, and as such it should serve the dog's health, not work against it.

My preference with dog treats is a tasty food that is generally conducive to good health. Jerky is one such food, as long as it's 100% meat, it contains no artificial preservatives, and the meat came from a wholesome, reliable source. (For example, I avoid dog treats that come from China.)

But I don't prohibit treats that are not all that healthy. Miss Lilly *loved* it when she got a dog cookie from the drive-through teller at the bank, from the UPS driver, or from her friend Uncle Walter. There's something really wonderful about getting a treat just for being a dog.

Once she became healthy on her fresh-food diet, she could tolerate those occasional unhealthy foods. I would always rather she got a wholesome treat, but my philosophy on treats is this: *Good for the soul, if not for the body, and that's important, too.*

And, dare I admit it, Miss Lilly also loved chocolate. I love chocolate, so I eat it often and I shared it with Miss Lilly. She got the smaller share, but mostly because I'm a chocolate hog.

Chocolate toxicity is well documented in dogs, but Miss Lilly was living proof that not all dogs are highly susceptible.[1] Some dogs have trouble with chocolate in any amount, even very small quantities, but that's not true of all dogs. Miss Lilly probably ate her weight in chocolate over the years. Even so, chocolate is best consumed in moderation (even by humans ☹).

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[1] Miss Lilly became known as The Dog Who Ate Christmas when she ate an entire block of Belgian dark chocolate I'd been given by my sister for Christmas one year. She was a little "wired" for the next several hours, but otherwise she was fine.

6. Keep mealtimes interesting

Variety is also important from a psychological perspective. Imagine eating the same thing day in, day out, week in, week out, year in, year out, for your entire life. You'd quickly learn what to expect at mealtimes, which makes life a bit more predictable; but how mind-numbingly boring! And yet that's how most dogs are fed. It's no wonder that Miss Lilly's dog friends went crazy for even a little bit of her food.

There certainly is a lot of variety in the lives of wild canids. One might say that there's a little too much, at least from the armchair-view of our relatively safe, comfortable lives.

But I wonder what our dogs would say about that if we asked them?

Which would you prefer: (a) a life in which all of your physical needs are met, even before you really need them, that is safer and more predictable than those of your wild counterparts, and likely longer, too, but also vastly less interesting; or (b) the shorter, less predictable, more arduous, more dangerous, but infinitely more interesting life of wild canids?

The answer, I suspect, would be (c): something in between.

One of the keys to keeping Miss Lilly healthy and happy — and, in my view, one of my responsibilities as her caretaker and companion — was to keep life *interesting*. When it came to food and feeding, there are several things I did:

(i) Vary feeding times. I didn't do this on purpose; it was simply that our rather flexible daily routine serendipitously ended up serving this purpose. I fed Miss Lilly twice a day, but not at exactly the same time each day.

Breakfast was usually within an hour of us getting up, but on a weekend it may not have been until mid-morning. Dinner was usually sometime between 5 and 7 pm, but some days it was as early as 4 pm and occasionally as late as 8 pm. Both meals always arrived; just not on the dot of anything.

Miss Lilly's digestive system rolled along beautifully when I fed her at *generally* the same times of day. (Same goes for me.) But it made things easier on me, and it kept things a bit more interesting for her, that I didn't feed her strictly by the clock.

Dogs who are fed at exactly the same time each day do enjoy a certain buildup in anticipation that Miss Lilly didn't get to experience. There's something to be said for enjoyable anticipation as a means of keeping life interesting. So, if you simply must keep your dog's feeding times rigid, don't worry. Chances are, your dog is OK with that; and there are other things you can do to make mealtimes more interesting.

(ii) Vary feeding places. This strategy too was more of a happy accident than a deliberate move to keep things interesting. Miss Lilly's food bowl sat in its standard location in the kitchen, and I usually fed her there. But at least a couple of times a week I fed her outside on the grass or on the back deck.

I did it so that she didn't make a mess in the house with a bone or a large chunk of meat, such as a whole deer heart. (She always liked to pin such foods to the floor to eat them.) But feeding those messy things outside was serving double duty by making her mealtimes more interesting.

That said, when Miss Lilly had to contend with competition from other dogs at mealtimes, I took the necessary steps to avoid competition when feeding her outside. Dog fights are a bit *too* "interesting" for me!

(iii) Vary feeding methods. This, too, was taken care of in the way I fed Miss Lilly. Her food was never quite the same from one meal to the next (unless she was eating leftovers). Most of the time her meal was a mix of meat and veggies, but sometimes it was a large meaty bone or a big chunk of meat, such as a slab of beef heart or a whole deer spleen.

As for the meat that I mixed with the veggies, I often used ground or minced meat because it was so easy to mix in with the veg. But I also liked to buy the meat in chunks (*e.g.*, stew meat) or I'd cut up larger pieces of meat into

chunks myself. No doubt because of the way carnivores eat, feeding the meat portion of her meal as chunks seemed to be more satisfying to Miss Lilly than feeding it all ground or minced. So, not only did the *content* of her meals vary, but so did the *texture* and the *size* of the food particles.

(iv) Vary meal sizes. I didn't always feed the same amount at each meal. Routinely, breakfast for Miss Lilly was the smaller of her two daily meals, but not always. And even though dinner was typically the larger of the two meals she got each day, it wasn't the same size each evening.

Depending on what she'd been eating over the past couple of days, and on her weight and recent activity, dinner might be smaller or larger than usual. Or it might be lighter or heavier in density and fat content from one day to the next, based on her current needs. It wasn't always the same; in fact, Miss Lilly seldom ate exactly the same thing twice. (It's not as much of a chore as you may be thinking. Feeding Miss Lilly was simple and easy.)

(v) Include some "hunting" for food. Exercising the dog's natural drive to hunt for food is another way of making meals more interesting. I knew a veterinary behaviorist who advised hiding the dog's food or spreading the meal out over several locations and having the dog find the food.

I never needed to do that with Miss Lilly because she already played that game when she buried her bones and when I left her partially eaten bones in the yard for her to come back to the next day. It seemed to be a delightful surprise when she found some food she'd forgotten about. I was always amazed when she trotted back around the house with a bone she'd buried days or weeks ago... I finally concluded that she hadn't forgotten where she'd put them at all; she was simply waiting until they were "ripe."

I would also let Miss Lilly go hunting in the woods, in meadows, and along creek banks wherever it was safe to let her off-leash. I felt bad for the little creatures she bothered in the process, but she only occasionally caught anyone, and it wasn't me who came up with the whole predator-prey dynamic; it's something I learned to accept as part of nature's wisdom.

By repeatedly suppressing the dog's natural prey drive, through lack of opportunity or by reprimand, we may be encouraging a variety of unhealthy or unwanted behaviors. It may be better to allow the dog to act as naturally as possible under the circumstances, given all the constraints of modern life, including neighbors, livestock, cats, and leash laws.

(vi) Allow some "scavenging" for food as well. Dogs are both hunters and scavengers, in roughly equal measure. I saw this scavenger behavior in Miss Lilly manifested in several ways. Even when she'd just had a big meal of her own, the cats' bowls at our friends' place were never quite empty enough for her, and any other dog's bowl was always worth inspecting, just in case. Plus, when we were out on walks, anything remotely resembling food was like manna to her.

Although it may not be good for her, I let Miss Lilly eat any discarded human food she found on our walks (*e.g.*, hamburger buns, French fries, milk shakes, potato chips). I also let her eat or bring home roadkill and other dead animals she found along the way. She was not once made ill by such foods, and those finds were such a source of delight for her that I took to saying when this topic came up, *it's good for the soul, if not for the body, and that's important, too.* Food should be nourishing to every aspect of being; not merely the physical.

(vii) Be unpredictable about treats. I do not use food as a reward; not in any species. Food is food and praise is praise, and I don't think it's wise to confuse the two. I much prefer a reward to be a loving pat, a hug, a light massage or brush, or even just verbal praise. I often shared my snacks and even some of my meals with Miss Lilly, but not as a reward for anything.

What I suggest to people who are incorrigible treat-givers is to mix things up a bit. Give a variety of different treats (preferably all healthy foods, such as jerky or dried organ meats) and be unpredictable as to where and when you give the dog a treat. If you're using treats as a training aid, be consistent in rewarding good behavior; but otherwise, be unpredictable. In other words, be interesting beyond merely being good for a tasty handout.

I freely admit that I'm not above buying a dog's affection with food. I loved it that dogs loved it in my kitchen and would practically break in to gain entry.[1] I loved the "everyone over to Lilly's place; she's got the best food!" But the way I preferred to buy their affection was by making meals of fresh, tasty food. Whole meals; not just treats. There weren't always dog treats in my house, but there was always good food to share at mealtimes.

(viii) Use culinary herbs and spices. As I mentioned earlier, Miss Lilly enjoyed her food much more when I seasoned it with herbs and spices as I do my own food. So, for added interest as well as for expanded variety, I sometimes fed the same type of meat (*e.g.*, ground or minced beef) for a couple of days in a row, but with different veggies and seasonings each time.

(ix) Add in the occasional fast. I'm not an advocate of fasting for any sort of nebulous principle such as "cleansing" or "detoxifying." I don't see the value of fasting for that purpose when the basic diet is wholesome and the dog hasn't been overeating. Fasting should not be necessary for the purpose of flushing, cleansing, or detoxifying a system that naturally performs those functions all on its own when fed properly.

But because we don't always get it right, the occasional short fast can be worthwhile. My general rule is to skip no more than one meal, no more than once a week.

My preference is to do it on a weekend, when everyone's schedules are more relaxed. Miss Lilly could easily skip breakfast on a Sunday without missing it. Breakfasts were always fairly light anyway, so coupled with a lie-in or a morning outside doing yard work, she didn't seem to miss breakfast at all. Neither do I.

One last thing about fasting: Miss Lilly fasted herself more often than I imposed it on her. She'd sometimes leave her breakfast and occasionally her dinner. I took it to mean that her digestive system needed a short break.

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[1] I blogged about this in 2010. See Appendix B, *Blogging Miss Lilly*.

In this regard, fasting is a normal, natural response to something she ate the previous meal or the day before that didn't agree with her or was too much for her. It's a physiological righting mechanism, rather than a pathological response, so I just took note of what led to it and tried not to do that again.

***

Variety and simplicity

Variety is much more than the spice of life; it's one of the keys to good health. Feeding a varied diet can seem overwhelmingly complicated at first. But at its core, it's really very simple: feed mostly meats (a variety of beasts and body parts) and lesser amounts of veggies. The veggie options are practically endless; just avoid the starchy ones such as potatoes and sweet potatoes, and go easy on the legumes. Oh, and be sure to provide a supplemental source of calcium, such as bones or bone meal powder, as I discussed in Chapter 2.

Summary

* the more variety, the better

* when shopping for Miss Lilly, I'd buy as many different beasts and body parts as I could manage

* I also used lots of colorful veggies, as well as some seeds and nuts

* but animals were primary and plants were secondary in her diet

* "prairie in a pot" (making up a big pot of different beasts, body parts, eggs, and veggies) served us well when time was limited

* later, I did my best to vary her meals each day, as I do for myself

* I fed a different beast or body part each day (or every couple of days with leftovers), with a mix of veggies and seasonings

* I extended the variety factor into *how* I fed and otherwise cared for Miss Lilly each day so that her life was more interesting

4. Carnivores eat their prey raw

This aspect is a tough one for many people, and even for some dogs, as I'll explain in a bit. Feeding raw meat runs counter to how most of us eat and prepare our food. But consider how wild canids eat meat: sometimes it's freshly killed, and sometimes it's days or weeks old. Even when it's fresh, they eat it on the ground, where it gets coated with soil and contaminated with gut contents; and they generally eat part or all of the bacteria-laden digestive tract as well.

That's the first thing to bear in mind: our dogs are *dogs,* not small humans. Carnivores are well adapted to eating foods that have high bacterial loads. The ecological niche they occupy is complemented by a digestive anatomy and physiology which allows them to cope with bacterial loads on/in their food that would likely make us sick.

Even so, dogs can be made sick by excessive numbers of "good" bacteria (microbial species that are adapted to living in the gut and that benefit the dog), just as they can by microbial species that don't belong inside the dog. They can also be made sick by even *normal* numbers of good bacteria if the dog's system is already disordered, especially if the normal 'gate-keeper' function of the gut barrier is compromised (*i.e.,* a leaky gut).

And that's the second thing: in sourcing and preparing food for our dogs, we cannot afford to have too casual an attitude toward bacteria on/in their food. Miss Lilly taught me that even healthy dogs have their limits. This chapter is really about eating well within those limits.

Despite the chapter's title, when it comes to the raw *vs.* cooked debate, I'm somewhere in the middle. Miss Lilly was on what I call a "mostly raw" diet. I did cook some of her food — some components (particularly the veggies) and sometimes entire meals (including the meat) — for reasons I'll explain as we go along.

There are two distinct aspects to the choice between raw and cooked food for dogs that I want to discuss in this chapter: (1) how cooking changes food (and how that's not necessarily a bad thing), and (2) how to ensure that the bacteria on/in raw food, particularly raw meat, don't cause problems.

Cooking changes food — but is that a bad thing?

Cooking changes food both physically and chemically. In fact, that's the point of it, along with warming the food and destroying bacteria on/in it. But cooking has variable effects on food, depending on the type of food and the cooking method, temperature, and time. Still, when it comes to feeding dogs, we can make some generalizations about cooking.

veggies

Lightly cooking veggies, such as steaming them in a small amount of water just to the point of fork-tenderness, generally improves their digestibility and thus their *nutrient availability* for dogs. One of the things I learned from the food therapy seminar I mentioned in Chapter 3, and one of the best things I've heard in a long time about canine nutrition, is this:

"Eat a carrot, poop a carrot."

That hilariously states how dogs process raw carrots and other firm or fibrous raw veggies: the carrot comes out looking much the same as it did going in! Dogs don't chew their food more than a couple of times (if that!) before swallowing it, so they're pretty much skipping the first step in getting the most nutritional value from a vegetable. In addition, their rapid gut-transit (flow-through) time, along with their digestive enzymes and gut microbial spectrum, limit how much they can get from veggies without a little help.

Herbivores and omnivores have the dental and eating patterns, enzymes, gut capacity, transit time, and microbial spectrum needed to make good use of raw plant material, but dogs do not. Cooking improves the nutritional value

of most veggies for dogs simply by breaking down some of the fibrous bonds that trap vitamins, minerals, and other nutrients within the plant's structure.

So, when using plants *nutritionally* in a dog's diet, and not just as filler, we have to ensure that the dog can make the best possible use of them. Here, cooking helps.

However, it's worth noting that *overcooking* does the opposite. Minerals are not damaged by cooking; in fact, cooking may make plant-source minerals more available to the dog. But some vitamins and other 'labile' (fragile) nutrients are heat-sensitive, so veggies are best cooked only to the point of tenderness. Discarding the cooking liquid (*e.g.,* draining the water from the veggies into the sink) is another way that nutrients, including minerals, can be lost, so save and feed the cooking liquid.

Whizzing up raw or frozen veggies in a blender or food processor is an alternate way of doing the dog's chewing for her. It also has the advantage of preserving the heat-sensitive nutrients. But unless the particles are made very small, these methods may not be quite as good as light cooking, as far as maximizing nutrient availability for dogs. Also, there is greater potential for gas production (flatulence) with raw veggies, particularly those in the Cabbage or *Brassica* family (cabbage, broccoli, cauliflower, *etc.).*

grains & legumes

As I discussed in Chapter 1, I'm not a fan of feeding grains and legumes to dogs in any great quantity. When they are being used, they should be thoroughly cooked to make them more digestible and less of a problem.

Sprouted or fermented grains and legumes may be less problematic, but they should probably still be fed cooked. I once put myself on a raw-food diet for almost a year, during which I shared some items with Miss Lilly and our dog friends, including sprouted-grain crackers. In my experience, the purported benefits of sprouted raw seeds (grains, legumes, oil seeds, *etc.*) are largely lost on dogs for the same reason that veggies aren't very well used by dogs unless cooked or practically vaporized in some sort of food processor.

I can report that small amounts of sprouted raw seeds seem to be handled OK by dogs. But these foods just aren't species-appropriate for a carnivore, so I don't advise feeding much of them in any form, raw or cooked. There are better ways of getting calories, protein, and other nutrients into dogs — such as feeding them the animals that *are* well suited to eating raw seeds (small mammals, birds, *etc.).*

meats

Muscle, organ meats, and other soft tissues are highly digestible to dogs in their raw form, so cooking is of limited value in that regard. The two main purposes of cooking meat for dogs are to destroy bacteria on/in the meat and to make the meat more appetizing and perhaps easier to chew. I'll discuss bacteria separately later in the chapter.

The physico-chemical reaction that happens in the browning or searing of meat (the Maillard reaction) makes the meat more appetizing. That can be useful in dogs with picky appetites, including elderly dogs and those recovering from serious illness or injury. However, it also increases the amount of advanced glycation endproducts (AGEs) in the food; these are proteins and fats that become bonded to sugar molecules. Accumulation of AGEs, whether made by the body or consumed in the diet, accelerates the aging process and contributes to various chronic diseases.

As long as the meat is only lightly or gently cooked, and any oil or fat used in its cooking isn't allowed to get too hot (ideally, kept below about 350° F, or 180° C), relatively little AGEs or other harmful molecules are formed. So, when cooking meat, my general rule is to cook it either (a) very lightly, such as a quick sear or scald, simply for flavor or to kill surface bacteria, or (b) very slowly, such as simmering it in a soup/stock pot (moist cooking on low heat).

The slow, low-heat, moist cooking methods also make the meat more tender, which is another good thing for dogs in a weakened state or with bad teeth. So, there are some circumstances when cooking the meat is a good thing to do. Not all cooking is bad, just as not all cooking is good.

And as a reminder, most *fish* should be cooked for dogs. A small amount of raw fish (*e.g.*, cold-smoked salmon or trout, dried fish treats) now and again is OK, but when feeding fish as a significant part of the dog's diet, the fish should be cooked to destroy any thiaminase (vitamin B1-degrading enzyme) in the flesh. Salmon and trout from the Pacific northwest should also be cooked to destroy the organism that causes salmon poisoning in dogs.

bones

As I discussed in Chapter 2, most methods of cooking change the structure of bone in a way that makes cooked bones generally more risky to feed than raw bones. So, when cooking bone-in meat, I either removed the bones after the meat was cooked and continued to cook the bones separately until they were soft (see the chicken stew recipe in Appendix A) or I cooked the meat for only a short time so that the bone, while warm, was still essentially raw.

Feeding Miss Lilly

To make sure Miss Lilly got the most nutritional value and enjoyment from her food, while keeping her meals simple and easy to prepare, I fed most of her meat raw and most of her veggies cooked. There were exceptions, of course, as I'll discuss.

her veggies

Just as I do when steaming veggies for myself, I used only a small amount of water (just enough that the veggies didn't boil dry) and I'd take them off the heat as soon as they were fork-tender. While the veggies were cooling at the sink, I added the raw meat (typically ground or minced), straight from the fridge, so that the meat was warmed by the veggies, and the veggies were cooled and flavored by the meat. Easy!

If I was cooking Miss Lilly's meat for that meal, I usually cooked the veggies with the meat so that the veggies were flavored by the meat. How I cooked the meat dictated which veggies I could cook this way. If I was slow-cooking

the meat, then any veggies could be used, although I timed the addition of the veggies so that they were just fork-tender as the meat finished cooking.

For example, if I was making a pot of chicken stew for Miss Lilly, which I did once a week when she got older, I might cook some onions and celery with the chicken to make sure the broth was really tasty, but the rest of the veggies I added toward the end of the chicken's cooking time, so that they were just turning fork-tender when the chicken was done.

(By the way, simply for ease of deboning, I cooked the chicken until the meat was almost falling off the bone, and then I threw the bones away or I crock-potted them separately. To make cooked chicken bones safe for dogs, they need to be cooked for hours longer than I wanted to cook the meat. Instead, my routine when I cooked a whole chicken for Miss Lilly was to give her the giblets, neck, and wings raw, before the chicken went into the pot.)

If I was lightly searing the meat, then the veggie portion may have been only a big handful of spinach or other tender veggies that cook quickly. Or I'd steam a mixture of veggies for myself and add some of that blend to Miss Lilly's meat after everything was cooked the way I wanted.

When I was very busy, I would buy bags of frozen veggies and whizz the still-frozen veggies in the blender with just enough hot water to make a creamy consistency, and then add the veggies to some ground meat. As long as I used almost-boiling water, the frozen veggies were warmed to at least refrigerator temperature by the time they were pulverized. Miss Lilly didn't object to cold veggies, although she always preferred her meals to be at body temperature. (Can't say I blame her!)

This quick and simple method of veggie prep made all the difference when I was really busy but still wanted to be making Miss Lilly's food myself. There's nothing to wash, peel, chop, or cook, and cleaning up was as simple as rinsing the blender parts with warm water. And as most frozen veggies are partially-cooked before being frozen, and their cell structure is further altered by the process of freezing and thawing, Miss Lilly seldom had trouble

with gas. I avoided using frozen peas this way, as legumes really do need to be cooked. But the bags of frozen spinach and mixed cauliflower, broccoli, and carrot, for example, were perfect for this quick fix.

As Miss Lilly aged, I realized that I needed to take more care with the veggie portion of her diet, so I made sure to always feed her veggies lightly cooked and to feed most of her meals warm, particularly during the colder months.

I've included some of my tried-and-true recipes in Appendix A, with notes, amounts, cooking times, and variations. Appendix B is a series of blog posts I wrote during Miss Lilly's middle years, in which I documented everything I fed her for 2 weeks straight.

her meat

As for the meat portion of her diet, Miss Lilly loved cooked meat just as much as raw meat, so I'd sometimes lightly sauté or sear her meat simply as a treat. And anytime she'd been a bit picky with her food, I'd give her a cooked meal and she bounced right back.

That, as much as anything, taught me not to be too rigid with my feeding approach. Miss Lilly was healthy and happy on mostly raw meat, but she did seem to benefit from some cooked food. Whether that addressed an actual need for cooked food or it indicated some problem with the way I was feeding raw food, I can only guess.

I just know that as long as I continued to pay attention and provided what she seemed to need and want at the time, she stayed healthier than when I tried to impose my food and feeding ideas on her.

As a lead-in to the next section, I also cooked any suspect cuts of meat. More than any other sense, I used my sense of smell when deciding whether or not meat was fresh enough to feed raw. Discolored, slimy, and foul-smelling meat got thrown out. But if it just had a slight odor which told me it was beginning to "turn," that meat got cooked or at least dropped in boiling water for 30 seconds. Which brings me to the next issue: bacteria.

Bacteria — not all bad

Contrary to popular belief, including among the medical professions, bacteria are not our enemies. They are neither good nor bad; they are simply tiny living things (microbe, or micro*bios* = microscopic life), doing what they need to do in order to survive and reproduce.

To that end, it behooves them to "work and play well with others." There is no survival advantage, and considerable disadvantage, to being in a constant state of hostility with other microbes or, as in the gut microbes, with the host. Peaceful co-existence or benign indifference is by far the better strategy; and *mutual benefit* is the best of all.

gut microbes

The diverse population of bacteria and other microbes that are adapted to living in the gut — collectively called the *gut microbiota*[1] — benefits from the conducive environment and food sources provided by the host. No doubt as part of this adaptation, these bacteria benefit their host in turn.

'Pathogen-free' lab animals are born and raised in strictly sterile experimental environments so that they have no functional microbiota. Research in this field reveals the extent to which the resident microbes in our mouth, gut, upper airways, lower urinary and genital tracts, eyes, ears, and skin help to maintain, restore, and even enhance our health.

Thus, it could just as well be said that our gut is adapted to housing a wide variety of bacteria and other microbes as part of *our* survival strategy. Our gut microbes are our silent partners in digestion, protection from disease (including bacterial disease!), and other normal and necessary functions.

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[1] 'Microbiota' is the term used for the population of bacteria, protozoa, fungi, and other microbes that inhabit a space, such as the gut. 'Microbiome' refers to the entire habitat or ecosystem, including its microbial inhabitants. (As an example on a much grander scale, the planet Earth is *our* biome.) These terms are often used interchangeably, although they are different in small but important ways.

Nutritionally, the gut microbes break down complex food components into simpler molecules, making the food more available for absorption, and thus of more value to the host. Some of the microbial products that are generated in the process are even nutrients in their own right; and certain ones support the maintenance, repair, and replacement of the cells that line the gut and compose the gut barrier. These microbial activities also facilitate normal gut motility. (If you need evidence that normal gut motility is important, think back to the last time you were constipated…)

Immunologically, a healthy gut microbiome protects against overgrowth of any one species or type of resident microbe and against colonization by foreign microbes, thus preventing or limiting microbial invasion of the body via a compromised gut barrier. In other words, not only does a healthy gut microbiome help preserve the gut barrier, it helps limit who can pass through the barrier and cause illness. But that's not all…

It is widely accepted that roughly 70% of the immune system's cells are located in the wall of the gut and its associated lymph nodes.[1] If we were to expand that to encompass the entire digestive tract, from mouth to anus, and would thus include the tonsils in the back of the throat and the lymph nodes associated with them, it's probably closer to 80%.

Regardless of the exact figure, it is clear that much of the immune system's frontline surveillance is found in close association with the gut microbes, so it should come as no surprise that the gut microbes have a lot to do with the immune system, and *vice versa.*

A healthy gut microbiome helps maintain and restore immune tolerance, wherein the immune system is well able to discriminate between what is helpful or benign and what is harmful, including the tolerance of such

[1] As a reminder, lymph nodes are small structures that are organized collections of lymphocytes and other cells of the immune system. Because the gut lining is such an important interface with the outside world (via the food we eat and the fluids we drink), the gut has an abundance of lymph nodes located just outside its wall.

important foreign substances as food. It also involves the ability to recognize 'self' (the body's own cells) as helpful and not harmful.

A healthy gut microbiome further contributes by helping to ensure normal immune responsiveness so that the system neither under-performs (immuno-compromise or -suppression) nor over-reacts (hypersensitivity/allergy or dysregulated inflammation). In short: discernment, flexibility, and balance.

As a practical example, the 'hygiene hypothesis' of childhood asthma and allergy, now proven well beyond the hypothesis stage, explains why these immune-mediated disorders are more likely to develop in the children of parents who are "germophobes" than in those who take a more relaxed approach to house-cleaning and their children's exposure to "dirt" and to the outdoors in general. Being too clean can be unhealthy!

Metabolically, the gut microbes aid in the metabolism and detoxification of many substances, natural and artificial, that are consumed in food and water.

In short, *we need our gut microbes as much as they need us.*

This fact is highlighted by the sheer number of bacteria we have living on us and in us: there are at least as many bacteria on and in our bodies as there are human cells.

It had long been accepted that our resident bacteria outnumber our human cells by a ratio of about 10 to 1, (*i.e.,* that there are 10 times as many bacteria as there are human cells). However, in 2016 that figure was questioned and subsequently revised. Now, the accepted ratio is somewhere between 1 to 1 and 1.5 to 1.[1]

For example, the average adult weighing approximately 150 pounds (70 kilograms) is composed of about 30 trillion human cells and it hosts about

[1] 'Revised estimates for the number of human and bacterial cells in the body.' [doi: 10.1371/journal.pbio.1002533]

38 trillion bacteria. That's just under 1.3 bacteria for every human cell, or a ratio of 1.3 to 1. Dogs probably have a similar ratio of bacteria to canine cells.

Regardless of the actual numbers and ratios, 'Bugs *R* Us', and we need *them* just as much as they need *us.* It could even be said that we eat as much to feed our gut microbes as we do our own cells.

The gut microbiome deserves a book all of its own (and I'm working on that), so I'll just share some of the key points here:

- across all species studied, the gut microbiota is established within the first few hours or days of life
- while there are some broad similarities, each individual has its own unique gut microbiota which is actively conserved (maintained and, when necessary, restored) over that individual's lifetime
- change is always possible, but unless it is achieved gradually, it is met with active resistance that defies the establishment of a new order
- too rapid a change results in discomfort (bloating, cramping, malaise, *etc.*), and perhaps overt signs of disease (vomiting, diarrhea, fever, *etc.*) as well
- the more diverse the population of host-adapted microbes, the more stable it is over time, and the faster order is restored after disruption

That last point bears repeating: the more *diverse* the population of host-adapted microbes, the more *stable* it is over time. Compared with a more uniform population comprising fewer species, a diverse or 'rich' microbiota comprising many different species is less vulnerable in the face of sudden challenge, such as an abrupt change in food source or the introduction of foreign microbes, and its equilibrium is restored more quickly after disorder.

In other words, a diverse population is more *resistant* to change in the short-term and more *resilient* over the long-term. It is also likely to be of more value and less trouble to the host.

Other examples of sudden challenge or disruption to the gut microbiota are antibiotic therapy (especially with oral antibiotics) and 'food poisoning' (food contaminated with bacteria or their toxic products which cause illness).

'food poisoning'

Food poisoning is an interesting (not to mention *relevant*) phenomenon because most of the common culprits are *gut microbes* — bacterial species that are specifically adapted to living in the gut. In other words, they are some body's resident microbes. Among many others, the headliners include *E. coli* and various *Salmonella, Campylobacter,* and *Clostridium* species.

Their natural habitats are the digestive tracts of animals (and humans…). That's where they belong; it's their ecological niche. In appropriate numbers and relationships with other gut microbes and the host animal (or person) — when living *in balance* — these bacteria serve a useful purpose in aiding the digestion, immunity, and various other normal and necessary functions of their host. In other words, there's a mutual benefit to microbe and host.

Problems arise when these microbes end up on or in our food in numbers too great for our digestive systems to handle. Food hygiene can break down anywhere along the way from farm to table. Common examples include the use of untreated human or animal waste on crops; contamination of meat with gut contents or fecal matter during slaughterhouse processing; and lax hygiene practices (hand-washing, disinfection of surfaces and equipment, food storage, *etc.*) by people handling our food before sale.

While it is possible for us to make ourselves sick with our very own gut microbes (I'll let you figure out the scenarios in which your fecal microbes might end up in your mouth…), in most cases food poisoning is caused by microbial species or strains that are *foreign* to the animal or person, being adapted to a different environment or individual.

For example, I once upset my gut microbiota for weeks by eating a lettuce from my garden that was infested with slugs. I took care to wash off every one of the little blighters and their droppings before making my salad, but

evidently I didn't remove the microscopic remains of their gut microbes well enough. I recently had a similar, although far less dramatic, experience with a slug- and snail-infested lettuce sold by a commercial grower. Clearly, invertebrate gut microbes and me (or *mine*) just don't get along!

Several things happen when foreign microbes, or microbes foreign to that part of the body, encounter the resident microbes. The 'foreigners' must compete for location and nutrients, and they may have to fight for their very survival when the 'locals' mount a defensive or frankly offensive response. And then there's the *vigorous* response to it all that is mounted by the host: vomiting, diarrhea, and fever are manifestations of local and systemic inflammatory responses that, left unchecked, can be lethal.

So, to use the common idiom, bacteria in the right place and in the right relationship with each other and with their host constitute "good" bacteria. And any bacteria that don't belong in the gut or that are overgrowing or otherwise interfering with their neighbors or their host are "bad" bacteria.

why don't wild carnivores get food poisoning?

Before I discuss how I avoided causing food-borne illness when feeding Miss Lilly raw meat, I want to briefly examine why wild carnivores don't get sick from eating the gut contents of their prey and other bacteria-laden food such as rotting carcasses.

First, the question itself is an oversimplification. Wild animals *do* experience digestive illness and have been observed to self-medicate by fasting or by eating things they would not normally consume, such as grass or other plant material, clay, and even charcoal. (In fact, that's probably how humans came to appreciate the medicinal value of certain plants and of clay and charcoal.)[1]

Second, when it comes to the composition of the gut microbiota, there is a vast difference between the wild animals captured and consumed by wild

[1] If you're interested in this topic, I highly recommend reading *Wild Health* by Cindy Engel, PhD.

carnivores and the farmed animals eaten by most humans and domestic carnivores. Conventionally-raised farm animals, particularly those finished (feed-lotted before slaughter) on high-grain diets, are not all that healthy.

As I discussed in Chapter 1, most cereal grains are at least 50% starch, and some crops can be as much as 75% starch. Microbial fermentation of starch alters the gut microbiome, and not for the better. In sufficient quantity, the products of starch fermentation compromise the gut barrier, leading to a leaky gut and an unhealthy animal.

In addition, the disordered gut microbiome allows and even encourages the overgrowth of certain bacteria that are common in food-borne illness, such as *Clostridium* species. And that's all before we add in the indiscriminately antibacterial effect of glyphosate (the active ingredient in Roundup®), which is prevalent in the grains and legumes used in the diets of food animals.

Furthermore, antibiotic use is widespread in conventionally-raised food animals, both for the treatment and prevention of illness. In any species, under any circumstances, systemic antibiotic use dramatically alters the gut microbiota — and not for the better. The accelerated evolution of multi-drug-resistant "superbugs" isn't even the half of it!

That is why sourcing and buying wild-caught or pasture-raised (grass-fed and grass-*finished)* meat, eggs, and dairy products is so important. They're still not available everywhere or all the time, and they are generally more expensive than their conventional counterparts, but the payoff is huge, in terms of the health and wellness of our dogs (and ourselves).

Well, that was a *very* long way of saying that not all bacteria are bad! And while we're at it, not all bacteria are good; "good" bacteria are not always good; "bad" bacteria are not always bad; and good food hygiene still matters, even when buying food and preparing meals for carnivores, who are inclined by nature to eat their prey, including its gut, raw.

Feeding Miss Lilly

Here's how I fed Miss Lilly and handled meat in my own kitchen to avoid food-borne bacterial illness in her body and mine.

I primarily bought *human-food-grade* meat. The exception was the fresh deer meat I collected from the local processing plant during deer-hunting season. It was a USDA-inspected facility, but I used the discards for Miss Lilly.

All meat products were dealt with as soon as I got them home, in one of these ways:

1. *Fed fresh* — with most foods, the fresher it is, the more nutritious it is, so I usually fed some of the meat right away or at the very next meal. I tried never to let warm meat stay at room temperature for more than 1 hour, so if it had to wait for the next meal, it went in the fridge.

2. *Refrigerated* — unless I was feeding it right away or freezing it, the meat went straight into the fridge and was used within 4 days (my upper limit for any meat products in the fridge, even if they were cooked).

3. *Frozen* — any meat I wanted to store for longer than a few days went into the freezer right away. I thawed frozen meat in hot water if I forgot to get it out of the freezer soon enough, but otherwise I thawed it at room temperature, in the sink. (I thawed the meat in the container I put it in before it went into the freezer.) As soon as it was thawed, I fed it straight away (raw or cooked), stored it in the fridge, or dehydrated it.

4. *Dehydrated* — I thinly sliced and then dried some lean meats and organs (*e.g.*, liver, spleen, lung) using my wonderful little food dehydrator. The jerky kept well at room temperature in an air-tight container.

Most of the bacteria that can cause food-borne illness replicate by simple cell division, where one bacterium splits itself into two. That process is temperature-sensitive, being impeded at low temperatures and optimal at body temperature. At room temperature, bacterial counts on/in meat

begin to rise almost immediately, and by about 6 hours at room- or body-temperature, the count has risen exponentially (*i.e.,* it's skyrocketed).

What prevented this same thing from happening inside Miss Lilly was her stomach acid (which is hydrochloric acid), digestive enzymes, resident gut microbes, and the carnivore's relatively short gut length and rapid gut-transit time.

As I said earlier, dogs can handle foods with higher bacterial loads than we can. They're built for it, so to speak. Even so, they each have their limits, so food hygiene is still important in sourcing, storing, and preparing their food.

I was careful about leaving fresh meat out at room temperature, and I didn't rely on refrigeration to keep bacterial counts low for more than a few days. Bacteria can still multiply in the fridge; it just takes them much longer. As for frozen meat, freezing kills some bacteria, but not all; others it merely puts into hybernation, so I treated thawed meat just like fresh meat.

I was also scrupulous about cleaning my knives and cutting boards (and hands!) with hot, soapy water as soon as I'd finished using them to cut raw meat. I didn't keep separate knives or boards for meat, yet I didn't once sicken Miss Lilly or myself, so the precautions I took seemed to be good enough to keep us both safe. (They may not be sufficient for families with young children or people who are immunocompromised, though.)

Any meat with even the slightest whiff of "offness" got cooked, and any that had really gone off was thrown out. Fresh meat doesn't have an unpleasant odor (unless you're vegan), so if the meat had *any* sort of bad smell, I cooked it (slight odor) or binned it (strong odor). I learned the hard way that Miss Lilly can be made ill by foods that contain too high a bacterial load.

Any suspect bones got dropped in a pot of boiling water for 30 seconds to kill the surface bacteria. I still fed them raw, but only once they'd been scalded (and then cooled to body temperature). Typically, the highest

bacterial loads are on the surface, so the rest of the bone was usually safe to feed (and it was still raw despite its dip in boiling water).

The exception was intricate bony structures, such as chicken backs. As I mentioned earlier, I nearly killed Miss Lilly once by feeding her a chicken back that smelled a little funky. That was in the era when I foolishly thought that healthy dogs can handle any amount of bacteria. After that, any foul-smelling fowl got thrown into the garbage (outside, in a dog-proof bin, where Miss Lilly couldn't get to it).

I just don't trust that the boiling-water trick is sufficient to decontaminate heavily contaminated poultry carcasses, with all their little nooks and crannies. The relatively small body size and unique anatomy of birds, coupled with the factory processes involved in their slaughter and butchering, all contribute to poultry products generally having higher bacterial loads than meat products from larger animals. In particular, contamination with gut microbes is more likely on poultry products.

But for all that, here's an interesting phenomenon I observed: Miss Lilly could safely eat roadkill and any other remains she came across on our adventures. She would also eat food *she'd* left sitting for hours or even for days or weeks (*e.g.*, bones she's buried) without getting sick. Was she merely benefiting from all the precautions I was taking with food hygiene?

Might she even have gotten some benefit from certain foods with higher bacterial loads, as I discussed regarding her buried bones in Chapter 2? Fermented foods with live microbes still active in them have a long history of use in a variety of human cultures, for both nutritive and restorative purposes, so it's possible...

As I still don't know the answers to these questions, I continued to feed most of her meat raw, but with all of the precautions I've described.

Why do some dogs have trouble with raw food?

Some dogs don't seem to do well on raw food, at least not at first, especially if the transition from their conventional kibble or canned-food diet is abrupt. In my experience, there are two main reasons for this trouble.

1. The gut microbes need time to adapt.

The bacteria and other microbes that inhabit the dog's digestive tract and assist with digestion are quite simple organisms. However, the *population* of microbes is very complex. In any one body, there are several hundred different species of gut bacteria, probably more; and the specific *profile* of the population — the individual's unique gut microbiota — reflects the life history and everyday diet of that individual.

For example, horses have between 1,500 and 3,000 different species of gut microbes. (Some studies suggest that the true number may be over 10,000 per horse.) Fiber-fermenting species predominate in horses fed a forage-based diet (pasture and/or hay). But on a high-grain diet, the carbohydrate-fermenters may outnumber the fiber-fermenters.

Dogs on meat-based diets have a predominance of microbial species adapted to breaking down animal proteins and fats. But dogs on typical dog-food diets that are heavy on grains or other starches tend to have a population of gut microbes that is intermediate between that of a herbivore and a carnivore.

That's not a harmful thing in itself. In fact, it's a good example of how living systems adapt. The trouble arises when we abruptly change the dog's diet to something that is unfamiliar to its gut microbes; digestive upsets often ensue.

In my experience, that's the most common reason people stop trying to transition their dogs onto a fresh-food diet, whether raw or cooked. The assumption is that the dog doesn't tolerate this "radical" diet, when in fact it's the gut microbes that are struggling to adapt.

If the symptoms are not too serious and you can both ride them out, then the gut microbes typically adapt to the new diet fairly quickly, usually in 3–5 days. But a safer and gentler approach is to make the transition more gradually.

Particularly when making such a fundamental change in the composition of the diet as the switch from the typical high-starch kibble or canned food to a low-starch, meat-based, fresh-food diet (whether commercial or home-made, cooked or raw), *go slowly*. Take 7–10 days to complete the switch.

Start by adding just a few mouthfuls of the new food to the current diet. Gradually add more and more of the new diet, and feed less and less of the old diet, until you're feeding only the new diet. Depending on the dog, this transition can be completed in as few as 5 days; and occasionally it needs to be done much more slowly (over a period of 2–3 weeks).

Sometimes I recommend a probiotic product to facilitate this transition, but as time has gone on and my understanding has grown, I recommend probiotics less and less for this purpose. Except when the gut microbes have been decimated by antibiotic therapy, fresh and species-appropriate food is generally the best "pro-biotic" (*i.e.*, promoting healthy gut biology).

probiotics

For the most part, probiotic products sold for dogs and cats are based on research done in humans and lab animals (rats and mice), although the manufacturers are not averse to using studies in farm animals (cattle, pigs, and poultry) when it suits their purpose. One thing these studies generally have in common is a diet that is high in grains or other rapidly-fermentable carbohydrates.

Equally problematic, most of these products contain only one or two bacterial species or strains, when the healthy gut is inhabited by several hundred (or more) different microbial species. These products do not reflect the normal gut microbiota of healthy dogs and cats on fresh, species-appropriate diets.

There is a small but vocal contingent of holistic vets who advise feeding the feces (poop) of healthy dogs to replace or "restore" the gut microbiome in dogs with chronic digestive disorders. In fact, proponents of this approach claim benefit for pretty much every disease you can imagine, including cancer. It is the panacea (cure-all) we've all been looking for…

Granted, gut health underpins general health and vitality. However, this concept is not new. Transfaunation (transfer of 'microfauna', or microbes, from one body to another) has been used for decades in horses and other livestock species for the treatment of digestive disorders that have not responded to less intrusive approaches. We know from long experience in these other animal species that it is a rather crude instrument and it is not always effective. It is by no means a cure-all.

Some fascinating studies in dairy cows may explain why. The rumen is the main forestomach (pre-gastric chamber) in ruminants; it's where the majority of their gut microbes are housed and where microbial fermentation has the biggest impact on ruminant nutrition, health, growth, production (milk, meat, wool), and fertility.

When the contents of the rumen are almost completely exchanged between two cows, the individual's unique microbiota returns toward its original profile within weeks. In as little as 2 weeks, the post-exchange profile more closely resembles the cow's original microbiota than that of the donor.[1]

In essence, these studies show that, not only is the gut microbiota unique to each individual, but the body does its best to restore its own microbiota, even in the face of overwhelming challenge (*e.g.,* the replacement of one's microbiome with someone else's).

Another problematic element to transfaunation with the feces of healthy dogs is that the most vocal proponents of this approach are also vocal advocates

[1] 'Host specificity of the ruminal bacterial community in the dairy cow following near-total exchange of ruminal contents.' [doi: 10.3168/jds.2010-3500] This is just one such study.

of vegetarian or vegan diets for dogs. As I noted earlier, the gut microbiota is a direct reflection of the individual's diet. The microbiota of a dog on a vegetarian or vegan diet will be that of a herbivore, or at best an omnivore, rather than that of a carnivore. So, transfaunation with feces from a dog on a vegetarian/vegan diet will be of limited use to a dog on a meat-based diet.

It is also worth noting that the body considers feces as *waste* that is not worth keeping and trying to recycle, repurpose, or otherwise reuse. In fact, by the time the remains of a meal have reached the rectum, the body has already reused whatever it can. It has recycled some components through the liver and kidneys and it has reabsorbed and reused water and electrolytes it secreted in its digestive juices.

In all sorts of ways, the body practices economy with its on-board resources, so when it considers the feces not just waste but potentially *harmful* waste, I think we should respect that.

Rabbits recycle their own waste by eating some of their own feces (a practice called coprophagy). However, rabbits are strict herbivores, and one could argue that coprophagy in rabbits is similar to rumination (cud-chewing) in ruminants. But in dogs and in most other species (including humans), the body considers the feces potentially harmful waste, in need of elimination.

Transfaunation or 'fecal microbial transplant' is used in humans for the treatment of intractable digestive disorders, such as antibiotic-associated dysbiosis.[1] (Post-antibiotic diarrhea caused by *Clostridium difficile,* or "C. diff," is a common situation in which this procedure is used in people.) However, it is considered a *medical intervention,* not a nutritional strategy.

Dogs sometimes eat the feces of other animals, so one could argue that it is a species-appropriate behavior which we are co-opting as a medical

[1] Dysbiosis is a medical term for disturbance of the microbiota that is serious or persistent enough to cause signs of illness. While we're at it, fecal microbial transplant in humans has also been called trans-poo-tion, although I think it should either be transpootation or transpoosition. ☺

intervention. I never minded when Miss Lilly ate horse manure or the manure of wild herbivores such as rabbits and deer. That was a good way of getting a supply of the gut microbes which can make the best use of the plant portion of her diet. But the few times I saw her eating *dog* poop, there was something wrong with her health — and the first place I looked for clues was her diet.

I continue to follow the research on this topic, and I look forward to learning more about this fascinating and still largely unexplored and "foreign land" of the gut microbiome and the host-microbe relationship. But thus far I remain convinced that the best "pro-biotic" (pro-*bios*, and in this context pro-*micro*-bios) is food: *species-appropriate food,* fresh, varied, and prepared with love and care.

The best way I know of to ensure a diverse and resilient population of gut microbes is to feed a richly varied diet of species-appropriate foods. There are two essential elements in that approach, and I've discussed both at length: species-appropriate foods (Chapters 1 and 2), and variety (Chapter 3).

This is a proactive health strategy because a diverse gut microbiota is more robust and resilient than a more uniform (less 'rich') microbiota, such as one that is adapted to a diet with very little variety (*e.g.,* the typical dog-food diet). The typical dog-food diet is not as species-appropriate as the picture on the bag or can would have us believe. Nor is it varied beyond the particular flavor (animal source) and the cost-driven substitutions the manufacturers disguise with nebulous industry terms in the list of ingredients.

By cultivating a diverse gut microbiota, episodes of digestive disorder are both less likely and less problematic (less severe and of shorter duration), with less potential for long-term disorder and associated health effects.

Generally, all it takes is a species-appropriate diet of fresh, high-quality food and a little patience and prudence through the transition.

2. The digestive juices may also need time to adapt.

To some extent, the dog's digestive functions, including the production of stomach acid, bile,[1] and the various digestive enzymes, also adapt to the everyday diet. A feature of biological systems is adaptation, and a large part of the drive for adaptation is the need for economy: limited waste; optimal use of resources.

Dogs who are abruptly switched from a diet that is high in starch, as are almost all kibbles and many canned dog-foods, can initially have trouble digesting diets that are much higher in animal proteins and fats. Fibrous plant material (some veggies) can also be hard for these dogs to process.

It's not just the gut microbes that struggle with this abrupt change. The dog's digestive system may also need time to adapt by adjusting the production of some of its digestive secretions, especially its digestive enzymes.

A well-chosen digestive enzyme supplement can help some dogs through this transition. For dogs switching to a meat & veg diet, I prefer those that are a mix of animal- and plant-source enzymes. 'Animal-source' means the *pancreas,* so the label will say dried pancreas or pancreatic enzymes; most are sourced from cattle or pigs. 'Plant-source' enzymes are mostly from pineapple, papaya (paw paw), and other enzyme-rich fruits.

However, just like probiotics, digestive enzymes should not be fed long-term.[2] The point of using digestive enzymes is simply to help the dog make the transition to the new diet a little more smoothly. Using a crutch indefinitely does not help a body regain the ability to walk on its own.

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[1] Bile is a fluid that is made by the liver and stored in the gall bladder until it is released into the upper part of the small intestine after a meal. Its main role in digestion is to emulsify fats (similar to how dishwashing liquid "cuts grease"), thus aiding the digestion and absorption of dietary fat.

[2] An exception is exocrine pancreatic insufficiency (EPI) — inability of the pancreas to produce enough digestive enzymes — which is very uncommon in most breeds.

One of my guiding principles is to intervene only when necessary, with only what's necessary, and for only as long as necessary. In my experience, probiotics and digestive enzymes are overused, and they are too often relied upon in place of simple and gradual dietary changes that would allow the dog to be healthy without them.

The only times I've encountered serious problems with raw feeding in dogs and cats are when the animal was very unhealthy and seriously lacking in vitality. In these patients, we start slowly, make changes gradually, and emphasize lightly-cooked fresh foods until the system is stronger. Whether or not the dog or cat can ever tolerate *raw* food is not as important as getting the animal onto a species-appropriate diet of fresh, wholesome foods.

***

Nearly there! Only one more chapter to go, and it addresses the question: how much of this food should I feed my dog?

Summary

* I fed most of Miss Lilly's meat raw and most of her veggies lightly cooked

* I cooked her veggies until they were just fork-tender, to improve their nutrient availability

* an alternate method of veggie prep I used was to whizz them up in a blender or food processor (*i.e.,* "pre-chew" them for her)

* if I cooked her meat, I cooked it either lightly (light sear or scald) or slowly (*e.g.,* soup or stock pot on low heat)

* I avoided getting the oil/fat too hot (less than 350° F or 180° C)

* on arrival, all meat items were immediately fed, refrigerated, frozen, or dehydrated

* no meat was left for more than 1 hour at room temperature or for more than 4 days in the fridge

* any suspect meat or bone got cooked, dipped in boiling water for 30 seconds, or thrown out

* I washed my knife and cutting board (and hands!) in hot, soapy water as soon as I'd finished cutting raw meat

5. Carnivores are meal-feeders

By nature, dogs are meal-feeders rather than browsers or grazers who eat small amounts throughout the day, so they generally do best with one or two substantial meals per day. In fact, dogs are naturally well adapted to eating their fill and then not eating again for another day or two (although I don't advise feeding dogs that way).

As an experiment — to test my ideas about appetite, self-regulation, and how dogs eat — and because I was worried that I might have been under-feeding her, I once kept adding food to Miss Lilly's bowl until she was well and truly full and didn't want any more. By that point, she'd eaten an entire roast chicken with veggies (*i.e.,* enough to feed a family of four!) and licked the pan clean. She kept it all down, but she didn't want to eat again for another day and a half. She wasn't sick; just not hungry.

In wild carnivores, much of that dynamic, and maybe even the whole thing, is based on the inconsistent availability of their prey or success of the hunt. It's the classic feast-or-famine dynamic: eat until you're full when food is available, because you don't know when you might eat again.

Hence, the carnivore's stomach is quite large for its body size; and domestic dogs are no exception. In the average-size dog, the stomach holds 2–3 liters (2–3 quarts), and up to 8 liters (2 gallons) in the giant breeds. In comparison, the average stomach capacity in humans is 1–2 liters, and up to 4 liters.

At the lower end of the ranges, these figures work out to about 2 cups per 10 pounds body weight in dogs (100 ml/kg) and 2 *ounces* per 10 pounds in humans (14 ml/kg).

So at 50 pounds (23 kilograms), Miss Lilly had a stomach capacity of about 10 cups. But that's how much the dog's stomach can *hold,* not how much is needed to satisfy hunger and meet the dog's nutrient requirements.

Feeding less than half the volume of stomach capacity (45%, to be exact), or about 4 cups for a dog Miss Lilly's size, is usually enough to provide a feeling of satiety (of being satisfied).

As for meeting the dog's nutrient requirements, that also depends on the composition of the meal, and of the diet as a whole. (As that's what this entire book has been about, I'll say no more here.)

Feeding frequency

I have long been a twice-a-day feeder (morning and evening), but many people feed their dogs once a day, and that's just fine. As I mentioned in Chapter 3, dogs who are fed once a day, and at approximately the same time each day, get to experience the pleasure of anticipation that dogs fed twice a day may not appreciate to the same extent.

There may be more tangible benefits to once-a-day feeding as well (although they may very well depend on the diet…)

Researchers involved with the Dog Aging Project[1] recently published a study in which they examined the incidence of various disorders in relation to feeding frequency (once-a-day *vs* more-frequent feeding) in over 24,000 pet dogs.[2] In a subset of nearly 10,500 of the dogs who were at least 6 years old, they also examined cognitive function (an index of brain aging).

This was a 'snapshot' (cross-sectional) study, using owner-reported data from two separate online questionnaires: one on health and another on social and learned behavior (a survey tool for assessing mental decline in mature dogs).

After they accounted for differences in age, gender, breed or body weight (a proxy for breed in mixed-breed dogs), whether the diet was supplemented

[1] dogagingproject.org

[2] 'Once-daily feeding is associated with better health in companion dogs: results from the Dog Aging Project' [doi: 10.1007/s11357-022-00575-7]

with omega-3 fatty acids — and, in the behavior subset, physical activity and training history — they found the following:

Dogs fed once a day had *slightly* better average scores for cognitive function and they had lower odds of having disease involving the liver or pancreas (average 59% lower), gastrointestinal tract (gut, average 35% lower), kidney or urinary tract (average 29% lower), musculoskeletal system (orthopedic disease, average 22% lower), or teeth (average 16% lower) compared with dogs fed more frequently.

But the devil, as the saying goes, is in the details.

In the dogs 6+ years of age whose people completed the behavior survey, there was less than a 1-point difference in average score between dogs fed once a day and those fed more frequently, on a scale of possible scores that ranged from 16 to 80. Out of this possible swing of 64 points, the difference in average score was just over half a point (0.62, to be exact). That's a *very* small 'effect size' (difference between groups or change over time) for such a large study.

(Of the 10,474 dogs in the behavior subset, 860 dogs were fed once a day. These are *enormous* numbers for a study in veterinary medicine. In fact, that's the greatest strength of this study: its statistical *power,* by virtue of its size, of the number of dogs involved.)

But while there were significant reductions in the incidence of several different disorders in the dogs fed once a day, there were *no significant differences* in the odds of having heart disease, cancer, neurologic disorders, or skin disease compared with dogs fed more frequently.

In a separate Dog Aging Project study on lifespan, cancer was responsible for 45.5% of all classified deaths in pet dogs.[1] (In that study, in which data were collected from veterinary medical records, 48% of all deaths were

[1] 'Lifespan of companion dogs seen in three independent primary care veterinary clinics in the United States' [doi: 10.1186/s40575-020-00086-8]

unclassified, meaning that a cause of death was not known or not recorded.) The next most commonly recorded category was degenerative disease, which accounted for 29% of all classified deaths.

Given that cancer was by far the most commonly recorded cause of death in the lifespan study, it is interesting that feeding frequency did not significantly affect the risk for this oh-so-common and often terminal disease.

When they teased out the results according to how often a dog is fed, rather than lumping all of the dogs fed more than once a day into the same group, the dogs who were fed free-choice (food always available) had just as good, or even better, health outcomes as those fed once a day.

In regard to cancer, only the dogs fed three or more times a day were significantly more likely to have cancer. Those fed twice a day or fed free-choice were not. Bearing in mind that this was a 'snapshot' study, the researchers conceded that the reason some dogs were fed three-plus times a day, when this was not a common feeding strategy (used in 7% of the dogs in this study), may have been because these dogs already had cancer or some other disease that required them to be fed frequent, small meals each day.

Perhaps what bothers me most about this study is that the researchers appear to have made the mistake of assuming that all dog-foods are equal, so the only thing worth examining is how *often* a dog is fed. They made no attempt to determine how many calories a dog was consuming each day, nor the source of those calories (animal *vs* plant material, starch *vs* fat, *etc.*).

As over 80% of the dogs were on a commercial dry dog-food diet (kibble), the best we can say about the study is that, if you are feeding this junk-food diet, then it may be better to feed it just once a day rather than more often.

Studies of high-starch diets in horses might explain why: a high-starch meal causes big changes in the gut microbiota and in the chemical composition (including acidity) of the gut contents, along with huge shifts in body water, electrolytes, and the hormones associated with eating and with fluid balance,

that last for several hours after a meal. In horses who are fed high-starch meals twice a day (*e.g.,* morning and evening), the body is only just righting itself and restoring its equilibrium when the next meal sends it reeling again.

Frequent, small meals are not only more species-appropriate for horses, they prevent these big swings and the perpetual cycle of disorder. Perhaps that is why the dogs who were fed free-choice fared as well as those fed once a day.

The assumption that underpins this study is that once-a-day feeding, which amounts to intermittent fasting or time-restricted eating (two current fads in human nutrition), has metabolic benefits that pay off over the long haul. That may be true, but it is not validated by this particular study.

A real failing — and a lost opportunity — in this study is that the researchers didn't get into the details about the content or composition of the dogs' diets. It would be a gross over-simplification to conclude that dogs should be fed just once a day on the basis of this one, well-meaning but fundamentally flawed, study.

Neither did this study get into the social or human aspects of feeding dogs. It's a very interesting study, and a great project overall, but no single study, including this one, can definitively answer such a complex question as this: "how often should I feed my dog?"

I will likely be a twice-a-day feeder with my next dog, because mealtimes were an *event* in my daily life with Miss Lilly, which we both relished. Miss Lilly loved to eat and I loved to feed her — and I *know* I'm not alone on that score. In fact, our love of pleasing our pets with food is a vastly under-appreciated factor in the obesity epidemic that plagues dogs and cats.

Feeding Miss Lilly

Although the content of our diets differed greatly, I prepared Miss Lilly's food in the same kitchen, and at the same time, as I prepared my own meals, and we ate our separate meals at the same time. It was a twice-daily ritual

we both loved. I would sometimes share some of my lunch with her as well, depending on what I was eating (she was not at all interested in salad!). My point is that eating was always a *social occasion* for us.

We generally ate our evening meal fairly early, so our overnight fast was almost always 12–14 hours on weekdays, and often more like 16 hours on weekends. So, simply because of my daily and weekly rhythms, we were both doing a casual version of intermittent fasting or time-restricted eating most days.

Did that contribute to her long healthspan and ultimately to her long life-span? I don't know. Probably not as much as *what* she ate and *how much*.[1]

For most of her life, Miss Lilly maintained a healthy, lean weight eating about 4 cups of this fresh meat & veg diet each day, divided between a smaller breakfast (1 cup or so) and a larger dinner (2–3 cups), depending on the contents of the meal. Sometimes breakfast was simply a small can of sardines; and when I was feeding a particularly watery stew, I might fill her bowl to the brim. So, both the content and volume varied somewhat.

Most of the time she was well satisfied with this amount of food, as each meal was typically at least 60% meat, I was not having to control the fat content of her diet (except when we were suburbanites), and I used plenty of veggies which helped fill her up as well as providing needed nutrients.

I gave her more food or I increased the fat content (used fattier cuts of meat, added more oil or butter) when she got a bit too lean or she still seemed hungry after a meal, and less when she started to get a bit too well padded or she left some food. It's like an old equine vet once told me about feeding horses: "It's easy; the fat ones get less and the thin ones get more."

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[1] In a landmark study by Nestlé Purina (makers of Dog Chow), dogs fed a calorie-restricted diet (25% fewer calories) from weaning onward had a lower incidence and/or severity of arthritis, along with delayed onset of arthritis, and they lived almost 2 years longer on average, compared with dogs on an unrestricted diet. [doi: 10.2460/javma.2000.217.1678 and 10.1017/S0007114507871686]

Oh, and I added more animal fat and included fish oil the few times her coat became a little dull and dry and her skin became a bit flaky. I've seen this problem in other dogs as well, when the fat content and fat *sources* in the diet are better suited to a sedentary human than to an active dog.

Dogs are designed to run on animal protein and fat as their primary source of calories and essential fatty acids. The skin (including the hair and nails) is one of the first organ systems to tell us if we're going wrong with regard to fat content and fat source (animal *vs* plant sources of essential fatty acids).

Lastly, Miss Lilly wanted less food in the summer and more in the winter, so I adjusted both the content and volume of her meals accordingly.

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It really is as simple as that. As you do (or should be doing) for yourself, know your dog, feed according to appetite and satisfaction, and adjust as needed to maintain a healthy, lean body condition, great coat, plenty of energy, and much enjoyment.

If Julia Child had been a dog, her iconic cookbook would have been titled *The Joy of Eating!*

Summary

* dogs are meal-feeders, so they do well with one or two meals per day, rather than snacking their way through the day

* I fed Miss Lilly twice a day, typically a small breakfast and her main meal at night

* we often had a late breakfast on weekends, which extended our overnight fast into “intermittent fasting” territory

* on average, she ate about 4 cups of fresh meat & veg each day, divided between those two meals

* I adjusted both the volume and the content of her meals according to her needs at the time

Afterword

Well, there you have it. Hardly rocket science. It just takes adjusting one's thinking, stepping away from what the pet-food and veterinary industries have been telling us and selling us for decades, and operating from the foundation of how carnivores are designed to eat. It's really very simple. After all, nature has done the hard work for us.

"Your dog eats better than I do!"

I wish I had a dollar for every time I've heard that! I usually answered some variation of the same thing: "Well, shame on you!" It was said with a smile, but I really did mean it. Why are you not feeding yourself well? How do you think you're going to stay healthy that way? Other times I'd answer: "So? Why shouldn't my dog get the best food I can provide?"

If you have a dog, you have expenses. It's up to you how you spend your money; just bear in mind that every choice has a consequence. Good food is so fundamental to good health that it comes down to this: you can either spend your money on good food and greatly increase the chances of your dog having a long and healthy life, or you can spend it on vet bills, treating one or more of the chronic degenerative diseases for which poor diet is a strong causal or contributing factor.

For dogs already dealing with chronic disease, switching to a fresh meat & veg diet can make managing the disease easier, and in many cases it can improve and even extend the dog's quality of life.

Incidentally, Hippocrates is often quoted as having said, "Let thy food be thy medicine, and thy medicine thy food." But what he actually said was more

along the lines of this: "Food is food, and medicine is medicine; but when we eat well, we have less need of medicine."[1]

Miss Lilly lived to at least 16 years of age, on no special supplements and no medications. If you have a middle-aged or senior dog on conventional care, you know full well how much I saved by not having to keep buying joint supplements or medications for arthritis, heart disease, *etc.*, even at discount prices. I'm very glad I spent the money on good food instead.

While it did cost more than conventional dog-food to feed Miss Lilly this fresh-food diet, I was able to economize by supplementing the premium-grade muscle meats with organs, which cost less per pound than muscle meat, and by adding some veggies. Pound for pound of body weight, it cost me about the same, or even less, to feed Miss Lilly this way as it did to feed my vegetarian self.

Why would I want to take any less care of my dog than I do of myself?

It strikes me as distinctly odd that we expect dogs to stay healthy on inferior-grade foods (*e.g.*, ingredients not fit for human consumption), "convenience" foods (*i.e.*, dry or canned foods), or otherwise cheap diets. To the detractors of this feeding approach, I want to say this:

What superpower do you think dogs have that we lack which enables them to stay healthy on a junk-food diet?

Several years ago, I saw an ad on TV for one of those superstores (department store and grocery store rolled into one; tires, toys, and turkeys all under the one roof). A father is shopping with his kids; he turns to the camera and says something like this: "[W___] helps me save on food so that I can buy more of the important things." I was gobsmacked! What on earth (or at least, in that store) could you possibly buy that is more important than food?!

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[1] 'Let not thy food be confused with thy medicine: The Hippocratic misquotation.' [doi: 10.1016/j.clnme.2013.10.002]

Good food is fundamental to good health and well-being. But the kicker is that the food must be *good;* it must be wholesome, conducive to good health, *good for you*. This ad seems to be echoing a common sentiment: food is food; and the cheaper, the better.

But we know this to be false. It's very hard to get or stay healthy on cheap, mass-produced food, designed from beginning to end with profit in mind.

Perhaps more than any recent development, the coronavirus pandemic that began in early 2020 (dubbed COVID-19) has made this point with brutal clarity: the wealthiest nations, those with the highest *per capita* consumption of highly processed foods and thus with the highest rates of obesity and related diseases ('comorbidities'), generally had the highest rates of severe illness, hospitalization, and death associated with COVID-19.

Conversely, the countries with the shortest food-supply chains (fewest steps and shortest time between farm and table) and the lowest consumption of foods containing refined sugars, flours, and seed oils were among those least impacted by COVID-19.[1]

Good food is essential for good health. But it's got to be *good* food, and the closer to its natural state, the better. As my mum would say, "I'd rather pay the grocer than the doctor."

Hopefully by this point, I'm preaching to the choir.

Miss Lilly's Lessons on Life

Miss Lilly's Lessons on Life continue to this day. The two that are of most relevance to food and feeding, and that I'll be implementing from the first meal with my next dog, are these:

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[1] For example, 'Cabbage and fermented vegetables: From death rate heterogeneity in countries to candidates for mitigation strategies of severe COVID-19.' [doi: 10.1111/all.14549]

1. More love, more care (attention), more companionship

This one includes more sharing of meals and mealtimes, snacks and treats, hugs and pats, play, walks and other adventures, naps — in other words, more camaraderie, more of a sense of family and of *belonging* to one another. I did all this to some extent with Miss Lilly, but next time around I'll make it more of a priority.

Next time around, I'll make our meals a little ritual in which I pause in my day to appreciate my dog, our food, and our life together. In other words, I'll make our meals more of an *event*. A particularly fun thing we do together.

2. More natural flavor, more good smells

This one may be a bit of a challenge even for this veterinarian because it includes blood, 'guts' (microbially fermented food), urine, and the smell of early decomposition — all things we're taught from infancy are "dirty." But *more* of these natural scents and flavors is what Miss Lilly advises.

blood

Let's start with blood. Typically, animals killed and processed for human consumption are hung and bled immediately after death. As a result, their meat is not very "bloody" — at least, not from a carnivore's perspective.

Miss Lilly loved it when I fed her a tub of raw chicken livers, in part because she found the livers delicious, but also because there was quite a bit of blood in the container, having leaked out of the livers. She lapped up every drop of blood and then licked her bowl clean — and then licked it again. Blood was always one of her favorite "flavors."

The same thing happened when I fed her fresh deer organs (liver, spleen, heart. *etc.*). Unlike all of the other meat I bought for her, the deer organs were from wild animals who had been freshly killed by hunters. None had been hung and bled after death, so their organs were particularly bloody.

These were her special favorites. I thought at the time it was because they were so fresh and also so wild (not raised on commercial livestock feeds, given none of the chemical products used in livestock production, freely moving around to the best feeding areas, *etc.*). But now that I think back, those were also quite bloody meats.

So, next time around I will try to source more blood and more fresh organs and meat from animals who had not been hung and bled after death. I never availed myself of it at the time, but some grocery stores and butcher shops sell containers of fresh blood, as many different cuisines include recipes that use blood as a key ingredient.

'guts' and urine

Next on her list is the scent and flavor of animal waste: gut contents, manure, and urine. These are scents that signal the proximity of potential *prey*.

In that light, I can see why they are particularly compelling to a carnivore. But they are also nutritious; and gut contents/manure, in particular, are rich in gut microbes, making them a species-appropriate "probiotic" for a carnivore on a meat-based diet that also contains some plant material.

early decomposition

Similarly, the smell of early decomposition signals the proximity of a carcass that may be suitable for scavenging. As I mentioned in Chapter 1, dogs are as much scavengers as they are hunters. Scavenging another's kill is perfectly fair play to a wild canid and to a dog; and the scent of blood, animal waste, and early decomposition all signal the proximity of a good feed.

OK, but *how?*

That's all well and good, but how do we manage that in our shopping carts and in our kitchens? And without making our dogs and ourselves sick in the process? "Urine" is easy: feed raw kidneys. But what about the rest?

Fermented foods. One not-too-difficult or unpleasant way is to soak or marinate meat (any food, really) in live-culture yoghurt, kefir, or indeed any other cultured milk product that still contains live, fermentative bacteria. These bacterial species and strains have been carefully selected over millennia to be generally beneficial to human health. As long as the dog tolerates dairy products, the same is generally true in dogs as well.

Another option is to feed small amounts of fermented vegetables such sauerkraut or kimchi. Whenever I open a jar or tub of sauerkraut, I'm reminded faintly of the ruminal contents of a cow or sheep… That's the smell of the volatile fatty acids produced by microbial fermentation of plant carbohydrates (sugars and fiber).

However, just a little will do it. These fermented veggies are very acidic. As with using vinegar as a seasoning, just a little can be wonderful, but any more than that is terrible! And it's not just about the taste. Fermented foods that still contain their live microbes are powerhouses as probiotics. It really doesn't take very much for them to work their wonders; and too much can cause digestive upset.

The acidity of fermented foods and vinegars also stimulates saliva flow, which is another benefit, particularly for oral health. On the one hand, acidic foods can damage tooth enamel; but on the other hand, saliva is a protective buffer (it is alkaline) and aids in protection and remineralization of the teeth.

Raw tripe or gizzard. Also fairly simple, although admittedly not so pleasant, is to feed raw gut, such as raw tripe (any of the three forestomach compartments in ruminants) or poultry gizzard (the muscular "mill" portion of the stomach in birds). "Green" tripe is particularly good, as it still contains the grass stains (plant pigments) and attached microbes on its inner surface.

Raw liver. Raw liver is also good in this regard. Because of what the liver does for a living, it has a strong "gut-y" smell. (All of the blood that leaves the gut flows through the portal vein directly to the liver for processing before it returns to the general circulation.)

However, liver is best fed in small amounts, as it is high in iron, copper, vitamin A, and several other micronutrients that, when consumed in excess, can be toxic.

In addition, one of the liver's primary responsibilities is detoxification, so liver may contain substantial amounts of any toxic plant or other harmful substance the animal it belonged to had consumed or produced.

How much liver is too much? Consider the size and weight of your liver in relation to the rest of your body. It's around 2% of your total weight. Likewise, in small prey species such as rats and mice, the liver represents only 2–3% of the animal's total weight. In livestock species (horses, cows, sheep, goats, pigs), it's a bit lower, 1–2% of body weight.

That's about how much fresh liver should feature in a dog's diet, and even less for dried liver such as liver jerky and liver treats (in which the water has been removed). When a wild canid eats an animal, the liver is only a small proportion of the whole. A very tasty and delectable portion, but still only a small part of the whole animal. So it should be in the domestic dog's diet.

With the exception of chicken livers, Miss Lilly didn't particularly like raw liver, not even wild deer liver. I think I might have overfed it; in retrospect, feeding a liver as a whole meal was probably a mistake. But she loved the dried liver treats I made for her.

I cut the raw liver into thin slices (about ¼ inch or 6 millimeters thick) and let them dry out in my food dehydrator (it took about 8 hours at 140° F or 60° C). It was a smash hit with Miss Lilly and all of her dog friends. I'd often give some to a friend with dogs, and she reported being mobbed by dogs at the dog training center if she had even the empty packet in her pocket.

Roadkill? Roadkill is another way of satisfying the "more smells, more flavor" quota. Miss Lilly would help herself to roadkill on our walks, and I never minded, but I only ever picked up one item for her: a freshly killed deer by the side of the road, its bright red blood only just starting to clot

(so, it had been dead less than 15 minutes). I wrestled its limp body into the back of my car and drove it home. It was a young adult, but still way bigger than I bargained for! I cut it up the best I could, stored all that I had room for in the fridge and freezer, and left the rest for the wild things.

My editor-sister asked whether I had any recommendations on feeding roadkill to dogs. I know that plenty of people do it, but I don't have much experience with it. I would probably limit my use of roadkill to very fresh bodies or to those that are several days old and have completed the very smelly, messy, bloating stage of decomposition. For what it's worth, wild carnivores have been observed to eat carcasses that are several weeks old.

Buried bones. Two other ways to increase scent and flavor in a dog's diet are things I've already discussed. The first is allowing and providing opportunities for dogs to bury bones and later dig them up and savor them. You could replicate this process by packing a piece of meat in clean soil and leaving it for a few days. But all things considered, I'd rather the dog do this for herself and decide when it's ready for eating.

'Reducing'. The second is to 'reduce' or concentrate the savory scents and flavors of meat dishes by simmering the broth down to a gelatinous gravy or sauce. The more water that is evaporated from the broth, the more intense the flavor becomes.

Body temperature. Lastly, with almost any food item, warming it to body temperature (neutral when you stick your finger in it) enhances its scent and its flavor, and its enjoyment for a carnivore. It's replicating the warmth of freshly killed prey.

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Here's wishing you and your lovely pet carnivore great health and happiness for years to come!

Appendix A: "Recipes"

You'll have noticed by now that this is not a cookbook for feeding dogs. In this first appendix are "recipes" for some of the most common meals I made for Miss Lilly. I'm including them just as rough guides or starting points for those who want to start home-making food for their own dogs but don't know how to begin.

As I've said throughout the book, I fed Miss Lilly a very diverse diet that didn't adhere to any particular formula for every single meal. Sometimes breakfast really was just a can of sardines, and dinner may simply have been a deer heart or a big piece of frittata I'd made for myself (recipe to follow).

To give you a better idea of how I fed Miss Lilly day to day, how much variety there was in her diet, and how simple it really was, Appendix B contains a series of blog posts I wrote in 2010, in which I logged everything I fed Miss Lilly for two weeks straight. But first, some recipes...

Note: Miss Lilly weighed about 50 lb (23 kg).

Simple chicken stew

Although it's a single-animal-source meal, this stew is easy to make and yielded about 3 days of meals for Miss Lilly, so it was also economical.

ingredients

* 1 whole chicken, medium size (approximately 3 lb or 1.4 kg), ready to be cooked (*i.e.,* from a grocery store, butcher shop, or farmer's market)
* 1 bag of frozen mixed veggies, 1 lb (16 oz or 450 g)
* salt "to taste," dried herbs (optional)

notes

A cooked chicken is 60–70% meat, so a 3-lb chicken yields about 2 lb of meat after cooking. That makes this simple stew about 67% meat and 33% veg (or a ratio of close to 70:30). Sometimes I added more veggies if I felt Miss Lilly needed a bit more veg in her diet that week, but I never went over 50% veg. When I did add more veg, I usually threw in some spinach, fresh or frozen, about 8 oz (230 g) if frozen or a couple of big handfuls if fresh.

The chicken. Whenever possible, I used *pasture-raised* chicken, as it yields more lean meat per pound and healthier fats than even free-range, organic chicken. (I'm told it also tastes better, and Miss Lilly seemed to concur.)

For the "free-range" label, the USDA requires only that the chickens have *some* outdoor access. It does not specify the type or size of the outdoor area; it could simply be (and often is) a door to a dirt pen outside a huge poultry shed. Nor does it specify the amount of time the chickens get to spend outside each day, which could be zero (and often is), as long as they have outdoor "access." In comparison, pasture-raised chickens forage outside on grass and other vegetation all day long.

When you look at pasture-raised and free-range chickens side-by-side after getting them out of their packages, there really is no comparison. In my considered opinion, pasture-raised chicken is worth every extra penny per pound. In fact, when I had to choose between "organic" and "pasture-raised/grass-fed" (but not organic) for any type of meat, I chose pasture-raised or grass-fed every time. (Although *ideal* is both.)

The veggies. Here, though, I chose organic whenever possible. Because pesticide and herbicide use are so prevalent in conventional food production, and potentially harmful genetic modifications are creeping in without our knowledge, I bought organic veggies almost exclusively.

For this stew, I liked the veggie blends that are diverse and really *colorful* (my favorite contained red bell peppers, carrots, yellow squash, green beans,

and zucchini), although I avoided those that included corn. Even if it's organic, and thus free of genetic adulterations, Miss Lilly didn't do well with corn. She tolerated it in small amounts, but she did better without it.

instructions

1. Remove the chicken from its package and take out the giblets.

Chicken giblets typically include the neck and liver; and if you're lucky, you'll also get the heart and gizzard. In other words, a variety of organs, which makes the giblets especially good dog food.

2. Rinse the chicken, inside and out, under running water (cold or warm); also rinse the giblets.

The types of bacteria on/in raw meat that are most likely to cause illness grow exceptionally well in liquids such as the bloody fluid that leaks out of a chicken carcass. So before I did anything else, I thoroughly rinsed the outside of the chicken *and* its body cavity under the tap.

I fed Miss Lilly the giblets raw (she *loved* Chicken Day!), but first I rinsed them under running water. The liver quickly gets waterlogged, but as it's the organ most likely to be contaminated, I did give it a quick rinse.

If I was at all concerned about the freshness of the chicken, I cooked all of it, including the giblets. I kept them in the fridge while the chicken did most of its cooking, and added them to the pot with the veggies (step 5) so that they didn't overcook and lose some of their nutritive value, yet any bacteria they contained would be killed by the heat.

With a nice, fresh chicken (and by that, I simply mean it had no funky smell or other signs of spoilage), I also removed the wings at the elbow using kitchen shears* and fed Miss Lilly the raw wings as a source of calcium.

(See Chapter 2 for a detailed discussion on meeting the dog's calcium needs with a home-made diet.)

* I stretched out the wing and snipped through the skin on the inner angle of the elbow — where the wing changes angle (it really does look like an elbow) — aiming for the joint itself. I then stretched the wing out further and cut through the ligaments and the exposed joint space to remove the wing. (It takes longer to describe it than to do it!)

By the way, I wore rubber gloves (the type used for washing dishes) while handling the raw chicken. Not only did the gloves protect my hands from chicken germs, but they aided my grip. Raw chickens are like buttered footballs! When the chicken was in the pot, I washed my gloved hands and the kitchen shears thoroughly with hot water and dishwashing detergent.

3. Place the chicken in a large soup pot and add 3–4 inches (8–10 centimeters) of water; add salt (and herbs, if desired).

The pot I used was an 8-quart (8-liter) stockpot with lid. It was large enough that the chicken fit easily and the sides of the pot came up well above the top of the chicken. There has to be room for the veggies later, and I wanted to make sure that the pot couldn't boil over if I left it unattended (which I generally did).

I added enough water that the pot wouldn't boil dry during cooking, but not so much that I end up with chicken soup instead of stew. Chicken soup is not so bad, but it takes up more space in the fridge, I'd have to feed more of it to satisfy Miss Lilly's hunger, and she'd pee more after a soup than a stew.

With the stockpot I had, I laid the chicken on its back (breast uppermost) and then added enough water that the backbone was completely submerged and water partially filled the body cavity. To speed things up, I sometimes boiled the kettle and added the boiling water to the pot.

I added a teaspoon or so of salt and a variety of dried herbs. I typically used a little rosemary, sage, thyme, and parsley — a classic aroma and flavor profile! My kitchen smelled wonderful as the chicken cooked.

As for how much salt and herbs I used, I never bothered to measure. I like to cook for myself, so I just used the quantities I'd typically find enjoyable in my own cooking. If you're not a cook yourself, then err on the side of using less salt and herbs. Under-seasoning is the lesser "sin" here, as chicken is a flavor in its own right. Tom Colicchio (tough judge on the reality TV show, Top Chef) might object, but your dog won't mind under-seasoned food.

4. Place the lid on the pot, bring to a boil, and then lower to a simmer; cook until the meat is just beginning to pull away from the bone (about 45 minutes).

With a medium-size chicken, it usually takes about 45 minutes at a simmer until the skin at the lower end of the drumstick has pulled away from the bone. That was my cue to add the veggies because I knew that, by the time the veggies were fully cooked and infused with chicken flavor, the chicken would be cooked all the way through and easy to debone.

5. Add the frozen veggies, bring the pot back up to a boil, then lower the heat and simmer until the veggies are fully cooked (another 15 minutes or so).

I usually added the veggies straight out of the freezer — mostly because I'd forgotten to pull them out of the freezer in time to thaw! — so I'd bring the pot back up to a rolling boil before turning it down again to a simmer. If I waited for the pot to come back up to a boil on its own after adding the frozen veggies, the stew took forever to finish cooking. Ideally, I'd have the veggies thawing at the sink before I even put the chicken on to cook.

To avoid overcooking the veggies, I kept an eye on them after they'd been simmering for about 15 minutes. I wanted them to remain brightly colored but be soft all the way through. The pale-fleshed veggies, such as yellow squash and zucchini, were my testers: when their flesh was translucent, I knew they'd be fully cooked and infused with chicken flavor.

If I was adding frozen spinach, I added it in the last 5 minutes of the veggies' cooking time. Spinach very quickly overcooks, so because freezing it softens

the leaves enough, I didn't actually cook it for this stew; I just let it thaw in the hot stew. If I was adding fresh (raw) spinach, I added it after everything else had cooked, after the heat had been turned off, but while the stew was still really hot. I simply wanted the fresh spinach leaves to wilt and mix in well with the other veggies and the chicken.

6. Once the veggies are cooked, turn off the heat and put the pot in the sink; fill the sink with cold water up to the level of the water in the pot.

When I needed the stew to cool quickly so that I could feed it to Miss Lilly, I filled the sink with cold water, up to the level of the liquid in the pot. I also took off the lid and opened the window over the sink. When I had the luxury of hours before I fed the stew, I would simply turn off the heat and set the pot aside on the stovetop to cool more slowly.

The trick, though, is to not let the chicken get cold before trying to debone it. The meat pulls away from the bone much more easily when the chicken is still warm (but not so hot that it burns your hands).

7. Once the chicken is cool enough to handle, remove the meat from the bones.

I used my trusty washing-up gloves for this step, too, because I didn't like having to wash chicken fat off my hands. A bonus to using gloves is that I could debone the chicken when it was hotter than my bare hands could stand. Deboning is easy when the chicken is well cooked and still warm.

8. Either discard or recook the bones.

With pasture-raised chicken in particular, I used the bones in Miss Lilly's diet as a source of calcium and other nutrients. I was less inclined to feed her the bones (other than the raw neck and wings) when I couldn't find pasture-raised chicken. If I was not feeding the bones, for safety's sake I put them into the garbage as soon as I'd deboned the chicken.

When I wanted to feed the bones, I put them in a crock pot with just enough water to cover them and I cooked them on low heat for another 18–24 hours. The goal was to make all of the bones soft or crumbly.

I didn't want the meat to cook any longer than necessary to kill any resident bacteria and make deboning easy; but I cooked the bones for a long time on low, moist heat to make them safer to feed. After their time in the crock pot, I added the now-soft bones back into the stew (which I kept in the fridge).

9. Mix the chicken meat and veggies together, transfer to storage containers, and refrigerate or freeze.

Although Miss Lilly loved big pieces of chicken, such as the breast or thigh, I usually broke up the larger pieces with my gloved hands so that the stew was a more uniform blend of meat and veggies. I then transferred the stew into storage containers and kept them in the fridge.

Some weeks I fed this stew at almost every meal until it was gone (about 3 days), although I did my best to add in other animal sources here and there along the way (*e.g.,* a small can of kippers for breakfast or some beef heart for dinner). Other weeks I put half the stew in the fridge and the other half in the freezer. I was always glad to find a container of chicken stew in the freezer when I'd run out of fresh meat for Miss Lilly. I really should have frozen it more often!

There you have it. Easy! And quicker than you might be thinking. (It took me longer to describe it than it did to make it.) I got on with other things while it was cooking and cooling because it doesn't need any standing-over and stirring and what-not. For the effort of only a few strategic minutes here and there, I got several delicious, nutritious meals for Miss Lilly.

Note: *If the bones are not being used, this stew contains too little calcium to meet the dog's needs.* When I wasn't feeding bones at least a couple of times a week, I'd add bone meal powder or another powdered source of calcium to this stew, as discussed in Chapter 2.

crock pot variation

This chicken stew can also be made in a crock pot (slow cooker), although the times are quite different. I cooked the chicken (in a similar amount of water, with salt and herbs) on "high" until the skin was just pulling away from the drumstick (about 4 hours in my small crockpot). I then added the frozen veggies and turned the heat down to "low," simmering until the veggies were fully cooked but still brightly colored (about 2 hours in my crockpot).

It's not something you can put on in the morning and leave for the day, because the chicken would be overdone if cooked for 8+ hours, and the veggies really should be added at the end so that they don't overcook. That said, it was an even simpler way of making this stew when I was home for the day and had things to do outside.

Fresh meat & veg

Here's a meal I often made for Miss Lilly when I was cooking veggies for myself. It can be made with *any* veggies and *any* meat, but ground or minced meat (beef, turkey, lamb, *etc.)* mixes in best with the veggies.

Note: *the veggies are cooked but the meat is raw.*

ingredients

* ½ a medium-size cabbage (or 1 small cabbage), finely sliced, as for coleslaw
* ½ a medium onion, thinly sliced
* 1 medium carrot (or 2 small carrots), thinly cut into rounds or on an angle
* ½ a medium bell pepper/capsicum (red, orange, or yellow), seeded and thinly sliced
* 8 oz (1 cup) of frozen green peas
* 8 oz (1 cup) of ground beef or other ground meat
* salt to taste, vinegar or other seasonings (optional)

notes

Onions. The Onion or *Allium* family includes onions, shallots, garlic, scallions or spring onions, leeks, and chives. You may have been led to believe that the Onions are toxic to dogs in any amount. But that's not true.

Certain breeds (*e.g.,* Akita, Shiba Inu, Korean Jindo) are more susceptible,[1] but most dogs tolerate the Onion family in the amounts we typically use for flavor in our own cooking. It's all about *amount.*

The toxic amount in dogs is reported to be in the range of 15–30 grams of onion per kilogram of body weight,[2] which works out to be 2.5 to 5 ounces per 10 pounds of body weight. For a dog Miss Lilly's size, I'd need to have fed her *more than 12 oz* (340 g) of onions in a single meal to cause a problem.

I can attest from long experience that, when used in the same amounts that we find tasty in our own cooking, members of the Onion family are generally well tolerated and much enjoyed by dogs. I always fed the Onions *cooked,* though; never raw. Cooking doesn't change their toxic potential, but it changes their structure and flavor so that I could do more with less.

Other veggies. I substituted veggies according to what was in the fridge or needed using up first. (That's the beauty of these recipes: substitutions are not only possible, they're encouraged!) Regardless, my goal was plenty of *variety.* Whether I was making this recipe with white/green or red cabbage, it's a colorful blend and contains several different types of veggies.

Meat–veg ratio. This meat-to-veg ratio may seem way off, but here I was cooking enough veggies to feed myself *and* Miss Lilly. For my vegetarian self, I threw in a handful of walnuts and some nutritional yeast to my portion after

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[1] In the study that documented the greater susceptibility of certain breeds to onion toxicity, the dogs were fed 200 grams (almost a cupful) of boiled onions. That's enough to make *me* feel sick! [*American Journal of Veterinary Research,* 1992; 53 (1): 134–137.]

[2] 'Household food items toxic to dogs and cats.' [doi: 10.3389/fvets.2016.00026]

the veggies were cooked and I'd separated off Miss Lilly's share (about 2 cups loose, or 1 cup compressed). I'd just eyeball the veggie portion for her, but I was aiming for a meat–veg ratio of at least 50:50, or *at least* 50% meat.

This blend worked well as leftovers, too, and maybe even better, because the veggies sopped up the savory flavors as they sat in the fridge overnight. If I needed leftovers, I kept all of the veggies for Miss Lilly and used 1 pound (~ 450 g) of meat.

instructions

1. Put cabbage, onion, and peas into a medium-size saucepan with a small amount of water; steam veggies until fork-tender (10–15 minutes).

I added just enough water (about ½ inch or 1 cm) so that the veggies wouldn't boil dry, but not so much that there'd be a lot of water left over after cooking. Any surplus cooking liquid can be mixed in with the meat & veg, but I didn't want there to be so much that the meal was soupy. (I have used a steamer basket to steam the veggies, but I lost mine a few moves ago and didn't bother to replace it.)

I gauged the total cooking time by the type and size of the cabbage, in particular on the thickness of the ribs down the center of the leaves. Red cabbage takes the longest (up to 15 minutes); ordinary white or green cabbage takes about 10 minutes, and savoy cabbage (a smallish green cabbage with crinkled leaves) takes 5–7 minutes to be cooked without being overcooked.

The peas and onion usually take about 10 minutes to cook. I didn't mind them slightly overcooking (better to slightly overcook than undercook these veggies), so I added them to the cabbage at the start, even when using red cabbage. But when I used savoy cabbage (which wasn't very often), I gave the peas and onion a 5-minute head start before adding the cabbage.

These cooking times are important only because I used them to let me know when to add the rest of the veggies so that I didn't overcook them (see steps 2 and 3). As soon as the cabbage, onions, and peas were at the boil, I turned the

heat down to medium and set the timer on the stove for the appropriate time, then got the rest of the veggies ready for their turn.

2. Add the carrots when there's about 5 minutes left on the timer.

3. Add the bell pepper with 2–3 minutes to go.

I like bell peppers (‘capsicum’ to us Aussies) raw, so when making this veggie mix just for myself, I barely steamed the peppers. I added them after the other veggies were cooked and I'd turned off the heat, letting them lightly steam in the residual heat.

Miss Lilly, though, wouldn't touch bell peppers unless they were thoroughly cooked, so it was at least 3 minutes for her. (Same goes for the carrots.)

4. When all the veggies are fork-tender, take the pot off the stove and drain off any remaining liquid into a bowl; let the veggies cool for a few minutes.

Catching and keeping the surplus cooking liquid is important because it contains nutrients (minerals, antioxidant pigments, *etc.*) that were leached out of the veggies during cooking. The color of the cooking liquid makes that abundantly clear. These plant pigments are generally rich in antioxidants, which is one of the reasons I fed them to my reluctant dog.

Even when using a steamer basket, some nutrients are lost from the veggies into the water below. Because I was using veggies in Miss Lilly's diet for their nutritional content, I added this liquid back in to her meals. When I was making this veggie blend for both of us, I took out my portion and then added the residual cooking liquid to hers. But first, I added some seasonings.

5. Add salt (and other seasonings, if desired) to taste.

I’m a salt fiend, so I think everything needs salt. I added salt “to taste" (according to my taste preference) to the veggie blend, even if I was making it just for Miss Lilly.

I also like a splash of vinegar with steamed veggies, so I usually added some apple cider vinegar or white wine vinegar to the veggies when using white or green cabbage, or balsamic vinegar when using red cabbage. Miss Lilly seemed to really like a bit of vinegar, too, which helped the veggies go down.

I typically added a tablespoon or so of oil as well, my preference being olive or walnut oil. I added a bit more to Miss Lilly's portion if I was feeding a lean meat such as ground turkey, but not when using the more fatty meats such as beef or lamb. The oil improves the palatability (specifically, the "mouth feel") of the veggies, and for Miss Lilly it added calories as well.

6. Mix the ground meat with the veggies in a ratio of approximately 50:50.

From experience, I just eyeballed the amounts when doing this step. This veggie blend is quite loose and bulky. In comparison, ground meat is quite dense and compact, so a ratio of about 2 cups of the cooked veggies (loose) to 1 cup (8 oz) of ground meat comes out to a ratio of about 50:50. (The one time I checked it, 2 cups of the loose veggie blend compressed down to about 1 cup, or 8 oz, of compacted veg.)

By the way, I'm well aware of how imprecise this approach is, and how uncomfortable that makes some people, particularly those used to feeding by numbers. But “the proof of the pudding is in the eating.” Not only did Miss Lilly survive this rather relaxed approach, she thrived on it. I do use nutrition tables, lab results, calculator, and scale when dealing with certain problems in my patients. But I don't use a scale, nor measuring cups and spoons, when preparing meals for myself; and neither did I for Miss Lilly.

Because Miss Lilly didn’t care for even seasoned veggies on their own, I had to "meat up" the veg really well for her. I put on my washing-up gloves and thoroughly mixed the ground meat with the veg by hand.

I took the raw meat straight out of the fridge and mixed it in with the hot veggies. The veggies were cooled by the meat, and the meat was warmed by the veggies — and just as importantly, the veggies were *flavored* by the meat.

As for feeding ground or minced meat raw, I never had a problem with this approach, not even when feeding this blend as leftovers the next day. (I put the remainder into the fridge right away, so it didn't get to sit out at room temperature after mixing.)

Note: *On its own, this meal contains too little calcium to meet the dog's needs.* When I wasn't feeding bones at least a couple of times a week, I'd add bone meal powder or another powdered source of calcium to this meal, as discussed in Chapter 2.

Even easier meat & veg

Here's an even easier version of a 50:50 meat & veg meal I sometimes made for Miss Lilly. It uses frozen veggies and fresh meat, ground/minced or in chunks (*e.g.*, stew meat or cut-up beef heart).

Note: *Both the veggies and the meat are cooked.*

ingredients

* 1 lb (450 g) of frozen mixed veggies
* 1 lb (450 g) of raw meat, ground/minced
* 1–2 tablespoons of vegetable oil or butter
* salt to taste, other seasonings (optional)

instructions

1. Put the oil in a flat saucepan or frying pan and add the meat; cook on medium heat until the meat is just beginning to brown (10–15 minutes).

I used only about a tablespoon of oil for fatty meats such as beef and lamb, but for lean meats such as turkey I used a bit more oil — not just to prevent the meat from sticking to the pan, but also for the extra calories.

In fact, when using turkey I'd often add a tablespoon of butter instead of the second tablespoon of oil. Butter has more flavor than vegetable oil and, being from an animal source, it's more species-appropriate for a dog. Ghee or clarified butter (the oily portion of butter, minus the milk solids which burn so easily) can also be used.

I stirred the meat occasionally, breaking it up as necessary, to make sure it cooked evenly; but otherwise I left it alone while I did something else. I browned the meat with the lid off the pan; otherwise, it just boils (*yuck!)*

2. Add the frozen veggies, stir in well, cover the pan with the lid, and cook on low-medium heat until the veggies are fully cooked (15–20 minutes).

If I'd planned ahead and left the bag of frozen veggies at the sink to thaw, this step took only about 10 minutes. But if the veggies were still frozen (which was usually the case), this step took 20 minutes or so, as the pan needed to come back up to heat after the addition of the still-frozen veggies.

I didn't want to overcook the veggies; but if I didn't cook them with the meat for at least 10 minutes, Miss Lilly picked out the ones she didn't like and left them on the floor, which rather defeated the purpose.

3. Remove from the heat and add salt and other seasonings.

For the fattier meats such as beef or lamb, salt is often enough. (I added about as much for Miss Lilly as I would to a meal I would make for myself.) Sometimes I also added a little dried oregano. It was always well received and it made my kitchen smell wonderful!

Particularly with the blander meats such as turkey, I usually added a dusting of mild curry powder and/or a generous squirt of ketchup (tomato sauce). In the winter months, another reliable option was a light sprinkle of chipotle powder (a smoky chili powder that has a moderate kick).

The seasonings can also be added during cooking.

Lightly browning the meat before adding the veggies, and then cooking the veggies with the meat, usually got the veggies down Miss Lilly. However, adding these other seasonings ensured that the bowl was licked clean and no veggies were spat out onto the floor.

Note: *On its own, this meal contains too little calcium to meet the dog's needs.* When I wasn't feeding bones at least a couple of times a week, I'd add bone meal powder or another powdered source of calcium to this meal, as discussed in Chapter 2.

Steamed fish & veg

This simple, two- or three-ingredient meal is one I made whenever Miss Lilly had a digestive upset or she was a little "off her food." Its aroma and flavor stimulated her appetite, and it was easy to digest, with plenty of lean animal protein and digestible fiber to satisfy the microbes in her colon. It never failed us. I also advise this meal for dogs recovering from digestive upsets. It's vastly better than the conventional "chicken and rice"!

ingredients

* approximately 8 oz (230 g) of 'white' fish fillets, fresh or frozen
* ½ a medium cabbage (or 1 small cabbage), finely sliced, as for coleslaw
* 1 handful of spinach or other dark leafy greens (optional)

notes

The fish. The best types of fish to use in this recipe are the low-fat, white-fleshed ocean fish such as cod, flounder, and whiting. This meal is designed to be very low in fat, so I avoided oily fish such as salmon. I also bought *wild-caught* rather than farm-raised fish, for much the same reasons as I chose pasture-raised or grass-fed over lot-fed livestock and poultry.

I usually kept a packet of fish fillets in the freezer for whenever it was needed. Although I used this recipe when Miss Lilly was feeling a bit off,

I also used it when I'd run out of everything else before grocery day, and when I thought Miss Lilly could use a light, tasty meal instead of her usual heavier fare.

The veg. The principal veg in this recipe is ordinary white or green cabbage, finely sliced and then steamed. Steamed cabbage is great "bug food" for the gut microbes, and its bulk stimulates the movement of material through the digestive tract. When our digestion slows down, it creates a crummy, sludgy feeling that resolves once things get moving again. As long as the cabbage is well cooked (but not *over*cooked), it does not cause excess gas.

As for the spinach, I'd sometimes add a generous handful of spinach or other dark leafy greens (*e.g.,* kale or beet greens) if I hadn't been feeding Miss Lilly a lot of colorful veggies in the past few days, or if she seemed particularly "sludgy," for want of a better word. I hesitate to use the overworked term "detox" here, but the fresh greens really did seem to help "right the ship" beyond merely providing fiber, vitamins, and minerals.

instructions

1. Steam the cabbage in a small amount of lightly salted water in a flat saucepan or frying pan with lid, on medium heat, until just turning fork-tender (about 10 minutes).

I used a large, flat saucepan or lidded frying pan because I added the fish fillets while they were still frozen, and I wanted them to lie flat in the pan.

I added just enough water to steam the cabbage and fish without the pan boiling dry, which was barely a ¼ inch (6 millimeters) of water in the large saucepan I used. Using a pan with a lid is important, both to avoid the pan boiling dry and to speed cooking.

I added a small amount of salt to the water, or to the cabbage if I forgot to add it to the water. Just a pinch will do for this recipe.

2. After about 5 minutes, add the fish on top of the cabbage, replace the lid, and steam until both cabbage and fish are fully cooked (5–7 minutes).

Once the fish has thawed from the heat of the steaming cabbage, thin fillets of white fish take only a couple of minutes to cook. Thicker fillets take a bit longer. When the fillets were frozen together, I gently separated them as they thawed so that they cooked quickly and evenly.

Adding the frozen fish slows down the cooking of the cabbage, but by the time the cabbage is cooked to fork-tenderness, including the thicker leaves and the ribs, the fish is fully cooked as well.

3*a*. *(Optional)* Remove the pan from the heat, add the greens, replace the lid, and let the greens wilt in the residual heat (about 1 minute).

When I added spinach or other leafy greens, I simply wanted the leaves to *wilt* so that I could mix them with the fish and cabbage (otherwise Miss Lilly wouldn't eat them). I didn't want to *cook* them. If I wanted to speed up the wilting process, I'd start mixing the greens with the still-hot fish and cabbage.

3b. Thoroughly mix the fish and veggies, cool at the sink, then serve.

The point of this step was to thoroughly flavor the veggies with the fish. Steamed cabbage on its own is not very appetizing even to vegetarians, so to get Miss Lilly to eat it, it had to taste like meat (in this instance, fish). If the fish is fully cooked, it flakes apart into small pieces, which mixes well throughout the cabbage while everything is still hot.

As I mentioned in other recipes, I sped up the cooling of cooked meals such as this one by placing the pan in cold water in the sink for a few minutes. If Miss Lilly had a poor appetite, she didn't mind waiting; but if she had any sort of an appetite, she'd be impatient to eat as soon as it was ready. I don't blame her, so I obliged by cooling her food down to body temperature as quickly as I could after cooking it. Cooling it quickly also prevented the food from overcooking in the residual heat of the pan.

If I was simply using this recipe as an ordinary meal, rather than to address a digestive upset, I would often add a tablespoon or two of vegetable oil (walnut or olive oil), or even some butter, to increase the meal's fat content and make it more satisfying. Otherwise, I used no oil or fat. The fish was flavorful enough, so I also didn't use seasonings other than a little salt.

Note: *On its own, this meal contains too little calcium to meet the dog's needs.* When I wasn't feeding bones at least a couple of times a week, I might add bone meal powder or another powdered source of calcium to this meal, as discussed in Chapter 2.

Veggie frittata (lazy cook's quiche)

I made this "crustless quiche" about once a week, more for myself than for Miss Lilly. It can certainly be made with meat, but as I'm vegetarian, I made it without any meat. Sometimes I added ground/minced beef to the portion I gave Miss Lilly, but most of the time she ate the vegetarian version with me.

ingredients

* 8–12 eggs (can be made with as few as 6 eggs)
* 1 medium onion, coarsely chopped
* 1 medium carrot, coarsely grated
* ½ a medium cabbage, coarsely chopped
* 1 large head of broccoli (or 2 small heads), coarsely chopped
* 3–4 oz (½ cup) of feta cheese, crumbled
* ¼ cup of parmesan or cheddar cheese, grated
* 8 oz (1 cup) of milk or milk substitute (*e.g.,* almond or rice milk)
* 2–3 tablespoons of vegetable oil (walnut or olive oil)
* salt to taste, nutmeg (optional)

notes

This frittata can be made with any veggies, including cooked leftovers, so I substituted according to what I had in the fridge. The beauty of this dish is that it can be made with many different ingredients, so it's a great way to use up leftovers.

It can be made without milk or milk substitute, but the result is a much more dense, even rubbery, quiche. I prefer a light, fluffy quiche, so I usually made it with almond or rice milk. (I don't do well with a lot of dairy products in my diet, so I usually opted for a milk substitute.)

The frittata can also be made without cheese, but it's not as tasty. My favorite topping is parmesan cheese that I buy as a small block and grate as needed. It's not cheap, but it's so tasty that I can indulge without breaking the bank or upsetting my digestive system. When I'm out of parmesan or I'm avoiding dairy products altogether, I sprinkle the frittata with smoked paprika just before putting it in the oven.

instructions

1. Heat the oven to 350° F (180° C).

2. Using an oven-proof skillet, sauté the onions in the vegetable oil until tender (translucent).

I often used walnut oil because it's rich in omega-3 fatty acids, but nowadays I use olive oil. On medium heat, the onions take 10–15 minutes to reach this stage. In the meantime, I prepare the other ingredients, stirring the onions every couple of minutes so that they cook evenly and don't burn. I add a generous sprinkling of salt to the onions as they're cooking.

I often hear "*but aren't onions poisonous to dogs?*" In large enough quantity, any of the Onion family can cause stomach irritation and even hemolytic anemia (red blood cell rupture). But as I discussed on page 143, in the quantities we typically use in cooking, they generally are not a problem.

Miss Lilly probably ate at least twice her weight in onions over her lifetime and never showed any harmful effects — with one exception:

The only time Miss Lilly had trouble with anyone in the Onion family was when I put an entire head of garlic into the stew pot. I can't remember exactly why I did that, but it was for some well-intentioned reason, such as "garlic is good for the immune system." That was in my early days of learning about holistic medicine, and I wasn't yet thinking for myself. Anyway, not only did she find the stew unpalatable, but I think it upset her stomach, because ever since then she refused to eat anything that smelled strongly of garlic.

Sautéed onion, on the other hand, was a flavor she particularly loved, so I used it quite a bit to get her to eat her veggies.

3. Add the carrots and other veggies, stir well, and cook on medium heat until fork-tender.

I found out the hard way that it's important to fully cook the veggies on the stovetop *before* the frittata goes into the oven. Particularly when using veggies in the Cabbage or *Brassica* family (cabbage, broccoli, cauliflower, *etc.*), under-cooking the veggies can result in a bellyache and smelly gas. You'd think they'd finish cooking thoroughly in the oven, but they don't (at least, not before the egg mixture is set and the frittata is ready to be taken out of the oven). So, I make sure that the veggies are fully cooked before adding the egg mixture and placing the frittata in the oven.

I also add a generous sprinkling of salt to the veggies while they're cooking. I've heard it said that adding salt to eggs before cooking makes them rubbery. I don't know whether that's true, but as I don't like rubbery eggs — nor bland veggies — I salt the veggies. (Tom Colicchio, of Top Chef, taught me that: season every component of the dish as you go along.) I used to taste the veggies before I added the egg mixture, to make sure I had the seasoning right; now I don’t need to, I’ve made this frittata so often.

4. Crack the eggs into a bowl and beat well. Add the feta, a light sprinkle of nutmeg, and the milk (or substitute), and stir lightly to combine all ingredients.

The secret ingredient in this frittata is a little bit of nutmeg. Just a light sprinkle makes all the difference. The quiche can certainly be made without it, but once you've started adding nutmeg to your egg dishes, you'll miss it if you forget.

5. Once the veggies are fully cooked, pour the egg mixture over them and give the pan a gentle shake to distribute the liquid and feta evenly throughout.

6. Sprinkle the grated cheese (or smoked paprika) evenly over the top of the frittata, and place the pan in the oven; bake until set (about 35 minutes).

In my oven, it usually takes 25–30 minutes for a 6-egg frittata, and about 35 minutes for a 12-egg frittata. When the cheese on top is just starting to brown and the center is no longer jiggly, that's my cue that the whole thing is ready.

7. Take out of the oven; run a spatula or knife around the edge of the pan, and slice the frittata while still warm.

A 6- to 8-egg frittata usually disappeared in one meal, divided between myself and Miss Lilly. A 12-egg frittata gave us a few leftovers, unless the neighbor dogs were visiting… [See Appendix B, to follow.]

Note: *On its own, this meal contains too little calcium to meet the dog's needs.* When I wasn't feeding bones at least a couple of times a week, I might add bone meal powder or another powdered source of calcium to this meal, as discussed in Chapter 2.

Appendix B: Blogging Miss Lilly

In the summer of 2010, for two weeks straight I wrote this series of blog posts about what I fed Miss Lilly that day. I was living in the greater Seattle area at the time and mostly shopping at the local food co-op, Puget Consumers Co-op (PCC) Community Markets.

You'll see repeated references to our neighbors' dogs. We lived on a corner lot, with neighbors beside and behind us who rented from the same landlord. At the time I wrote these blog posts, all of these neighbors had friendly dogs, so we opened the interior fences which separated our yards and made one large, fully fenced yard for our dogs to share.

The core group consisted of six dogs, of various breeds and ages, who could freely visit all four houses. It was a wonderful arrangement for dogs and humans alike, and I still miss having a kitchen full of dogs.

Anyway, here it is, *Blogging Miss Lilly,* with only minor revisions. I've since revised the meat-to-veg ratios with which I was experimenting at the time (I was trying to get away with feeding less than 50% meat), but the rest is still pretty representative of how I fed Miss Lilly from day to day. I've left it in the present tense in which I wrote it.

Feeding Miss Lilly, day 1

Lately I've found myself having the same conversation over and over, about how to home-prepare food for dogs. A while back I wrote an article for my web site on how to feed dogs a great nature-inspired diet, in which I describe how I feed my own dog, The Splendid Miss Tiger Lilly.

But evidently, questions still remain about the practical, day-to-day issues of shopping and food prep, so I figured it might be useful for me to start

blogging about how I feed Miss Lilly. I don't know where this is gonna go, but let's see...

Last night, Miss Lilly had **lamb and veggies** for dinner.

ingredients

* napa cabbage, 1 medium-size cabbage, finely shredded
* red bell pepper, approx. ½ a large bell pepper (it was left-over strips of bell pepper from my dinner the night before), finely diced
* ground lamb (raw), approx. 8 oz (230 g)

notes

Cabbage. I use cabbage a lot in Miss Lilly's meals, as it's inexpensive, available year-round, comes in several different varieties (I'm big on variety), and it's nutritious. I have read/heard that one should not overfeed cabbage and other 'cruciferous' veggies, as the entire *Brassica* family (including cabbage, brussels sprouts, broccoli, cauliflower, and kale) can interfere with thyroid function. However, both Miss Lilly and I eat lots of these veggies — I use them often and I'm generous with the quantities — and we've not had any such problems.

Cabbage is also a great "filler" vegetable, as it's bulky, so it helps me meet the "satiety quotient" (*i.e.,* Miss Lilly feels satisfied after she's eaten). But cabbage is not just filler; it's food, as it's high in nutrients and in digestible fiber, which is great bug food. The "good bugs" (beneficial microbes) in the large intestine thrive on digestible fiber, and the body thrives when its gut microbes thrive.

In fact, lightly steamed cabbage and some lightly steamed white fish (cod, flounder, whiting, *etc.)* is my favorite meal for dogs with digestive upsets.[1] It is practically miraculous at settling things down. Vastly superior to the conventional standby: boiled rice and chicken!

[1] See page 149 (Appendix A) for the recipe.

Speaking of stinky things, as long as the cabbage is properly cooked, I haven't had any problems with unpleasant gas. The trick is to cook it "just right." If you undercook cabbage, your dog will stink; but if you overcook cabbage, your kitchen will stink.

To cook it "just right," cook it just until the thickest parts of the leaf (the base and ribs) are soft, but before any part of the cabbage becomes mushy. For a napa cabbage, that may be less than 5 minutes. For savoy cabbage (which has a little more robust leaf), 5–7 minutes; and for regular white/green and red cabbage varieties, it's 10–15 minutes.

By the way, I often add a splash of vinegar when I'm cooking cabbage. Whether and what I use depends on what I'm making. I have a lovely, raw organic apple cider vinegar, a very nice white wine vinegar, and an absolutely luscious balsamic vinegar. Regardless of which I use, the vinegar goes down a treat with the dogs.

I keep meaning to write an article on gut microbes, as they're so important to our health. For now, let me just say that some dogs need a little time and perhaps some probiotic help in order to (re)create a healthy gut microflora that can deal with a diet which includes veggies. However, it is not a difficult transition, and it pays off immediately in better health and well-being.[1]

Bell pepper. I love, love, *love!* bell pepper (or capsicum, as we call it in Australia). I especially love the red ones, but I also like the yellow and orange varieties. Miss Lilly, on the other hand, doesn't care for any of them. If I don't chop them finely, I'll find them strewn about on the floor beside her food bowl, from where the neighbor dogs eventually clean them up.

For the most part, I listen to her preferences and don't often add bell peppers to her food. But last night I did, as I had some left-over sliced peppers that needed to be used up, and because I wanted to add some colorful veggie to her dinner and didn't want to use carrots again.

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[1] Making this transition is discussed in Chapter 4.

I like carrots and use them often, but variety is hugely important, so I keep looking for ways to get more variety of foods into Miss Lilly's diet. I'm also big on not wasting good food, so in went the red bell peppers — just finely diced, so that she'd have trouble picking them out (kinda like hiding the broccoli in the pizza sauce).

Awhile back, I attended a lecture on food therapy in Traditional Chinese Medicine (TCM), adapted for veterinary patients. I was very interested to see bell peppers included in some of the recipes. I don't recall what their particular properties were, in TCM terms. I just remember thinking, "Oh, good; they're not toxic to dogs!" (Miss Lilly's aversion to them had me concerned...) Turns out, she's just very decided in her taste preferences, and bell peppers don't make her list of "acceptable" foods.

I do take her preferences into consideration when preparing food for her. But as I said, I'll also try to use up left-overs whenever I can. Even though my compost pile loves to be fed as well, it's perfectly content with scraps.

Lamb. The lamb I used is a ground mix of muscle meat, heart, and liver that I buy from PCC. It is labeled as "lamb pet food" and it's found in the freezer case. The lamb is grass-fed, from the Umpqua Valley in Oregon. So, while it's not quite local, it is at least regional. I do try to support local and regional producers whenever possible, although I will go further afield to meet the "variety quotient" when necessary.

instructions

1. Shred the cabbage and steam it in a small amount of lightly salted water until the thickest parts are just softening.

2. In the meantime, dice the bell pepper and add it to the cabbage in the last minute or two of cooking.

3. Take the pot off the heat and cool it in the sink.

Fill the sink with a couple of inches of cold water, and set the pot without lid in the water, so that the veggies cool to edible temperature quickly. Hungry dogs don't like to wait. Stir occasionally to speed cooling.

4. Add a splash of vinegar or other culinary flavoring, such as herbs or spices. (I used balsamic vinegar.)

5. Once the veggies have cooled down a bit, add the ground lamb and mix in well.

I put on the rubber gloves I use for washing dishes and mix the ground meat with the veggies by hand. You can certainly use bare hands if you want; I just prefer not to smell like raw lamb all evening. It's important to mix the meat in thoroughly so that the veggies are flavored by the meat.

6. Serve at body/room temperature.

Takes maybe 2–3 minutes once the veggies come off the stove if you cool the pot in the sink and add the lamb straight out of the fridge; the lamb warms as the veggies cool.

7. Put any leftovers straight into the fridge, in an airtight container.

The leftovers can be served right out of the fridge the next day; no need to heat (although you can if you want).

more notes

Cooked *vs.* raw. I often feed the veggies lightly cooked and the meat raw. Dogs don't make the best use of raw vegetables unless the veggies are practically ground to a pulp in a blender, food processor, or juicer. While lightly cooking the veggies results in the loss of some of the more delicate nutrients (*e.g.,* heat-sensitive enzymes), cooking improves the digestibility of veggies for this carnivorous species.

As for feeding raw meat, dogs are designed to eat their prey raw.[1] I have not had any problems with feeding human-grade meats raw in healthy dogs.

Flavorings. I'll often add culinary herbs and spices to Miss Lilly's food. While almost all culinary herbs have some nutritional and medicinal properties, I primarily use them for flavor: to add to the "variety quotient" of Miss Lilly's diet and keep it interesting.[2] She especially loves Indian spices, although she also likes Italian herbs and even a little hot chili (which still amazes me).

Last night I added a splash of balsamic vinegar once the veggies came off the heat. The cabbage & peppers looked like they needed a little something, and the balsamic vinegar seemed just the thing. A kitchenful of dogs, licked-clean plates, and "*any more?*" expressions told me it was a good choice.

Leftovers. I seldom have left-over dog food (unless I plan for it). The neighbor dogs know my routine and are usually begging for some of Miss Lilly's food at dinnertime. She won't share, but I will.

My motto at dinnertime is "*everybody eats,*" so whoever is in my kitchen at dinnertime gets at least a little bit of whatever I've made. I'm a hit! (But lest my head get too big, the commercial dog food at the neighbors' is a hit with Miss Lilly. The grass is always greener...)

Calcium. You may have noticed that there was no calcium added to last night's fare. Calcium needs to be added to home-made, meat-based diets for dogs. But I have that covered, as I feed raw bones at least a couple of times a week. Miss Lilly and all the neighbor dogs each got a big marrow bone to work on the night before, and a good bone every 2–3 days seems to be plenty for Miss Lilly.[3]

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[1] Raw *vs.* cooked is discussed at length in Chapter 4.

[2] Feeding for variety is the subject of Chapter 3.

[3] Feeding bones and supplying the dog's calcium needs are discussed at the end of Chapter 2.

how much?

For her evening meal (which I typically make the larger meal of the day), I usually give her 2–3 cups of whatever I've made. She got about 2 cups of the lamb & veg mixture last night. I would have had plenty of leftovers for her breakfast this morning, had I not shared the rest of it with the five neighbor dogs.

Had I kept some leftovers, I'd have fed her a scant cupful of the lamb mixture for breakfast. This PCC lamb dog food is quite fatty. That's perfectly appropriate for a dog, who should be getting the bulk of her calorie needs from animal fats and proteins. But presently Miss Lilly is a suburban dog and is now in her middle years. While we do go for walks most days and she has a very large yard and dog friends to romp with during the day, she's not as active as when she was younger and we had more space to roam.

Mostly as a matter of personal preference, I feed Miss Lilly more at night than in the morning. The reason is that I want her sacked out of an evening, digesting her dinner, when I'm on the couch doing the same. But you can certainly feed equal amounts morning and evening, feed a larger meal in the morning, or feed just once a day. It's up to you and what works best with your routine and for your dog.

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Breakfast. Breakfast this morning consisted of a small can of kippers, with a sprinkling of *Vitality Canid* (see below). I feed kippers or sardines at least a couple of times a week,[1] as they're delicious (well, I don't think so, but Miss Lilly does), high in protein and minerals, and high in essential fatty acids, particularly the omega-3s. And to be honest, I also feed canned fish (kippers, sardines, and occasionally salmon) because it's easy. Sometimes easy is good.

Vitality Canid is an all-natural micronutrient supplement I make for dogs. I don't feed it every day, as I believe that we should be getting most, if not all,

[1] I later fed canned fish only once a week or so, and I made sure to buy products which state that the can lining is free of bisphenol A (BPA).

of our nutrient needs directly from our food. That's one of the main reasons I emphasize variety. The more variety we have in our diets, the more likely we are to meet all of our nutrient needs.

But sometimes it pays to have a little insurance, to fill in the theoretical gaps in our diets with a well-formulated supplement. When we're eating mono-meals (*i.e.*, a meal of just one thing, such as peaches for me or fish for Miss Lilly), that's when it makes sense to take a little something extra to ensure that we're meeting all of our micronutrient needs.

Dinner. Tonight, I'll probably feed the rest of the lamb, along with some curried lentils I'll be preparing for myself. The lamb pet food comes in 1-lb (450-g) bags, and I used only half of it last night. I try to feed a different animal protein every night, but I also try to avoid wastage and to feed the freshest possible foods. As the lamb is already thawed, I'll use it up while it's still nice and fresh, and feed something entirely different tomorrow night.

***

OK; that's it for now. I'm going to try to keep a log of everything I feed Miss Lilly for the next week, so that you get the idea, and perhaps some menu ideas and recipes to try. It really is easy, once you get into the habit of feeding your dog (and yourself) this way: a wide variety of fresh foods, freshly prepared.

Feeding Miss Lilly, day 2

Tonight Miss Lilly had **curried lentils and lamb**. It was a hit!

ingredients

* cooked lentils, 2–3 cups (see recipe below)
* ground lamb (raw), approx. 8 oz (230 g), the remainder from Day 1
* salt, mild curry powder, to taste

instructions

1. Cook the dry lentils (details below) or open a 15-oz (425-g) can of lentils.[1]

2. Add a splash of white wine vinegar (either when cooking the lentils or later).

3. Add curry powder and salt to taste. (Note: taste it before adding the raw lamb!)

4. Mix in the lamb.

I gave Miss Lilly almost 3 cups of the lamb-lentil mixture, as it was quite soupy in consistency, and I wanted to make sure she got enough calories and other nutrients, as well as feeling nice and full.

The neighbor dogs were here again and licked everyone's plates clean; not a single lentil left anywhere. And my floor is now nice and clean.

cooking lentils

Lentils, beans, and peas — *i.e.*, legumes — are OK occasionally, as long as they're properly cooked. I use cooked lentils or peas in Miss Lilly's meals once a week or so. I eat them more often myself, but I'm a vegetarian, and legumes are an important source of protein for me.

I sometimes use canned lentils and beans, but with all the debate about the safety of the linings used in many canned foods these days, I prefer not to use them. When I'm able (and these days I'm making a serious effort to feed myself and Miss Lilly well), I prefer to buy dried legumes (organic, of course) and cook them myself.

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[1] Later when I made similar meals for Miss Lilly, it was generally because I was making the lentils for myself and sharing only some with her. For Miss Lilly, I used a ratio of 50:50 meat-to-lentils, or even a little more meat than lentils.

Here are some tips for cooking dried lentils (and beans) properly, learned the hard way (and you know what I mean... ☺):

* Soak the lentils for several hours, even overnight, before cooking: cover with warm water and let them sit at room temperature for 6–8 hours.

* Drain the water off, then rinse the lentils thoroughly (at least 3 times) before cooking; rinse until there is no longer any froth on the rinse water (froth now = gas later).

* Put the lentils in a soup or stock pot, cover with water (about 2 cups of water for every 1 cup of lentils), bring to a boil, then turn down to a simmer.

* Add a generous splash of vinegar at the start of cooking (or later if you forget); 1 tablespoon of white wine vinegar usually is ample for 1 cup of lentils in 2 cups of water. This step is also important for avoiding gas.[1]

* Cook the lentils per instructions on the package or bulk bin. For the tiny French green lentils (which I love, and used for Miss Lilly's dinner tonight), it takes only 45 minutes; for the regular brown or green lentils, it may take at least 1 hour.

* Test the lentils for "done-ness" before turning off the heat; they should be soft all the way through, but not mushy. Don't take them off the heat until they're fully cooked, no matter how long the instructions say to cook them. Under-cooking legumes is another recipe for gas.

* Flavor to taste with salt and whatever herbs, spices, or other seasonings you like.

I especially like balsamic vinegar with lentils, and I'll often add it once the lentils have finished cooking, even though I've cooked the lentils in a little

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[1] These days, I have to take a digestive enzyme supplement whenever I eat legumes; these cooking steps are no longer enough. In terms of preventing excess gas with legumes, the most important digestive enzyme is alpha(α)-galactosidase.

white wine vinegar. Miss Lilly likes balsamic vinegar, too. Thyme goes particularly well with lentils and other legumes; curry is another of our favorite additions. I can also recommend a light sprinkling of chipotle powder (that's a smoky chili powder with a medium kick).

Feeding Miss Lilly, day 3 (morning)

For breakfast this morning, Miss Lilly had the rest of last night's lamb & lentil stew, which had thickened nicely overnight in the fridge. She got maybe a cupful this morning, as I held a little back for Ms Bella, one of the neighbor dogs (who has the most uncanny sense of what's going on in my kitchen, and showed up right on time to get a little lamb & lentils this morning).

Last night, after I finished logging Miss Lilly's evening meal, we shared some raw almonds. I eat nuts quite often, and if Miss Lilly is around, she usually gets some, too. We mostly eat raw cashews, almonds, walnuts, and pecans. Sometimes peanuts, but not very often.

Granted, Miss Lilly doesn't make the best use of nuts, as dogs don't chew their food more than a couple of times before swallowing it. And it can't be pleasant, passing poop with chunks of nut in it! But still, we enjoy this little ritual of sharing food, and she likely gets some benefit from the softer nuts.

If her poop is nice and bulky, which it generally is when her meals contain ample veggies, then she seems to have no trouble passing it, even with bits of nut in it. I didn't count them, but Miss Lilly got maybe a small handful of almonds all up. I make sure I give them to her one or two at a time so that she doesn't swallow them whole.

Feeding Miss Lilly, day 3 (evening)

Today Miss Lilly and her dog friends got some beef ribs. As I said in an earlier post, I feed raw bones a few times a week to supply Miss Lilly with the calcium that would otherwise be lacking in her meat & veg diet. I like to feed raw bones to dogs for two other reasons: it helps keep their teeth

and gums healthy, and it satisfies their presumptively primal need to gnaw on their prey. Bones can also be a wonderful anti-boredom device for dogs with too little to do.[1]

Sometimes I buy shortribs, as they have a lot more meat on them than backribs. But today I bought a sheet of backribs, as I was planning on feeding ground beef for dinner tonight. I divided the sheet of ribs into singles by cutting down between the ribs. Miss Lilly got two ribs and her dog friends got one each. (Tears and recriminations if the number of bones is not = or > the number of dogs.)

Tonight for dinner, Miss Lilly had **ground beef & veggies**.

ingredients

* red cabbage, ½ a medium-size cabbage, finely sliced
* carrot, 1 medium-large carrot, coarsely grated
* apple cider vinegar, a generous splash (1–2 tablespoons)
* fresh thyme, a couple of small sprigs, finely chopped
* lean ground (minced) beef, approx. 8 oz (230 g)

notes

Cabbage. I wrote about cabbage on Day 1. I particularly like red cabbage for its color. As a general rule, brightly-colored veggies contain more antioxidants than paler veggies. However, the red cabbage leaves are thicker than the common white/green cabbage, so not only does red cabbage take longer to cook, but it probably is not as well digested as the finer-leafed varieties. For that reason, I generally feed red cabbage to Miss Lilly only once a week or so.

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[1] As I discussed in Chapter 2, my recommendations for feeding bones have changed substantially since this blog post. I would no longer feed beef ribs to a dog Miss Lilly's size.

Lean beef. The ground beef I used was organic and grass-fed, which is said to be higher in omega-3 fatty acids than lot-fed beef. This particular beef was 16% fat, although when I can find it I prefer the 9%-fat ground beef for Miss Lilly. As I mentioned earlier, she's a middle-aged, currently suburban dog, so her daily calorie needs are not that much higher than the maintenance requirement (*i.e.,* that needed to maintain body weight in a sedentary adult).

As long as I use lean meats, I don't have to worry about her weight; she maintains a healthy lean weight and good muscle mass on her current diet and exercise regimen.

instructions

1. Steam the cabbage in a small amount of water, to which the vinegar is added; cook until the thickest parts of the cabbage are just tender (about 15 minutes).

2. Add the carrot in the last 5 minutes of cooking.

3. Turn off the heat, and let the veggies steam in the lidded pot for another 5 minutes or so. (Miss Lilly likes her veggies softer than I do, so I cook them for a bit longer when I'm making veggies primarily for her.)

4. Cool the pot in the sink (see earlier post).

5. Mix in the ground beef.

6. Add any additional flavorings if desired (tonight I added a little fresh thyme from the garden, just because).

Miss Lilly got a generous 2 cups of this beef & veggie mix for dinner. It was probably a little more than that, as red cabbage has quite a lot of texture, even when steamed, so the mix was rather bulky. But had I pressed it lightly into a cup measure, it would have been no more than about 2 cupsful.

There is plenty left over for breakfast, even though two of the neighbor dogs bellied up for some this evening.

Feeding Miss Lilly, day 4 (morning)

Last night, after I finished logging Miss Lilly's evening meal, I noticed her eating another dog's poop out in the yard. She does this from time to time, as many dogs do. Eating the feces of other animals is a natural behavior for a dog. I suspect it is a simple and direct way of replenishing one's gut microbes when needed.

Even so, it disgusts me, and I just can't stand to see her doing it. So, last night I gave her (and the bunch of other dogs who piled into my kitchen) the rest of the beef & veggies, in which I mixed a couple of scoops of Primal Defense.

Primal Defense (PD) is my favorite probiotic product because it is the closest I've found yet to being physiologically sound. For one thing, it is a blend of about a dozen different species of beneficial bacteria.

Most other probiotic products on the market contain only a handful of species, if that; some contain only one (typically, *Lactobacillus acidophilus).* The microbial population of the healthy digestive tract is extremely diverse. There are several hundred different bacterial species in there, probably more. So, it strikes me as absurd that a commercial probiotic product would contain only a few different species, when what is natural is *many.*

Another thing I like about the PD is that the bacterial species it contains are what the manufacturer describes as "homeostatic soil organisms." These are the types of microbes we would naturally be getting on or in our food were we to be living a more natural lifestyle, growing our own food, and eating it fresh from the garden. That's the way nature designed for us to maintain a thriving, diverse microbial ecosystem in our digestive tracts: on/in our food.

Because most of the veggies in Miss Lilly's diet are cooked (for better palatability and digestibility), and as she is not getting to eat the whole

animal — digestive tract and all, in the nonsterile environment in which most prey are consumed — from time to time I add some PD to her meals.

I'm not a believer in adding a probiotic every day for weeks or months on end as some people do. In my opinion, that's a great recipe for creating a chronic disorder of the gut microflora (a condition called dysbiosis). It's forcing microbial species or variants on the system which may not be species- or diet-appropriate for that body.

And it's generally a very heavy-handed approach, too, with dosages in the *billions* of colony-forming units (CFU) per day, rather than in the hundreds or thousands which is more physiologically appropriate.

(Note: I sometimes prescribe daily probiotic use — but only for a specific medical purpose, and only for short periods. My aim is always to return the system to a state of self-maintenance in which artificial probiotics are not needed every day.)

So, that was her impromptu supper last night: a little more of the beef & veg, with a little PD. No digestive upsets; no other problems with her; just that little red flag of poop eating.

This morning we both got off to a slow start and we have yet to really get moving. We've been in a changeable weather pattern for the past week or so, and today's cool and overcast weather is quite a change from yesterday's warm sunshine. I was interested to see that the neighbor dogs are taking it easy today, too. So, I decided we should skip breakfast and have an early dinner instead.

That's something I do quite often, for both of us: extend the overnight "fast" by a few extra hours and just take it easy through the first half of the day.

One of the important lessons I've learned from living with dogs is to rest when you're tired. Today feels like a good day to just be tired and rest. So that's what we're going to do.

Dinner tonight: a veggie frittata, I think.

Feeding Miss Lilly, day 4 (evening)

For dinner this evening, Miss Lilly shared a veggie frittata I made for us. This dish is really just a crustless quiche — a lazy cook's quiche.[1]

The neighbor dogs always show up right before the oven timer goes off (it's uncanny!), but tonight I selfishly kept all but the pan for Miss Lilly and myself.

As I'm typing, the Lab (of course!) has settled herself on the kitchen floor in sphinx position, the pan held proprietorially between her front legs, and is carefully licking every inch of the pan for any bits that might come loose. It's one of their favorite meals, too.

Feeding Miss Lilly, day 5 (morning)

For breakfast this morning, Miss Lilly enjoyed a can of sardines, about 5 fish bodies all up. As I mentioned the other day, when I'm feeding "mono-meals" such as this, I usually add a little *Vitality Canid* for extra micronutrients (and something green).

Grocery shopping this morning was a bonanza, as the butcher at PCC had ordered various organ meats for me. I came home with chicken hearts; lamb hearts, liver, and kidneys; beef marrow bones; and some thinly sliced beef I'm making into jerky for treats.

I bought a four-tray food dehydrator last year, and now I'm a drying fool! In addition to making jerky for Miss Lilly and her dog friends, I make some wonderful raw-food crackers for myself. The dogs love them, too. This weekend I may attempt a dog-specific variation.[2]

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[1] See page 152 (Appendix A) for this recipe.

[2] I didn't get around to doing that. I stuck with 100% meat jerky as dog treats.

Feeding Miss Lilly, day 5 (evening)

Early afternoon, Miss Lilly and the other dogs each got a marrow bone.

For dinner tonight, Miss Lilly ate about ½ a pound (230 g) of raw chicken hearts. They're one of her favorite things.

Sometimes, if they've been sitting in the fridge for a few days, I'll cook them lightly, as any parts of a chicken, but especially the "innards," are rather more contaminated with undesirables (potentially pathogenic bacteria) than the equivalent mammalian parts.

But if it's nice and fresh (*i.e.,* good color, shiny, no odor), I've not had any problems feeding Miss Lilly raw poultry, not even innards. The other dogs love chicken hearts, too. They're our version of chicken nuggets. Always a hit with the "kids"!

I didn't bother adding any veggies to Miss Lilly's dinner tonight. I don't always. Sometimes her meals are 100% meat; sometimes 100% vegetarian (*e.g.,* the frittata we shared yesterday, the lentil soup that is one of our favorites, and the yummy pilaf I make to which I add peas and cashews).

Over the course of a week, she averages 50–60% meat and 40–50% veg. And the variety keeps it interesting.

So many reasons to get lots of variety into our diets!

Feeding Miss Lilly, day 6

Is it day 6 already?! Hmm... I think I'll keep going with this awhile longer, as I have yet to cycle through all of my favorite recipes for Miss Lilly, which is the whole point of the exercise: to show you how easy it is to feed your dog a healthy, fresh-food diet, and how few hard-and-fast rules there are.

This morning, breakfast was an *ad hoc* affair. I was in charge of feeding three of the neighbor dogs this morning, as their people were away overnight. These dogs are on a kibble diet, and although I will feed them as requested by their people, I wanted to add a little fresh food to their bowls as well.

I had ½ a pound (230 g) of ground beef in the fridge from the other night, so I mixed in some *Vitality Canid,* added some warm water to make a nice thick "soup" (mostly so the small amount of beef would go further), and shared it among Miss Lilly and our three guests. Miss Lilly got the lion's share (probably around 6 oz [170 g] of beef), but as that wasn't much of a meal, I followed it with another marrow bone.

I don't usually feed marrow bones two days in a row, but I felt she needed a bit more substance than what was in her breakfast bowl, and she does love her bones. I'm thawing some whole lamb hearts for her dinner, so she'll feast later today.

As you may have gathered, not all of Miss Lilly's meals are "nutritionally complete and balanced." But neither are yours or mine. Given the body's remarkable economy and ability to store more than it immediately needs, it does not appear necessary to take in the full complement of nutrients we're told we need, in every meal, or even in every day.

I can be as lazy as the next person, so sometimes a meal for Miss Lilly is whatever is in the fridge or on the shelf. And I think it needs to be like that for most of us. If it's not easy to do or somewhat flexible, then we're probably not going to keep it up long-term. There's got to be some wiggle room in the program for "less than ideal" when you're in a hurry, too tired, or find that the cupboard is bare.

The cool thing is that dogs in general are opportunists when it comes to food. Yes, wild canids hunt, kill, and eat fresh prey; but they also scavenge and will eat all sorts of other things, from rotting carcasses to insects and berries.

That's not to say it doesn't matter what you feed your dog. The whole point of this blog series is that it DOES matter. It just doesn't matter that you get it PERFECT every single time. If that was the litmus test, then I would fail.

And while most veterinary nutritionists would likely be apoplectic over how I'm feeding Miss Lilly, the proof is a healthy, happy dog.

Feeding Miss Lilly, day 7

For dinner last night and breakfast this morning, Miss Lilly had some raw lamb hearts, two hearts for dinner and one for breakfast. Each heart weighed about 6 oz (170 g), if I've done my sums right.

I bought the hearts frozen, but once thawed they looked very fresh. My preference is always for fresh foods, but sometimes frozen is the best option if the food was frozen immediately after harvest and it has to travel a good distance from farm to store, which was the case with this excellent, grass-fed, Oregon-grown lamb. I don't always make it to our local farmers market to get local produce, so, all else being equal, regional is next best.

I fed the hearts whole. For one thing, it saves me the trouble of cutting them up. But that's a minor consideration (although not to be sneezed at, given the issue of simplicity and ease I talked about earlier). The main reason I leave them whole is so that Miss Lilly has to chew on them.

When presented with large pieces of meat, dogs naturally gnaw on the meat with their large carnassial teeth (the shear-like fourth upper premolar and first lower molar), taking maybe a few chews before swallowing it in large chunks. I have a happy dog when I give her a large piece of meat, such as a big slab of beef heart or a whole lamb heart, and leave her to gnaw it into submission.

Perhaps it's because the dog's dentition and the rest of her digestive system is designed for such eating behavior, but I have had no problems whatsoever

with feeding Miss Lilly this way. In fact, she seems to remain satisfied longer after eating large chunks of meat than when I use ground (minced) meat.

That makes sense: it would take longer for large pieces of food to be digested than for small pieces. I love the convenience of ground meats, and I will continue to include some in her meals each week and keep some in the freezer for whenever. But I'm also mindful of how much she likes to gnaw on her food and how well she seems to do when I feed her meat in chunks or large pieces.

Feeding Miss Lilly, day 8

Let me see... where were we... breakfast yesterday, I think.

So, dinner for Miss Lilly yesterday evening was some raw beef liver mixed with a lovely rice-and-lentil pilaf I made for myself. The base of the pilaf was brown rice, wild rice, a couple of varieties of lentils, and some split peas. I kept the base pretty simple and just added some garam masala, balsamic vinegar, and salt once it was done cooking. For Miss Lilly, I mixed in the raw liver, 3 generous slices all up.

Although I'm big on feeding a variety of organ meats, I don't often feed liver, as Miss Lilly doesn't like it. I have to hide it in other things to get her to eat it.

I find that really interesting, as the liver is one of the most prized parts of the prey for wild canids. I got to wondering whether the liver of farmed animals, even grass-fed livestock, is having to deal with much more junk than that of their wild counterparts, so the livers of domestic animals taste different from those of wild animals.

I have noticed that Miss Lilly loves wild rabbit (*e.g.,* a freshly killed rabbit we found on the side of the road one day was like manna!), but she turns up her nose at farmed rabbit. Maybe it's simply that wild herbivores taste more "game-y." I don't know what it is, but the wild stuff certainly gets more stars than the farm-raised stuff.

Fortunately, heart, kidney, and other innards (when I can get them) from farmed livestock are a consistent hit with Miss Lilly. For breakfast this morning, I gave her the last of the lamb hearts I'd thawed for use over the weekend. And then another beef marrow bone, as my neighbor had generously bought enough bones for all of the dogs. So, the yard is nice and quiet this morning, as everyone settles down to work on their marrow bones.

It's been a week for marrow bones this past week. While I mostly use beef bones for Miss Lilly,[1] I do like to vary things and feed lamb bones whenever I can find them, and I sometimes feed raw chicken that includes the bones (*e.g.*, a leg quarter or the wings if I've bought a whole chicken).

I'm trying to balance variety with quality (whatever bones I buy, they've gotta be good) and suitability (especially matching the size of the bones to the size of the dog). I've had no serious problems feeding raw bones to Miss Lilly, but when I first started feeding her raw bones, I took the precaution of giving her the bone *after* her meal, so that she'd take her time and eat it properly.

That's it for now, I think. I'd better go look in the freezer and pull something out to thaw for dinner tonight.

Feeding Miss Lilly, day 9 (morning)

What I ended up pulling out of the freezer for Miss Lilly's dinner yesterday was a package of lamb kidneys. I let them thaw at room temperature — yes, I know, that's supposed to be a big no-no with meat; but I've never encountered any problems doing it, as long as the meat is good to begin with — and then fed the kidneys raw.

Clearly, these kidneys were super-fresh when they were frozen, because they thawed to look, feel, and smell like fresh kidneys, and there was fresh-looking blood in the package they came in. That's one of the hidden benefits

[1] As I discussed in Chapter 2, my recommendations for feeding bones have changed substantially since this blog post. I would no longer feed beef marrow bones to a dog Miss Lilly's size.

of buying meat from small producers who are processing their own livestock on-site and packaging the meat right away: it's fresh!

Miss Lilly got four kidneys to start with, but they were such a hit that I gave her two more. The neighbor dogs were going wild for a taste, too, so I gave them one each. Alas, no leftovers! All up, Miss Lilly probably got about 12 oz (340 g) of kidneys.

This morning for breakfast I had nothing thawed or left over, so I fed her a can of kippers to which I added some *Vitality Canid*. I was pleased to see that she wasn't terribly hungry. She liked the fish, and she ate it, but not as if she was starving.

I've noticed a number of times now how well satisfied Miss Lilly seems to be when she feasts on organ meats. Sometimes we can skip breakfast altogether the next day, because she just doesn't seem to need it. Fine by me. I'm all for eating when you're hungry, and not eating when you're not.

Feeding Miss Lilly, day 9 (evening)

Seems it's time to illustrate that not all of the meals I make for Miss Lilly are a smashing success. Tonight's was rather a flop...

I'd thawed some more of those lovely, grass-fed lamb hearts for her dinner, but as it's been a few days since she's had any veggies, I decided to make her up a heart & veggie combo. I already had the food processor out, as I'd just prepared a batch of sprouted-grain crackers for myself, so I decided to steam some of the veggies in the fridge that needed to be eaten, and then whizz them up with a raw heart and some of the fresh salad greens I'd picked from the garden a few days ago.

Mistake!

No problem with the steamed veggies (cabbage, cauliflower, carrot). She's eaten all of them many times before without complaint; and steaming them

lightly makes them more palatable to her. But today I decided to leave the fresh salad greens raw (I usually steam them for her), so that they'd be more nutritious and would still have some beneficial soil microbes on them.

Trouble is that the raw salad greens were just a little too bitter for her liking. It's a lovely mesclun mix that I grow for myself. But some of the constituents are a little... shall we say, piquant? I love 'em, but if I let the greens get a little too long, as I did this time, they can be rather too "stimulating to the salivary glands," as it were.

Perhaps I'd have gotten away with using less. I was trying to use up what had been sitting in the fridge for days. (Still nice and crisp, but with more ready for harvesting in the garden, I wanted to use up what I'd already cut.)

The lesson here is to not use Miss Lilly's food bowl as an alternative to the compost bucket! All of the veggies were in good shape, but still... I talked the other day about dogs being opportunists when it comes to food. But in this instance it was taking that concept a little too far to empty my crisper drawer into her food bowl just because I didn't want to waste good food. It would all have kept another day.

Anyway, she did eventually eat this weird goop. As a reward, and for the reasons I've already discussed about feeding raw meat in large chunks, she also got a whole lamb heart before and another one with the lamb & veggie slop. So, I'm happy: she ate her veggies. And she's happy: she got some "proper dog food" (*i.e.*, MEAT! ☺).

Feeding Miss Lilly, day 10 (morning)

Big grin on my face this morning... I had quite a bit of last night's lamb & veggie debacle left over, so I decided to see if Miss Lilly would eat some of it for breakfast, fully expecting to get The Look (you know the one, that only a well-fed and much-loved dog can give when presented with something entirely unacceptable ☺)...

Success!! She ate an entire cupful and looked for more. Either the bitter greens had mellowed a bit overnight or Miss Lilly was really hungry this morning. Perhaps a bit of both. I still have enough for part of dinner tonight, and a cupful was plenty for breakfast, so I didn't give her any more. Instead, I gave her a couple of large pieces of beef jerky I made on the weekend. It's a happy dog I have now.

See how easy this is?

Feeding Miss Lilly, day 10 (evening)

Just a short post this evening. Dinner for Miss Lilly was the rest of last night's lamb & veggies (about 1½ cupsful) and some raw chicken hearts (6 oz [170 g] or so).

I was thinking, as I watched Miss Lilly romping in the yard today, how very good she looks since I got serious about adding lots of veggies and organ meats to her diet. She really does look great, for any age, but especially for a "senior" dog.

I object to the current convention in vet med of calling any dog over the age of 7 "senior," which is a thinly veiled euphemism for "geriatric." What a miserable admission that the average dog's lifespan is barely more than 10 years. It should be somewhere around 18 or 20. Heck; I'll settle for 15 or 16 years with my beloved Miss Lilly, given that most of her contemporaries are barely making it to 12.

I don't want to put any limits on what's possible for Miss Lilly, but neither do I want to set unrealistic goals. It's said that nowadays we're all living in a toxic soup of polluted air, water, seas, and soils.

Perhaps it's an occupational hazard, but almost daily the thought occurs to me that I won't have Miss Lilly forever. That lump she had on her flank (until recently, when it spontaneously started to recede) reminds me that my best efforts for her may still not be good enough.

Anyway, that makes me cherish her all the more and take the best possible care of her, starting with the food I give her, the filtered water I use for her drinking water, the time I spend with her (which admittedly is too little), the walks, the hikes, the hugs, the shared treats — a shared life, really.

I think that's the point: we're traveling through this part of our lives together, friends and companions.

Speaking of traveling, I have a long day on the road tomorrow, so I probably won't post again until Friday.

Feeding Miss Lilly, day ??

... let me see... where was I? Dinner yesterday evening, I think.

So, for dinner yesterday evening Miss Lilly had some raw lamb liver and steamed cabbage. I mentioned earlier that liver isn't her favorite organ meat. One thing I've found works every time is when I marinate the liver in walnut oil and curry powder for a few minutes before adding it to the veggies.

It doesn't have to be walnut oil; that's just the oil I prefer to use in my own cooking, as it's high in omega-3 fatty acids. Olive oil would work just as well, as the oil is mostly a vehicle for the curry powder. The curry I use is a mild one (called Muchi curry, and found at Whole Foods), and the dogs love it.

So, while the cabbage was steaming (one medium-size napa cabbage, coarsely shredded), I added about 1 tablespoon of walnut oil to the bottom of a flat pan, added some curry powder (I don't know how much; several shakes of the bottle; "to taste" according to my preference), added a little Himalayan pink salt (because it's yummy, and contains about 80 different trace minerals), mixed it up so that the curry and salt were evenly distributed through the oil, and then added the slices of liver.

I mixed it about a bit, flipped each piece of liver over so that both sides were flavored, and let it sit in the curried oil while the cabbage finished steaming and then while it cooled in the sink. (Note: the liver remained raw.)

I forgot to look at the package to see how much liver I used, but I'm guessing it was about 12 oz (340 g). So, given the size of the cabbage, this meal was probably about 50:50 meat to veg.

The reason I'm bringing up this issue of meat–veg ratio is because yesterday morning I was reminded of something I'd forgotten: Miss Lilly is more dog-friendly when I keep her diet at least 40% veggies.

She has a tendency to be aggressive toward other dogs; territorial is probably a better word, as she feels it necessary to police along the fence line and growl at anyone who is walking by along the road. That behavior is worse when her diet is predominantly meat, as it has been this past week, and it lessens when I add more veggies.

The other thing I've noticed in the past week or so, as I've gotten a bit lazy about including lots of veggies in her diet (the organ meats have been excellent, and so easy to feed...), is that she's become very grabby about food that I give her by hand.

For example, I'll hand her an entire lamb heart rather than putting it in her food bowl. She used to be very good at taking food gently from my hand, but since our ranks have swelled to seven dogs (one visitor for the past few weeks) and I've slackened off on the veggies, she's become very grabby with food.

When I don't feed her bones often enough, she goes all "shark eyes" when I give her a bone. (If you're a Shark Week fan, you'll know what I mean: when sharks go to bite at their prey, their eyes get all wide and stare-y. That's what Miss Lilly does if she's not getting enough meat and bones in her diet. Shark eyes.) Lately she's been doing shark eyes with anything I give her by hand.

I think it's partly because she feels she's having to compete too much with the other dogs, even though everyone is well fed, much loved, and gets lots of attention. I'll need to work on that with her.

I always take care to feed her first. "*Lilly first,*" is what I tell all of the dogs, including Miss Lilly. But evidently I need to be a little more proactive there. And get back to adding lots of veggies to her diet.

OK. So, that was yesterday. This morning I fed her the rest of the chicken hearts (raw) from the other night. About 4 oz (110 g), I'd guess. She also got a couple of pieces of the beef jerky I made for her last weekend. Just because. Nutritionally, it's not much (thin slices of beef, rendered even thinner by drying). But good for the soul, if not for the body.

Dinner this evening was some raw turkey giblets (a liver, a gizzard, and a heart) plus a raw lamb heart. The turkey giblets were nice and fresh, and it's been weeks since she's had any turkey, so in the interest of variety, dinner was turkey innards and a lamb heart that was sitting in the fridge and needed to be eaten. Later, when the other dogs are off doing something else, I'll give her a beef bone.

It's been a few days since she's had a fresh bone, so she's due a new bone for calcium. But I really must figure out this veggie thing. I think it'll come down to "meating up" some veggies, perhaps with some flavorful fish, so that I can continue to give her whole hearts and other organs in large pieces, and still get plenty of veggies into her.

One final thought before I sign off. I've had people tell me "I can't afford to feed my dog that way!" Well, I don't think I can afford *not* to. I can't afford for her to have a serious illness which requires expensive diagnostic tests and medical or surgical treatment. I'd far rather pay to keep her healthy, and bet on it being the lesser expense.

Oh, and a big THANK YOU! to Barbara, the wonderful "butcher lady" at PCC in Issaquah, for ordering us so many great organ meats and bones for our

dogs. Thanks to Barbara, my neighbor and I can now buy beef heart, liver, kidneys, tongue, tail, and marrow bones; lamb heart, liver, kidneys, and often neck bones; whole chickens with their giblets, as well as separate chicken hearts, livers, and occasionally chicken necks, backs, and feet; occasionally turkey giblets and turkey necks and backs; and probably some other things I'm not thinking of right now.

And I'm leaving out the various pig products, bison, rabbit, and all the fish and seafood. So, thank you Barbara and the other meat buyers at PCC for sourcing such excellent quality meats and providing us with a great variety of organ meats.

That's about it for tonight, I think.

Feeding Miss Lilly, day 14 (I think)

My apologies for the radio silence over the weekend. Sometimes I just need a break from my computer...

I think we left off at breakfast on Saturday. After breakfast, Miss Lilly got another bone, as my wonderful neighbor gave all of the dogs a beef marrow bone to keep them occupied while she was gone for the day.

Miss Lilly will never turn down a good bone, and neither would I want her to. But another thing I've noticed over the years is that marrow bones can contain quite a bit of fat. (Bone marrow itself can be very fatty, particularly in a mature animal.) Being a suburban dog at present, Miss Lilly starts to get a bit "sludgy" when I'm too heavy-handed with the animal fats.

So when, on Saturday evening, I noticed that her breath smelled a bit "fatty" (hard to describe, but imagine how you'd be feeling and how your breath would smell if you'd eaten a whole bag of pork rinds — the family size), I decided that dinner should be a very light affair. I wasn't all that hungry either, so we shared some scrambled eggs with parsley, chives, and an abundance of salad greens fresh from the garden.

You might be questioning the choice of eggs, the yolks being quite fatty. But eggs are also high in protein, vitamins, and minerals — close to a complete food, in fact — and with the greens mixed in to what probably amounted to only 2 eggs, it was still a very light meal. I scrambled 6 eggs, but I had at least 2 eggs' worth myself, and three of the neighbor dogs got some as well, so Miss Lilly ate barely 2 eggs, and lots of greens.

By the morning, she smelled good again (her breath seldom smells bad — and she never has "dog breath"; morning breath, yes, but don't we all ☺). Even so, breakfast was just a few pieces of beef jerky, as I try to eat very lightly on the weekends myself, and I usually do the same for Miss Lilly.

Various natural health experts, including some in the veterinary community, recommend fasting once a week. I don't do well with fasting myself, and Miss Lilly doesn't seem to appreciate it, either. But we can do very well with — and even feel better for — skipping a meal here and there. Usually breakfast, but not always.

I just don't subscribe to the tenet, "breakfast is the most important meal of the day." I'm more of the "eat when you're hungry" school of management. Well, that's easy enough for me to do myself, but making that decision for my dog takes quite a bit of care.

As long as I'm paying attention — real attention — and listening to her, I'm less likely to get it wrong. We go along swimmingly, her telling me when she's hungry, what she'd like to eat of the available options, when she really needs more, *etc.* — *when* I'm paying the right sort of attention.

It's fun to watch what happens when I tell her "dinner will be another half an hour": she'll go back outside or back to her bed, only to come back 30 minutes later, on the dot, ready for dinner. And, having accidentally burned her tongue more than once by putting down food that was too hot, I can tell her "it's still too hot; let me cool it down first" and she'll wait for about 10 minutes, then return and tuck into her now "just right" dinner.

(BTW, I'm re-reading *Kinship with All Life* by J. Allen Boone. I highly recommend this marvelous little book for all its wonderful stories on this sort of interspecies communication. Such fun!!)

Over the weekend I've been pondering the veggie dilemma some more. How can I get more veggies into Miss Lilly's diet, while still satisfying her need for animal-source nutrients and still feeding the various meats in large pieces when possible?

As a result, dinner on Sunday evening consisted of some white beans I cooked for my vegetarian self (with some extra for Miss Lilly) and some large chunks of raw beef heart mixed in. I "meated up" the beans with some of the blood from the package of beef heart. I think that's going to be the key with Miss Lilly: make the veggies worth eating by adding meaty flavors.

Alas, I am not blessed with one of those dogs who will eat raw broccoli or carrots. No. If I don't meat them up or whizz them up in the blender with something tasty, I'll find them strewn about on the kitchen floor, evidently having been tossed from her bowl in disgust. The neighbor dogs eat them with great delight, but that rather misses the point — and the target. I love my dog friends and I'll happily feed them a little of what Miss Lilly is eating, but I want her to eat her veggies!!!

(Is this one of my childhood transgressions coming back to haunt me? I HATED brussels sprouts when I was a kid. I didn't particularly like carrots, either. But brussels sprouts were positively vile! Well do I recall having an abscess on my hand that I wouldn't let anyone touch. It got so bad that there was a red streak progressing up my arm — "blood poisoning!" But still I wouldn't let anyone touch my hand. *Until* mum promised that if I let her lance the abscess, she would let me leave my brussels sprouts on my plate, uneaten. Deal!!)

Funny thing is that now I love brussels sprouts (as long as they're not overcooked).

I rather despair of Miss Lilly "growing up" to love her veggies, though. I guess I'll have to live with having to hide the veggies in with the meat.

Dinner tonight: steamed zucchini (fresh from the garden) and carrots, with more of that lovely raw beef heart. Recipe to follow. For now: to the kitchen!

Feeding Miss Lilly, day 14 (again)

Success!! So, here's what I ended up doing: I steamed a big pot of veggies, added some kippers for meaty flavor, fed that first, and then fed Miss Lilly a big chunk of raw beef heart for "afters."

ingredients

* 1 medium-large zucchini, coarsely grated (sliced would have worked just as well)
* 1 medium carrot, coarsely grated
* 1 medium leek, thinly sliced
* approx. ⅓ large cauliflower, coarsely chopped
* salt, pepper, and herbs to taste (today I used dried thyme, dried oregano, and fresh rosemary)
* kippers, 1 can (approx. 3 oz [85 g])

notes

Zucchini. Finally, my garden has some zucchinis ready for picking. I use zucchini quite a bit in Miss Lilly's food prep, as it has very little flavor, so it's a good "filler" veggie. It has a high water content, so it's not as nutrient-dense as leafy greens and the root veggies, but it can come in really handy when feeding a hungry dog.

However, last year I overdid it, as my garden produced an “embarrassment of riches” in zucchini. Poor Miss Lilly started to throw up from all the zucchini I was adding to her food. Lesson learned: a body can become

intolerant of any food if it's used improperly. I gave her a break from zucchini, and now she tolerates it just fine — in moderation, and when not overmature (*i.e.*, not prize-winning marrow size).

Leek. Leeks are in the Onion family, which we're told are a no-no for dogs. But I love the entire Onion group, so I use them a lot in my own food prep. Miss Lilly has been eating them with me for years without a problem (except for the time I accidentally poisoned her with garlic... for the longest time she refused anything with garlic in it; now she'll eat it — in moderation).

Noticing a theme here? All things in moderation (even chocolate).

Oh, and I added the leek to tonight's veggie medley because it just didn't look or smell right until the leek went in. (The Onions add such a savory flavor.) Before I added the kippers, I tasted the steamed veggies and tinkered with the flavor, adding salt, pepper, and finally a splash of white wine vinegar, until it tasted just right. It was delicious, even before the fish went in.

And then it stank to high heaven — to my nostrils, anyway. The dogs, however, thought otherwise. Before I could turn around, my kitchen was filled with dogs!

instructions

1. Steam the veggies in a small amount of lightly salted water (I like Himalayan pink salt, for its lovely taste and all its trace minerals) until just tender.

2. Add any dried herbs at the start of cooking; add any fresh herbs near or at the end of cooking.

3. Once the veggies are tender, let them cool a little (when I'm in a hurry, I'll stand the hot pot in a few inches of cold water in the sink, and stir the veggies to speed cooling).

4. Whizz the veggies in a food processor or blender (I prefer the food processor, as it leaves the veggies with some texture).

5. Add salt, pepper, herbs, *etc.* to taste.

6. Add the kippers (or other flavorful fish), mix thoroughly so that the fishy flavor is completely infused.

I gave Miss Lilly about a cup and a half of this "fishyssoise," which she gobbled down. (Yay!) She even licked her bowl clean!

Although, I must admit that there may have been a modicum of the "cousin Mandy" effect at play here. That happens quite a lot when the neighbor dogs are over…

I'm one of six kids, but my cousin Mandy is an only child. Whenever she'd come spend a week with us during the summer holidays, her mum would give my mum a list of all the things Mandy wouldn't eat. My mum would listen politely and then completely ignore the careful instructions on how to feed the delicate and oh-so-fussy Mandy.

Cousin Mandy was served everything we kids were fed, and she ate everything on her plate, learning quickly that if she didn't clean her plate or if she took her sweet time doing so, there would be no seconds.

Competition can be a good thing with a fussy eater ☺.

Anyway, after Miss Lilly ate her veggies, I gave her a big chunk of raw beef heart, close to 8 oz (230 g), roughly a quarter of an almost 2-lb [900-g] slab of heart. So, for dinner tonight I achieved my goal of getting more veggies into her, while still ensuring a happy and well-fed dog.

(The neighbor dogs are not so happy, however. While they thoroughly enjoyed the fishy veggies, they were outraged at not getting any beef heart for afters. Try as I might, they just won't wear it that Miss Lilly is special!)

Lots of fishy veggies left over for tomorrow's meals.

Feeding Miss Lilly, day 15

OK, I think I have this nut cracked now. Last evening's fishy veggies were such a hit, last night and again tonight, that there's none left and all the bowls, plates, and pots are clean of every last morsel.

(Once again, my kitchen suddenly filled with dogs as I was preparing Miss Lilly's dinner. We currently number seven dogs among us four neighbors, so I'm usually scrambling to find enough bowls and plates for everyone to get a little of Miss Lilly's dinner. As I said earlier, "*everybody eats*"; whoever is in the kitchen at mealtimes gets at least something to eat.)

I think from now on I'll reserve the sardines and kippers I've been feeding as mono-meals (most often as breakfast) for "meating up" the veggies when I'm not using ground meat.

But until I get in more supplies, I'll have to use up what I have on hand. For breakfast this morning, I decided to give Miss Lilly the remainder of the raw beef heart (probably about 6 oz [170 g]) and then a beef marrow bone. I could have left the bone another day, calcium-wise, but I was going to be away for much of the day today and I like to leave Miss Lilly with something to chew on when I have a long day away from home.

Also, the bone was starting to smell a bit "ripe." That's generally not a problem for healthy dogs. In fact, Miss Lilly sometimes buries bones until they're all green and slimy, and only then does she dig them up and eat them. So unless they look and smell absolutely disgusting, I'll still offer smelly bones and let Miss Lilly choose whether to eat them or bury them first. This morning she ate it. With great enthusiasm. And is none the worse for it this evening.

For dinner tonight I gave her the rest of the fishy veggies (cold; it's been a warmish day) and some raw chicken hearts (also cold). All up, she got about 2 cups of veggies and 1 cup of chicken hearts. Her dog friends got the rest.

Someone asked me yesterday just how many dogs I have here! Just the one: Miss Lilly. She's the only dog I'm fully responsible for, but I'm in the happy position of being on a corner lot and having wonderful neighbors adjacent to me. We've set up a cool little community here in which we've opened up the interior fences which separate our yards, making one huge yard for our dogs to run and play in.

Currently, we total seven dogs, as one of my neighbors is taking care of her mum's dog for a while. At times you may actually be able to hear the noise from your place, but overall it's a peaceful, happy, well-adjusted group of dogs we have here. Such fun!

And we all have an open-door policy with dogs and neighbors, so the dogs freely drift among our houses. Hence, my kitchen is often full of dogs, even when there's no food on offer.

I'm living on a really tight budget at the moment, as so many people are, and still I can afford to feed Miss Lilly the way I've been describing — AND share some of this great food with the neighbor dogs. As I've said before, I can't afford *not* to feed her this way. If I can manage it, chances are you can, too. And as a bonus, feeding lots of veggies helps keep the cost down. That's not the main reason I'm doing it, but it's a great side benefit.

Oh, and here's another little thing I've noticed since paying much more attention to Miss Lilly's diet, committing to feeding her this way, and noticing her health and well-being improve: I'm feeding *myself* better, too! I see that in my clients as well when they start home-preparing for their dogs and cats, and it makes me smile. If this is what it takes to get you to start taking good care of yourself... ☺

~ the end ~