

Feeding the Working Canine Companion

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As a professional breeder and trainer of working canines, it is important to continually identify what aspects we can improve in, and I needed to expand my knowledge in canine nutrition. I have always believed a well-balanced raw diet is ideal for canines; however, maintaining such a diet over time is not always very affordable or practical, especially for a large population of dogs. For this reason, it is important to identify at least a few high-quality dry kibble alternate forms of dog food. Finding accurate information on canine nutrition is not an easy venture. Despite having professionally studied genetics, animal behavior, and animal husbandry extensively, when it came to canine nutrition, I mistakenly trusted popular reviews and recommendations of others. Despite positive reviews, nearly every recommended kibble or combination of kibbles, I tried over the years seemed to be lacking in some way. Given all the misinformation out there, adjusting diets for all variables (age, breed, activity, etc.), and not knowing who to trust for accurate information can be frustrating. Like all areas of expertise, acquiring good trustworthy information on canine nutrition not only requires one to study and to obtain data/experience, but to also accept real honest results as they are. So, I began organizing my notes.

The Association of American Feed Control Officials (AAFCO) and the National Research Council (NRC) are the two leading organizations when it comes to providing feeding standards and recommendations for domesticated animals, and the nutrient levels in animal feeds should not fall below the minimal recommended requirements set by either organization at the time the food is consumed by the animal. Additionally, note that “minimal requirements” should not be confused as “optimal requirements,” as meeting the minimal regulated AAFCO food requirements simply means the food is adequate, but not necessarily ideal. “Maximum requirements” are only established on ingredients with a potential for overuse or that are known to be toxic when consumption over a certain amount is sustained over time. The lack of any noted maximum should not be confused to mean safe at any dose above minimal. It simply means there are no known toxic effects or there is a lack of information on higher levels of sustained consumption of the specific nutrient. Establishing a “maximum” amount suggests that any value below that amount is safe; however, that may not be true since information is lacking on such nutrients. For this reason, no maximum amount is often generally listed for such nutrients. Feed labeled for specific profiles (growth/lactation and adult maintenance) are only required to meet the minimal concentrations and shall not exceed the maximum concentrations for that specific profile. In other words, a dog food designed for mature maintenance may not be good for working dogs or puppies. Additionally, treats that are not designed to be meal replacements and are designed to be used sparingly and are therefore not required to meet nutritional requirements. Foods that fail to meet a given profile are not permitted to be labeled for that profile. Dog food labeled as “complete and balanced” means the food meets minimal requirements. It may or may not take into account the aspects of absorption of said nutrients. For example...

Comparable example of MINIMAL requirements for puppies between NRC and AAFCO...

Nutrient	NRC dry matter min w/ 100% digestibility	AAFCO requirement w/ 80% digestibility
Protein	Min 18% of DM @ 100% digestibility	Min 22.5% of DM @ 80% digestibility

DM= Dry Matter is typically best calculated by using either the AF or GA values. AF values are in my opinion more accurate than the GA since companies build in a safety margin.

AF = “As fed” is the value actually obtained when measuring/assessing the actual contents.

GA = “guaranteed analysis” is the stated value min or max value promised (on the bag)

To calculate DM values, use the stated AF or GA values divided by (1.0 – moisture content)

For example, if the AF value is 30% protein, but the moisture content is 10%, then the DM protein value would be $30 / (1.0 - 0.10)$ or $30 / 0.9$, which equals 33% protein on a DM basis.

When selecting a kibble or kibble manufacturer, I expect (w/ explanations)...

- a) a consistent high-quality product from bag to bag.
- b) the use of quality ingredients rather than low quality food sources, and in particular look for quality meat-based protein sources (animal meats and animal meal are preferred over animal byproducts), very little or preferably no yeast products, and minimal amounts of grains.
- c) the use of fresh ingredients that are properly handled before and during the cooking process is essential for proper digestion, maximum absorption, and prevent the growth of harmful bacteria and/or fungi. Dogs consuming highly digestible food produce small moderately firm stools. Meanwhile, poorly digested or contaminated foods have lower nutrient absorption and can cause diarrhea. Since dog food companies know this, companies that use low quality ingredients will try to hide digestibility problems by adding excessive fillers and fibers to absorb the fluid in stools, which produces a dog with a bloated appearance and excessive stool volume.
- d) the kibble should not be very dark brown or dyed with food coloring. Being very dark brown is a sign that the food is severely over cooked, and there is no need what-so-ever to add food coloring to a kibble other than an attempt to make the food pleasing to the human eye. Since raw meats are easily digested by canines, fresh food sources only need to be cooked enough to enhance digestion of added plant products and to stabilize the food for storage by dehydration. When using possibly contaminated ingredients, formulas need to be cooked for much longer or at higher temperatures in order to kill the contaminants. Unfortunately, excessive heat degrades, or in some cases even destroys many of the desired nutrients,
- e) the food should have the proper amounts of calcium and phosphorus for growth, health, and activity. Studies show all kibble formulations for normal healthy dogs should have a minimal amount of 1.2% calcium. Maximum calcium levels however is not so simple, for studies show the maximum calcium levels in dog foods formulated for adults or for non-large breed puppies should be no more than 2.5%, while foods designed for large breed puppies should not exceed 1.8%. Even though studies show there were no issues noted with calcium levels between 1.8% and 2.5% in mature adults of any breed or in small or moderate size breeds of any age, dog food regulators (NRC & AAFCO) recently simplified published regulations by updating calcium regulations with the single 1.8% maximum figure to avoid confusion to consumers and kibble manufacturers. Phosphorus is necessary for proper metabolism of calcium; however, excess phosphorus binds to calcium and prevents absorption. Studies show the calcium to phosphorus ratio is properly balanced when calcium to phosphorus ratios are between 1:1 minimal and 2:1 maximum, which means the phosphorus levels should be greater than half the calcium levels but not greater than the calcium levels. Egg yolks are a good dietary source of phosphorus. Meat itself is very low in calcium, so if one feeds much meat (raw or cooked) you may need to supplement calcium by incorporating suitable types of bone, eggshell, plants with moderate levels of calcium, or a calcium supplement into the diet, or simply just choose a kibble or combination of kibbles that fall into the upper end of the recommended ranges for calcium. I occasionally give my dogs some raw meats, so I prefer to use kibbles with calcium levels ranging from 1.5 to 1.8% and phosphorus levels ranging from 1.0 to 1.2%. Before closing the topic of dietary calcium and phosphorus, we should also note that Vitamin D is necessary for the proper absorption and metabolism of calcium and phosphorus. Dietary sources of vitamin D include liver, fish, egg yolks, beef, and dairy products.
- f) the product needs to be affordable to the average dog owner, breeder, & trainer,
- g) the product to be bagged in a manner that maintains freshness until the bag is opened.

Finding all these components in a kibble formulated dry dog food is not as easy as one might assume. After extensive study and personal experiences, I created my own kibble dog food “grading system.”

“F-grade” kibbles - I have never used cheap budget minded kibbles from big box stores or grocery stores, as these products simply are not focused on the well-being of our canine companions. Manufacturers of such products use marketing strategies such as price point marketing (typically less than 65 cents per pound), colorful decorative bags with pictures, and/or misleading wording to suggest implied ingredients. They may also make unsupported claims and food dyes to further attract or appeal to their customer base. Canine nutrition is too important to consider such marketing strategies. Quality meat-based ingredients are typically not used in these budget-minded formulations. While these budget-minded formulations may not kill your dog immediately, they were not created for long-term health or fitness and are composed of the cheapest ingredients they can get away with. We know human health and athleticism cannot be maintained by just eating cereal, potato chips made from dirty old potatoes, or by repeatedly drinking sugar loaded sodas nor should we consume bacterial and fungal ridden ingredients just because they were “sterilized” by heat. The same is true for our canine companions. Many manufactures of budget-minded kibbles not only use low quality ingredients, but they will also use old, rotten, and/or poorly handled ingredients as well. After learning this, it becomes apparent they are solely motivated by profit. Whatever “meats” are used in such foods is almost always limited in quantity or some type of animal by-product. They may squeegee blood and dirty scraps off floors that humans and animals have walked on. As a result of high contaminants, these foods are almost always over cooked. If you see byproducts in the ingredients and notice the kibble is a very dark brown or dyed with food coloring, it is a likely sign of an attempt to kill contaminants in the food. Additionally, these kibbles often contain high fiber/filler to absorb water and hide digestion issues caused by the use of such ingredients and their processing methods. I completely avoid such kibbles.

“D-grade” kibbles – This is the largest and most inclusive category of dog food kibbles in my grading system. I have been using over 1000 pounds of dog kibble a month for years. Despite many kibbles coming highly recommended, I have regrettably used tens of thousands of pounds of some kibbles that I now categorize as “D-grade” kibbles. Some of these formulas mentioned in this section were used by us for more than a year. Typically, the price point of these kibbles may range from 65 cents per pound on the low end to perhaps even twice that or even more at a \$1.30+ per pound. The “premium,” “performance,” and “high energy” formulas by Diamond are foods that I consider “D-grade” kibbles. Do not confuse the previously mentioned Diamond formulas that I rated as “D-grade” with the Diamond Naturals product line or the Diamond Pro89, as I have found the latter two kibble to be very good. Other formulas I have used and place in this “D-grade” class include Victor (I used a lot of their Hi-Pro Plus), all the varieties by Sportmix I have used, two varieties by Valu-Pak, Bil-Jac, and a few others I have used but cannot think of right now. While many people with a number of dogs may swear on the “good value” of these kibbles, in the end, all the kibble formulas mentioned here left me disappointed. I would like to note that while Ingredient sources are generally better than the budget foods, one thing I have noticed in all the foods I ended up being disappointed with were almost always a very dark brown. Additionally, many of the foods mentioned above revealed many inconsistencies from bag to bag. The dogs may do reasonably well on the product for a while, but I would come across “bad bags” far too often (25-33% it seems) and noticed every dog on the yard would get diarrhea after a new bag was opened and fed to the dogs. As a result of the inconsistencies from bag to bag that resulted in digestive problems and the very dark brown color of these kibbles, I cannot help but be concerned that there is a common practice to again use either old or improperly handled ingredients in these product lines, and that additional cooking done in attempt to resolve safety issues. In fact, I recently tried mixing a kibble I placed in this class with a “B-grade” kibble I use, and sure enough, when I did so every dog in the kennel got the runs. I would like to mention that none of my dogs ever had digestive issues with the Victor products I used; however, it too was very dark, contains several sources of yeast, and nearly every dog my kennel did not like it, but would eat it because it was their only option. Additionally, I also know of several instances where people claimed their females had reproductive issues while fed Victor;

however, without further testing, this should only be considered coincidental or anecdotal. I no longer use any of the kibbles I consider “D-grade.”

“C-grade” kibbles - I have also used thousands of pounds of foods that range in the 80 cents to \$1.30 per pound or even more, and some have been rather good. Kibbles such as Diamond Naturals, Iams, Eukanuba, and Blue Buffalo are a few that come to mind. However, I would say my experience with what I am referring to as “C-grade” kibbles would be limited to these few. These foods tend to be much better than the options listed above, but still may be a little darker brown (overcooked) in my opinion, but I am sure this is done to accelerate dehydration for the purpose of maximizing shelf life rather than being done to kill undesired bacteria or fungi as they are not nearly as dark as the lower grade foods mentioned above. I have noticed the market is now delivering many more kibbles that I think will fall in this “C-grade” category as dog food manufacturers are stepping up to raise the bar and meet public demand for better options for their loved canine companions. Consumers are demanding more meat-based protein sources and becoming more opinionated (some good, some bad) on the use of other ingredients in dog foods as well. While some of the foods I listed in this class may be composed of entirely desirable ingredients, they have generally served my dogs very well. Occasionally, I may get a bag that resulted in loose stools in a number of dogs the same day, this happens no more 10-20% of the time, and even when it did happen, it typically was not “runny” per say. While I am not using any “C-grade” kibbles at this time, I have no reservations about using them from time to time.

“B-grade” kibbles – At this time, I only use what I consider to be “B-grade” kibbles, and the kibbles I use range from \$1.10 to \$1.35 per pound. While there are certainly many options out there that are more expensive than this, it is a mistake to blindly assume the more expensive options are any better. Diamond Pro89 and Purina Pro Plan Sport are two kibbles I place in this “B-grade” category. The only “faults” with Pro89 are the calcium and phosphorus levels are too high for large breed puppies and it is a little darker brown (overcooked) in my opinion, but, like the Diamond Natural lines, not nearly as bad as the entry level Diamond products. The Pro89 has a lot of meat-based ingredients, which I like, so to correct the calcium & phosphorus levels in the feed, I mix a 40# bag of Pro89 with a 50# bag of Purina Pro Plan Sport (chicken all life stages). This brings the calcium and phosphorus amounts and ratios right where I like them. Additionally, these foods tend to have higher caloric density, display high digestibility, and have better nutrient absorption. While these kibbles may cost more per pound than the “d-grade” and “c-grade” kibbles, the dogs will gain weight if the amount of “b-grade” kibble fed is not reduced by about 25%. Growth, muscular development, and fitness all seem very good when using these foods. Finally, the higher digestibility also results in easier cleanup.

“A-grade” kibbles – They do not exist. Let’s not forget, kibble is cereal, and as a result, all kibble formulas are going to fall short of optimal nutrition in my eyes. To really maximize health and fitness, one needs to learn how to feed and maintain a balanced diet composed of “natural” foods.

You need to decide for yourself what you are going to feed your dog(s); however, here at American Sentinel K9, LLC, I now feed a combination of two different formulas from two different companies. **I mix one 40# bag of “Pro89” (by Diamond) with one 50# bag of “Purina Pro Plan Sport Chicken 30/20.”** This is the best combination of foods I have used to date and falls within nutritional profiles that are suitable for all of my dogs any and all stages of life. Very good digestion as the dogs consistently have solid stools (very little variation from bag to bag), appears to have very high absorption as I have been feeding about 25% less feed yet the dogs still maintain their ideal weight. **While I have not used a mixture of one 40# bag of Pro89 with one 40# bag of Diamond Naturals Chicken All Life Stages formula yet, but I very well may do so in the future. I am confident this would work too, while at the same time also be a less expensive option when compared to the mixture with the Purina Pro Plan formula.** Noting that that egg yolks are a great source of healthy fats, phosphorus, and vitamin D, eggshells are a great source of calcium, and egg whites are a great source of proteins, I do occasionally give my dogs whole eggs with the shell (raw or boiled).

Nutritional requirements for dogs by unit of measure (% DM = percent of dry matter)

Nutrient	Unit of measure	Growth & Repro min	Adult Maint.	Max	Diamond Pro89	Diamond Nat Ch All Life Sta	Purina Pro Plan	Pro89 Mixed w/ DNCALS	40/50 mix P89 & PPP
Moisture (Max)	% GA max (% AF)				10 GA (8.5 AF)	10 GA (~8.5 AF)	12.0 GA (8.2 AF)	10 GA (8.5 AF)	(8.3 AF)
Kcal/Kg	kcal/Kg				4114 kcal/Kg	3708 kcal/Kg	4390 kcal/Kg	3911 kcal/Kg	4267 kcal/Kg
Fiber (Max)	% DM				2.2	2.5	3.0	2.35	2.64
Macronutrients									
Protein (Min)	% DM	22.5 %	18 %		30 AF (33 DM)	26 AF (28.4 DM)	30 GA (33 DM)	28 AF (30.6 DM)	30 AF/GA (33 DM)
Fat (Min)	% DM	8.5 %	5.5 %		20 AF (22 DM)	16 AF (18.5 DM)	20 GA (22 DM)	18 AF (19.7 DM)	20 AF/GA (22 DM)
Minerals									
Calcium	% DM	1.2 %	0.5 %	1.8%	2.5 DM (2.3 AF)	1.53 DM (1.4 AF)	1.1 DM (1.0 AF)	2 DM (1.85 AF)	1.72 DM (1.48 AF)
Phosphorus	% DM	1.0 %	0.4 %	1.6 %	1.4 DM (1.3 AF)	1.2 DM (1.1 AF)	1.0 DM (0.92 AF)	1.3 DM (1.2 DM)	1.17 DM (1.09 AF)
Cal:Phos ratio	Ratio	1:1	2:1	1:2	1.8:1	1.27:1	1.2:1	1.54:1	1.47:1
Potassium	% DM	0.6 %	0.6 %		0.61				
Sodium	% DM	0.3 %	0.08%		0.32	0.30		0.31	
Chloride	% DM	0.45 %	0.12 %		0.68		1.02		0.87
Magnesium	% DM	0.06 %	0.06 %		0.12		0.09		0.103
Iron	mg/Kg	88	40		219				
Copper	mg/Kg	12.4	7.3		17	15	16.1	16	16.5
Manganese	mg/Kg	7.2	5.0		37				
Zinc	mg/Kg	100	80		246	150	308	198	280
Iodine	mg/Kg	1.0	1.0		2.7				
Selenium	mg/Kg	0.35	0.35	2.0	0.66	0.35	0.30	0.51	0.46
Vitamins/Other									
Vit A	IU/Kg	5,000	5,000	250,000	21,858	15,000	15,000	18,429	18,048
Vit D	IU/Kg	500	500	3,000	1,202				
Vit E	IU/Kg	50	50		328	150	500	239	424
Thiamine	mg/Kg	2.25	2.25		34				
Riboflavin	mg/Kg	5.2	5.2		10.9				
Pantothenic acid	mg/Kg	12	12		107.1				
Niacin	mg/Kg	13.6	13.6		63				
Pyridoxine	mg/Kg	1.5	1.5		3.6				
Folic acid	mg/Kg	0.216	0.216		3.4				
Vitamin B12	mg/Kg	0.028	0.028		0.13				
Choline	mg/Kg	1360	1360		2,514				
Glucosamine (min)	Mg/Kg				300		500		411

- Amino acid profiles vary among protein sources. Some protein sources lack minimal required amino acids
- Data above presumes a 4000 kcal ME/Kg. If food is more calorically dense, values need to be adjusted. Foods less calorically dense do not need adjustment. Low calorie foods should not be used for growth or reproduction.
- Recommended values based on body weight assume the dog is at its optimal weight.
- Minimal fat requirement has not been established. Listed value is suggested as min for fat soluble vitamins.
- Iron from carbonate or oxide sources have very low digestibility and should not be included in iron values.
- Copper from oxide sources have very low digestibility and should not be included in copper values.
- IU units of Vit E to polyunsaturated fatty acids (PUFA) should be greater or equal to 0.6:1 IU. Diets with 50 IU will meet this requirement when PUFA content is 83 grams or less. Vit E should increase by 0.6 IU for each gr of PUFA over 83 grams.
- Processing typically destroys 90% of thiamine; therefore, thiamine should be confirmed after processing.