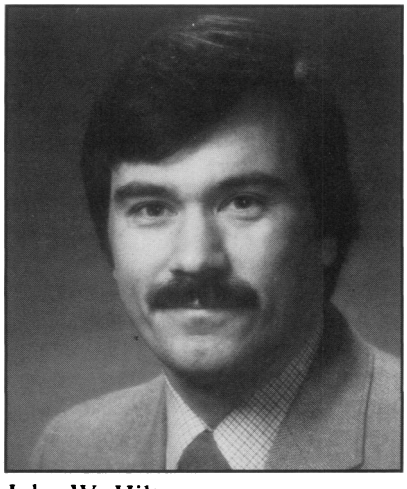
Vegetarian Dog Foods



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Introduction

Dogs are members of the mammalian order Carnivora and for this reason, a number of lay people believe that these animals are strict carnivores or exclusively meat eaters. However, dogs are in fact generally believed to be omnivores (1) and are more correctly labelled as opportunistic feeders. In other words, they can and do consume and receive nourishment from a variety of foods of both animal and vegetable origin. In relation to the dog's nutrition and/or nutrient requirements, the dog generally has the same essential nutrients as do other domestic animals including man. Therefore, it is entirely possible to formulate a diet or feed for a dog of primarily or exclusively vegetable origin feedstuffs that could satisfy all the known essential nutrient requirements for the dog as defined by the National Research Council (NRC) (2, 3). However, when formulating a completely vegetable-based diet for the dog, a number of factors and/or constraints have to be considered in order to produce a well-balanced and nutritious diet. The following describes a number of these major factors to be considered in the manufacture of a vegetable-based dog food.

Feed Formulation

The complete elimination of animal origin foods or feedstuffs from the formulation means that the nutritionist has to be much more rigorous and judicious in the selection of vegetable feedstuffs. Protein supplements or sources such as soybean meal and canola or rapeseed protein concentrates must be used in order to provide adequate levels of dietary protein and these have been used successfully (4, 5, 6). However, these protein supplements may not have the correct balance and/or levels of amino acids as do animal protein sources and the nutritionist has to be careful to not only account for deficiencies but also any potential nutrient imbalances. Dietary energy may be supplied by feedstuffs such as vegetable oils or carbohydrates-rich sources such as corn meal and wheat middlings. Studies have determined that dogs can digest and utilize both carbohydrates and fats equally well as energy sources (7). Similarly, by-product feedstuffs such as tomato pomace and distillers dried or brewer's grains can also be used to supply nutrients to a dog food (8, 9) and act as fillers in a diet, however only in moderation. Despite the fact that most feedstuffs used in the formulation of an animal's diet will contain variable amounts of vitamins and minerals, it is common practice to supplement these micronutrients to the diet in order to insure an adequate dietary level of these particular nutrients.

Digestibility-Nutrient Availability

A natural component of vegetable feedstuffs is fiber which can affect both gastrointestinal motility, transit time, feces evacuation rate and feces volume in dogs (10, 11, 12). In addition, increased levels of dietary fiber may also adversely affect the availability of nutrients in the diet (3). Therefore, contraints on the fiber level in a dog food have to be made.

In addition to fiber, vegetable protein sources such as soybean meal and canola meal may also contain phytate (inositol hexaphosphate). This compound is indigestible and may bind with dietary minerals, in particular zinc, which could lead to nutrient deficiencies in the dog (13). Therefore, increased levels of mineral supplements to vegetable-based dog foods may be warranted, depending on the formulation, to overcome a reduced availability of these minerals in such diets.

Processing

Vegetable feedstuffs may also contain a wide variety of inherent or naturally occurring toxicants as briefly described in Table I. Therefore, it is usually necessary to apply additional processing to vegetable feedstuffs in order to either eliminate or deactivate

TABLE I

Category of Toxicant	Example	Vegetable Feedstuff
Protease inhibitors	Trypsin inhibitor	Soybean meal
Mycotoxins	T-2 toxin	Corn meal
Goitrogens	Glucosinolates	Canola meal
Lectins	Hemagglutinins	Soybean meal
Glycosides	Saponins	Legumes

these toxic compounds. However, aside from reducing the presence of toxic compounds, the processing of vegetable feedstuffs may also increase the digestibility or availability of nutrients such as starch in the feed (14, 15). However, it should be noted that in some cases certain nutrients such as thiamin (16), may be destroyed during processing and increased supplementation of these nutrients may be required with certain types of processing.

Palatability-Acceptability

The poor acceptability of vegetable-based dog foods by dogs is a well known problem in the pet food industry. For this reason, it is common practice to supplement flavor or organoleptic additives to these kinds of diets. Examples of such flavor enhancers or potentiators include artificial garlic, onion, liver or meat flavors. If these flavor compounds are unacceptable to the consumer, there are also available a wide range of "digests" which can add meat or poultry flavors to a dog food. However, this would mean that technically the dog food was no longer a completely vegetable based diet since these digests are produced from animal by-products.

Additional Feed Additives

There is a perception by a number of lay people that chemical additives in a diet or feed are unnecessary and detract from the "natural" qualities of that feed. While it is true that such chemicals do not usually provide any nutrients to a diet, they are nevertheless beneficial to a diet. Additives are usually included in a formulation to enhance the nutrient stability and/or storage life of the product. Examples of such additivies include antioxidants, emulsifiers and antimicrobial agents. In addition, it is sometimes necessary to add a coloring agent to a diet to mask what otherwise would be a bland looking diet or feed. Given the acceptability problems of vegetable-based diets, it is not unusual to find that such diets are also colored. Whether this is for the consumer or the dog remains to be determined.

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Aliments végétariens pour chiens

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Introduction

Les chiens font partie de l'ordre des mammifères Carnivora et, pour cette raison, ils sont considérés par de nombreux profanes comme de stricts carnivores ou mangeurs de viande. En réalité, toutefois, les chiens sont généralement considérés comme omnivores (1) et il serait plus exact de les décrire comme des mangeurs opportunistes. Autrement dit, ils se nourrissent d'un choix d'aliments d'origine animale et végétale. Du point de vue de la nutrition ou des besoins en nutriments, le chien consomme généralement les mêmes nutriments essentiels que d'autres animaux domestiques et que les êtres humains. Il est donc tout à fait possible de formuler un régime ou un produit alimentaire d'origine surtout ou exclusivement végétale et capable de satisfaire tous les besoins connus de nutriments essentiels chez le chien suivant la définition du NRC (2, 3). Par contre, au moment de formuler un

régime entièrement végétarien pour les chiens, il faut tenir compte de certains facteurs ou contraintes afin que ce régime soit bien équilibré et nutritif. On trouvera ci-dessous une description de plusieurs facteurs clés de la confection d'un produit alimentaire végétarien pour les chiens.

Formulation

L'élimination de toute matière d'origine animale exige une bien plus grande rigueur dans le choix des matières végétales. Les sources ou suppléments protéiques comme la farine brute de soya et les concentrés de canola ou de colza doivent intervenir pour assurer un niveau suffisant de protéine dans le régime; ces éléments ont donné de bons résultats (4, 5, 6). Par contre, ces supplément protéiques n'ont pas toujours une teneur en acides aminés aussi équilibrée que les sources de protéines animales et il faut donc tenir compte des risques de déficience et de déséquilibre nutritif. L'énergie peut être fournie par des aliments comme les huiles végétales ou la farine brute de mais ou de blé riche en glucides. Des études ont montré que les chiens peuvent digérer et utiliser tant les glucides que les matières grasses comme sources d'énergie (7). Des sous-produits comme la pulpe de tomates et les grains séchés de distillerie ou de bière peuvent également servir de sources de nutriments dans un produit alimentaire pour les chiens (8, 9), ou encore servir de charges dans un régime, mais de façon modérée seulement. Même si la plupart des aliments utilisés dans la formulation d'un régime pour les animaux contiennent différentes quantités de vitamines et de minéraux, il est d'usage d'ajouter des suppléments de ces micronutriments dans le régime.

Digestibilité et disponibilité

La fibre qui constitue un élément naturel des matières végétales peut influencer tant la motilité gastro-intestinale et le temps de séjour que le taux d'explusion et le volume des excréments chez le chien (10, 11, 12). De plus, un niveau élévé de fibre alimentaire peut avoir un effet néfaste sur la disponibilité des nutriments dans le régime (NRC, 1985). Il existe donc des contraintes quant à la quantité de fibre dans un produit alimentaire pour les chiens.

TABLEAU I

Catégorie de toxicant	Exemple	Matière végétale
Inhibiteurs de protéase	Inhibiteur de trypsine	Farine brute de soya
Mycotoxines	Toxine T-2	Farine brute de maïs
Goitrogènes	Glucosinolates	Farine brute de canola
Lectines	Hémagglutinines	Farine brute de soya
Glycosides	Saponines	Légumineuses

En plus de la fibre, les sources de protéines végétales comme la farine brute de soya ou de canola peuvent également contenir de la phytate (hexaphosphate d'inositol). Ce composé non digestible peut entrer en liaison avec des minéraux alimentaires, le zinc en particulier, ce qui risque d'entraîner une déficience alimentaire chez le chien (13). Par conséquent, des niveaux plus élevés de suppléments minéraux peuvent s'imposer dans les aliments végétariens pour les chiens, selon la formulation, pour compenser une disponibilité réduite de ces minéraux dans un tel régime.

Traitement

Les matières végétales peuvent également contenir tout un choix de toxicants inhérents ou naturels comme l'indique le tableau I.

Par conséquent, il faut normalement prolonger le traitement des matières végétales afin d'éliminer ou de désactiver ces composés toxiques. Par contre, en plus de réduire la présence de composés toxiques, le traitement des matières végétales peut également augmenter la disgestibilité ou la disponibilité des nutriments comme l'amidon dans la nourriture (14, 15). À noter toutefois que, dans certains cas, des nutriments comme la thiamine (16) risquent d'être détruits durant le traitement de sorte que certains genres de traitement peuvent exiger des suppléments accrus de ces nutriments.

Aliments agréables au goût et acceptables

La piètre acceptablilité des aliments végétariens auprès des chiens est un problème bien connu dans l'industrie des aliments pour animaux de compagnie. Il est donc d'usage de prévoir des arômes ou additifs organoleptiques dans ce genre d'aliment. Parmi ces rehausseurs de goût ou produits aromatisants, mentionnons les arômes artificiels d'ail, d'oignon, de foie ou de viande. Si ces arômes sont mal accueillis par les consommateurs, il existe aussi tout un choix de "digestes" qui apportent un arôme de volaille ou de viande aux aliments pour les chiens. Bien sûr, le produit n'est plus alors strictement végétarien puisque ces digestes proviennent de sous-produits d'origine animale.

Autres additifs alimentaires

Aux yeux de nombreux profanes, les additifs chimiques dans un régime ou une nourriture sont inutiles et diminuent les qualités "naturelles" de cette nourriture. Il est vrai que ces produits chimiques n'apportent ordinairement aucun nutriment au régime, mais ils sont néanmoins avantageux. Les additifs font normalement partie d'une formulation parce qu'ils rehaussent la stabilité nutritive et la durée de conservation du produit. Des exemples de ce genre d'additif sont les antixogènes, les émulsifiants et les agents antimicrobiens. De plus, il est parfois nécessaire d'ajouter un agent colorant lorsque le produit aurait autrement un aspect fade. Compte tenu des difficultés d'acceptation des régimes végétariens, il n'est pas surprenant que les produits de ce genre soient aussi colorés. Reste à savoir si ces mesures s'adressent aux chiens ou aux consommateurs.

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BOOK REVIEWS

RECENSIONS DE LIVRES

A Colour Atlas of Equine Parasites. Dennis E. Jacobs. Published by Lea and Febiger, Philadelphia. 1986. 184 pages, 428 illustrations. Price $39.50 (Cdn $52.50).

The title of this excellent atlas tells the reader only part of what the author has accomplished. It is more than a colour atlas of equine parasites for it includes many illustrations of the lesions caused by them as well as a number of photographs of the clinical signs induced by them.

The atlas is organized into eight chapters which cover the parasites of the various body systems including skin, blood, stomach, small and large intestine, liver and finally lung and other tissues. At the beginning of each chapter diagrams and photographs quickly orient the reader on the basic anatomy of the system involved as well as on the distribution of the parasites inhabiting it. The outlines accompanying the illustrations of the various agents are clear and concise making it easy for the reader to appreciate how the various parasites develop and affect the host. The quality of the photographs is generally excellent. The index is adequate and the many workers who have contributed illustrative material are acknowledged at the end of each chapter. The atlas is among the finest I have seen, certainly the best on horse parasites. It would be a welcome addition to any parasitology library and be especially useful to the veterinary student or equine specialist.

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Infectious Tropical Diseases of Domestic Animals. G.J. Losos. Published by Longman Scientific and Technical, Harlow, England, in association with the International Development Research Centre, Ottawa. 1986. 938 pages. Price $95.00.

This new textbook serves the very useful purpose of bringing together a great deal of current information on tropical veterinary diseases which is otherwise inaccessible. Also, this text will occupy a special niche, in that other specialized texts on this topic are somewhat dated (Hall, 1977; BVA Handbook, 1976), and general texts on veterinary medicine ignore several of the important tropical veterinary diseases.

Dr. Losos, a Canadian pathologist with 15 years of diagnostic and research experience in Africa, has selected 25 of the most important tropical diseases, caused by protozoa, viruses, bacteria, rickettsia, or helminths, and has exhaustively reviewed the literature available up to 1983. Diseases of the following domestic animals are covered; cattle, sheep, goat, camel, horse, donkey, dog, and cat. Each disease is dealt with under the headings of etiology, epizootiology, infection, clinical signs, pathogenesis, immunology, vaccination, diagnosis, chemotherapy, and control, with numerous subheadings. Each section begins with an overview, which is followed by an extensive literature review. Each chapter is followed by an encyclopedic bibliography, e.g. 30 pages of references on babesiosis. Unfortunately, there are very few tables in the book, and figures have not been employed. The book does not have an index, but most topics of interest can be easily located through the table of contents of each chapter.

Overall, the text is well-written, and I can recommend it as a reference book for veterinary practitioners, research workers, laboratory diagnosticians, and zoologists with an interest in tropical veterinary diseases.

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