Canine Nutrition NEWSLETTER

July 2010

In this Issue

In May 2010, Liz Pask earned her Ph.D. in nutrition from the University of Guelph. This article is an inside look at pet nutrition research in general, as well as the process Liz went through to earn her degree. To learn more about pet nutrition research, please read:

Nutrition is a complex science. There is a great deal of misinformation in circulation which makes it very difficult for people to attain a sound understanding of nutrition. To learn some tips on how to distinguish science from pseudoscience, please read:

Research, product testing and quality assurance testing are three different types of testing with three different purposes. Research can cost hundreds of thousands of dollars and last several years. Product testing typically takes weeks or months and costs hundreds to thousands of dollars. Quality assurance testing is faster and cheaper but it is a daily on-going expense. For more info on these three different types of testing, see:

This month's Research Study of the Month is a recent study from the British Journal of Nutrition that examines the effect of diet composition on insulin resistance in cats. The results of this study contradict the results of several earlier studies. Specifically this study found **decreased insulin sensitivity in cats fed a low carbohydrate diet**. This is a classic example of how science progresses – new information challenges previous studies and calls for further experimentation in order to understand the mechanisms driving seemingly contradictory results. For more info, see:

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Fundamentals of Research in Pet Nutrition: The Journey to a PhD

By Elizabeth Pask, PhD

As some of you know, I defended my PhD thesis in nutrition in May. My research involved studying one aspect of the relationship between nutrition and cancer. Upon completing my thesis I realized what a luxury I had enjoyed for the last several years. For the duration of my graduate studies I was allowed to pursue knowledge for the sake of finding truth. Once I completed this journey and defended my research I was struck with a profound sense of loss. The knowledge I gained and horded for so long was being given in to the care of my peers. In that giving, my peers would either accept it as valuable new science or reject my research as having limited or no merit. A project that consumed my life for 5 years was now being allowed to succeed or fail on its own merits. The system of research in Canada is not well known outside of academia. Because of the experiences I have had over the last several years I wanted to share some of my journey and my love of science and research with you.

What is the Science of Nutrition?

The science of nutrition involves the study of how the nutrients in food affect the metabolic function of the body. This study can fall under the umbrella of physiology, biochemistry, toxicology or molecular and cell biology. This variety of ways you can pursue research is a wonderful aspect of nutrition. Other disciplines do not have this breadth of application.

How do You Begin to Research a Topic?

The initial stage of research involves an extensive review of literature. This literature should be from peer reviewed sources. The scope of the review that you do is dependant on the amount of research on your topic. If no one has researched your topic then your review may only be a couple of articles. If you are researching a "hot topic" then you may be reviewing hundreds of articles. The purpose of the literature review is to find a research topic that no one has researched before. Masters and PhD candidates in nutrition are expected to contribute new research and new knowledge to the field of nutrition.

Once you have your topic decided your next task is to define your objectives and hypothesis. Your hypothesis must be testable. If you cannot design an experiment that has objective and testable endpoints then you cannot do research. For example your hypothesis maybe that feeding omega 3 fats to dog will make their coat shiny. However the degree of coat shininess is very subjective and very difficult to measure successfully. An easier hypothesis would be feeding dog's omega 3 fatty acids will reduce inflammation in the body. You can measure many inflammatory markers by taking blood samples from a dog.

What is Peer Review?

Peer review is a process by which new research articles are reviewed by fellow researchers in your particular field. Your peers will decide whether your research should be accepted for publication. Research can be accepted with or without revisions. Revisions can be anything from including a little more background information or the reviewers can insist on major revisions that can result in more experiments. The peer review process exists to provide independent or unbiased assessment of your research. It is very difficult to remain objective about your research so peer review-

ers help by reviewing the article with objectivity.

Conducting Research

Now that you have identified your hypothesis and decided what parameters you can use to test your hypothesis you now have to decide what model you can use to build your experiment. There are several models available to use in nutritional science. We can use epidemiology, cell culture, or an animal based model.

Epidemiology is the study of patterns of health and illness in populations of animals. It is sometimes called population medicine. This is often the first step in any research program. We look for patterns of illness in a population and try to determine the factors that affect the cause or severity of illness. The important limitation of epidemiology is that is measures associations between illness and external factors (diet, environment, lifestyle etc.). The results of epidemiology tell us patterns and associations. They do not tell us what causes illness. Epidemiology is an important first step in research and it helps us focus our research efforts into testable hypotheses.

Cell culture is a model that uses cells that are grown in Petri dishes. These cells are purchased from companies and are grown in special incubation units. These cells can be from any type of tissue in the body or they can be abnormal cells such as cancer cells. Cell culture can allow us to examine how one cell in isolation from the body will respond to different substances. For example researchers examined how green tea gets into the cell using cell culture. This type of research model can be very useful in allowing us to test a very controlled and very finite hypothesis. However, the main drawback is that in cell culture we remove all the cell-to-cell communication that happens in the whole body.

Whole animal research can involve a variety of different animal models. Common research models are rats and mice but some research involves pigs, and dogs. This type of research can be beneficial in providing us with realistic results that may not be available with cell culture or epidemiological research. All animal based research must pass ethical approval from the animal care committee (ACC) of the university or research facility. In addition, the animal care committee is governed by the Canadian Council on Animal Care (CCAC). The ACC and CCAC have strict guidelines on housing but they also have strict guidelines on the handling and management of animals, including social enrichment to minimize stress.

Statistics

Once your model has been determined you have to decide on what type of statistics you need to use. You cannot publish an experiment in a peer reviewed journal without proper statistics. The results of the experiment are only as good as the statistics that you use to analyze them. Experiments done without statistics are worthless in the eyes of scientists. You should have all your statistics planned before you start your experiment.

Statistics tell us how far away our data is from the average of the population. In all experiments you will have a control group that represents the normal untreated population and you will have a treatment group that has had something done to it. For example in the case of the green tea and cell culture experiment, the control group consists of cells with no green tea added and the treatment group consists of cells that have had green tea added to them. Statistics will tell us whether the results in the green tea group were any different than the results of the control group. Without statistics we have no way of knowing whether the result we are seeing is due to the treatment or due to random chance.

Sample size

In all research there is always a possibility of random chance so we need to have more than one

dish of cells or animal for each experiment. The size of the sample for each treatment or control group is very important. When reading research the sample size is always designated as "N". Good research will always need an "N" of more than 4. There are statistical equations that you can use to determine the sample size that you need for your research. In general the more subtle the expected effect of your treatment, the larger the sample size you need. The bigger the effect, the smaller the sample size you will need. Most research uses an "N" of 6-10. Ultimately the bigger your sample size the less likely the effect that you are seeing is due to random chance and the more likely it is due to the treatment you are doing.

The Cost of Research

At this point I feel we need to mention something about the true cost of research. In Canada, research is funded mainly through government organizations such as Natural Science and Engineering research council (NSERC), Canadian Institute for Health Research (CIHR), Canadian Cancer Society, Heart and Stroke Foundation etc. However these funding agencies do not fund pet nutrition. Funding for pet nutrition is very limited and as a result, most pet nutrition research is done by pet food companies. Research that is conducted by pet food companies does not always pass a peer review process, nor is it always completely transparent in terms of the methodology used. Pet food companies that do publish their studies in peer reviewed journals contribute greatly to the body of scientific knowledge and our understanding of pet nutrition.

Research in Canada is very expensive. Researchers at universities are expected to fund their own research programs. Professors who don't do research and do not publish are generally fired or let go. Typically, to build a research lab from the ground up would cost approximately $100,000 for BASIC equipment, and funding for one graduate student for one year (graduate students earn between $16,000-$18,600/year). After that initial year you would need at least an additional $30,000-40,000/year to keep your lab running and producing 1-2 publications/year. A major limitation for those interested in doing pet nutrition research is that there aren't the same government and private funding agencies available to fund pet nutrition research as there are willing to fund human nutrition research.

The Final Stages

The data collection phase takes up the majority of time in a PhD and Masters. The time to collect data varies widely but most students will take 2-3 years to complete this phase. In my research I had 3 main projects. The first project took 3 years to complete and the remaining 2 projects took only 6 months to complete.

Once you have completed your data collection you now move onto writing up your results into a manuscript for publication in a peer review journal. This is where you trust that you have contributed positively to the body of knowledge and that your research will be the basis for someone else's research in the future.

Summary

When reading a research paper, make sure it has come from a reputable source (i.e. a peer review journal). A good place to start your search is an online data base called pubmed. Sometimes reading research articles can be overwhelming because of the amount of detail that they include. Most of this detail will tell you how well the research was conducted. Make sure that the research has a control sample as well as one or more treatment samples. Also check to see how many subjects were used in the study by checking "N".

Cooking Workshops for Dog Owners

The Satisfied Canine (a division of The Satisfied Soul Inc), has entered into a licensing agreement with HW Veterinary Nutrition Inc (Hilary Watson), in order to provide 3-hour cooking workshops for dog owners who want to prepare healthy home-made meals for their dogs. Instruction is provided by a licensed chef, following complete & balanced recipes formulated by Hilary Watson. Students are asked to bring Hilary's Blend supplement to the workshop (available from your veterinarian) but all other ingredients are provided by the chef. 4 kilograms of prepared dog food is included in the registration fee. No experience necessary – novices always welcome! Workshops will be offered on Monday evenings and Tuesday afternoons in downtown Toronto beginning in early July. Watch for more information at: www.satisfiedcanine.com and www.completeandbalanced.com or send me an email (hwatson@completeandbalanced.com) to have your name added to our cooking workshop mailing list - we'll send you more information as it becomes available.

Science versus Pseudoscience – Can You Tell the Difference?

By Hilary Watson BSc

I often get emails from owners and veterinarians who are frustrated by nutrition. Nutrition is a tough science. It doesn't help that there is so much misinformation out there. This article is about distinguishing between science and pseudoscience.

Pseudoscience

Pseudoscience is information claiming to be factual or scientific that fails to meet the usual scientific standards of testability, repeatability and consistency with experimental result. The incentive for promoting pseudoscience may be simple ignorance or deliberate deception for financial or other gain. How can we distinguish real science from pseudoscience? Here are 5 things to watch for:

1. Fantastic claims made with arrogant overconfidence
2. Confusion between correlation and causation
3. Reliance on anecdotal evidence rather than empirical evidence
4. Conflict of interest – profiting from claims
5. Distrust of authority, particularly academic and government institutions. Pseudoscience thrives on mainstream rejection.

1. Fantastic Claims Made with Arrogant Overconfidence

This concept has a name! It's called the Dunning–Kruger effect. Dunning and Kruger studied competence in a number of different skills, including reading comprehension, driving a car, playing chess and playing tennis. They found that "ignorance more frequently begets confidence than does knowledge". Incompetent individuals tend to overestimate their own competence and fail to recognize expertise in others. Competent individuals tend to underestimate their own competence and are more likely to assume that others share their expertise. I call this the "American Idol effect" – the contestants with the most talent tend to be the most surprised by praise from the judges, whereas the contestants who have no talent whatsoever are always completely oblivious of this fact and refuse to give any credence to the criticism of the judges. Beware of anyone who is sure they have all the answers. Scientists know that they don't.

2. Confusion Between Correlation and Causation

Suppose a study reports that middle aged men who eat two or more servings of salmon a week are less likely to suffer from high blood pressure than those who don't. Knowing that salmon contains omega-3 fatty acids, and knowing that omega-3 fatty acids are converted into metabolites that can affect blood flow, it is tempting to assume that eating salmon caused the reduction in blood pressure. However, there are other possible explanations. People who eat two servings of salmon a week are probably in a higher socio-economic class than people who don't. Those in a higher socio-economic class may have more leisure time to exercise. They may be better edu-

cated and more aware of other risk factors for high blood pressure. They may be receiving better medical care and eating a better quality diet in general. It is entirely possible that the omega-3 fatty acids in salmon caused the reduction in blood pressure. However, it is also possible that eating salmon was merely associated with a reduced blood pressure and that some other factors caused this result.

This is the distinction between causation and correlation. Causation means that A causes B. Correlation means that A and B occur together, and this could be because A causes B, or B causes A, or C causes both A and B, or A and B occur together by random coincidence. Proving causation requires studies that isolate and control for confounding variables. Science is very careful about not confusing correlation with causation.

If an owner sees their dog's health problems disappear after switching from kibble to all-raw, the effect of feeding raw on their dog's health is an example of correlation not causation. In switching to all-raw, the owner changed several variables. They changed from pet-grade ingredients to human-grade ingredients. They changed from high-starch food to low-starch food. They changed from food with cereal grains to food with no cereal grains. They changed from processed ingredients to fresh ingredients. They changed from low moisture food to high moisture food. And they changed from 100% cooked to 100% raw. A scientist observes the outcome (dog improvement) and seeks to isolate the various factors to determine which caused the outcome. Testing the raw hypothesis would involve feeding cooked or partially cooked human-grade, low-starch, no-grains, high-moisture foods to see if the same results are obtained as with feeding all-raw human-grade, low starch, no-grains, high moisture foods. Controlling for all variables except the one being tested is necessary to prove causation. This is classic science – scientists test their hypotheses so that they can support their causation claims with empirical evidence. Making claims of causation without testing or empirical proof is classic pseudoscience.

3. Reliance on Anecdotal Evidence Rather than Empirical Evidence

Science puts a lot of weight on empirical evidence. Empirical evidence is gathered in controlled research studies, is presented in peer-reviewed scientific journals and debated at scientific conferences. In fact, science by definition is any discipline that empirically tests its ideas.

Pseudoscience puts weight on anecdotal evidence. Anecdotal evidence is based on observation rather than controlled research trials. Care needs to be taken here. Many great scientific discoveries evolved from anecdotal observation. The development of the first vaccine is a case in point. Edward Jenner noted that milkmaids who were exposed to the cowpox virus seemed to be resistant to smallpox. This observation led Jenner to hypothesize that deliberately exposing someone to cowpox would give that person immunity to smallpox. Jenner tested his hypothesis by administering pus from a cowpox blister to a healthy subject, namely his gardener's young son James Phipps. He then exposed Phipps to smallpox and showed that Phipps had in fact acquired immunity. Of course, Jenner's approach would fall short of today's ethical standards for conducting research, but the scientific method is the same today as it was in 1796. Anecdotal observation often leads to remarkable scientific discoveries, but anecdotal evidence by itself is not good enough for a scientist. It is only a starting point from which controlled studies, empirical evidence and mechanistic understanding must follow.

4. Conflict of Interest – Profiting from Claims

Everyone has a bias. I sell a cookbook and supplement. That give me a bias and my bias should be taken into account when you interpret what I write. Pharmaceutical companies run drug trials. They have a vested interest in the outcome of those trials. The same is true for multi-national

pet food companies that do pet nutrition research. Even independent university academics receive their research funding from somewhere, often corporations or government agencies. Bias is everywhere and it can influence research outcome. However, that doesn't mean that we should discard all research as bias and therefore invalid. In fact, the entire purpose of research is to neutralize bias. This is achieved in two ways. First by transparency – sources of funding are clearly stated by those conducting the research and the research methodology is always clearly explained so that others can repeat the experiment to see if they get the same results. Second, through research design – for example, the purpose of the double-blind, placebo-controlled trial design is to minimize the impact of experimenter bias on the study outcome. We should always be aware of potential bias. We should critically evaluate trial design and interpret the research findings through that light.

When a pharmaceutical company runs a drug trial, it isn't just the company that has a vested interest in a positive outcome, so do all the patients who might benefit from the drug they are testing. If it weren't for the millions of dollars invested by corporations in research, many important lifesaving drugs would not currently be available. The same is true in pet nutrition. We can double the life expectancy of dogs with kidney diseases as a result of research done by pet food companies. Four corporations drive pet nutrition innovation by funding independent academic research around the world. These companies are (in alphabetical order): Colgate-Palmolive (Hills), Mars (Royal Canin/MediCal/Pedigree/Whiskas), Nestle-Purina (Purina/Alpo/Friskies), and Proctor & Gamble (Iams/Eukanuba). These big multi-nationals are market leaders because they do research. Research leads to innovation and innovation leads to market dominance. Any company can claim to be innovative, but only these four drive real scientific innovation in pet nutrition.

5. Distrust of Authority, Particularly Academic and Government Institutions. Pseudoscience Thrives on Mainstream Rejection.

I'm always amazed that some people put more trust in someone with no education in pet nutrition, no credentials, no research background and no scientific support for their claims, than they do in a person who has earned multiple advanced degrees, has many published research papers, is teaching at an academic institution and has devoted their life to empirical research in a highly focused area of pet nutrition. At the top of my list of people with no credibility are those who challenge the concept of complete and balanced nutrition. There are companies who claim their products are "balanced the way nature intended" and who claim that complete and balanced nutrition is not important. This is nonsense.

The concept of complete and balanced nutrition is a universally accepted concept amongst nutritionists of all species, all over the world. Human nutritionists have defined complete and balanced nutrition for humans. Their recommendations are printed on the labels of the food you eat. When the label on your milk carton says that one cup of milk delivers 30% of your "daily value" for calcium and 20% of your "daily value" for riboflavin (vitamin B2), that's telling you that human nutritionists actually have defined how much calcium and riboflavin a person needs each day as part of a "complete and balanced" diet. In fact, human nutritionists have defined minimum adequate intakes of all essential nutrients for humans. Similarly, equine nutritionists have a definition of complete and balanced nutrition for horses, poultry nutritionists for chickens, fish nutritionists for fish, and pet nutritionists for dogs and cats.

The National Research Council compiles nutrition research from around the world and publishes an updated edition of their "Nutrient Requirements of Dogs and Cats" once every decade or so. The nutrient recommendations published in this book are based on academic research from all over the world. When NRC recommends that a dog be fed at least 0.015 mg of iodine and no more than 4 mg of iodine per kilogram of body weight each day, that recommendation is based

on clinical trials that show that feeding less than 0.015 mg caused specific symptoms of deficiency and feeding more than 4 mg caused specific symptoms of toxicity. All of NRC's recommendations are based on empirical research, not on someone's opinion or beliefs. NRC recommendations are based on more than 50 years of research compiled from specialized academics from all over the world. Yet there are people with no education in pet nutrition who claim to know more about a dog's nutritional requirements than NRC.

In the end, this goes back to number 4. Almost always the people who dispute the need to adhere to NRC guidelines are people who profit from not following them. It costs $4000 to analyze a food sample for all 36 nutrients that NRC has identified as essential for dogs. In launching a new pet food, you have a choice. You can spend $4000 to have it tested for all 36 nutrients and then pay to correct any deficiencies or imbalances and then pay another $4000 to re-test it and so on. Or you can claim that complete and balanced nutrition is irrelevant and save yourself a lot of money. While I can fully understand why some companies would choose not to spend the money, I can't understand why some owners are willing to accept this approach. If a company doesn't analyze its products, how can they claim that their products meet a dog's nutritional requirements? Don't our dogs deserve better than that?

Conclusion

Nutrition is a tough subject. A university degree in nutrition (human or animal), requires four years of study. Just as you would hire an engineer to design a bridge, or a dentist to do a root canal or a lawyer to draft a legal contract, owners would be wise to trust the expertise represented by a university degree in pet nutrition when deciding the best approach to take with their dogs. There are a lot of pseudo-nutritionists out there, making some pretty outrageous claims. Hopefully this article helps you separate real science from pseudoscience.

"Lilly-Rose"

Testimonial

Lily-Rose, my 8 year old Lab mix was drinking so much water, I knew something was wrong. After blood and urine tests, my veterinarian confirmed the diagnosis I dreaded: Diabetes Mellitus! She would need daily insulin shots and a new diet. The challenge was finding a kibble that would be appropriate for a diabetic dog but that was also hypoallergenic because Lily also had severe food allergies. Having trouble finding something that worked, I mentioned to my veterinarian that I would be interested in home-cooked food for Lily but was unsure about what foods to give her, the amount and especially, how to know if it was a well-balanced diet. She referred me to the «Complete and Balanced» website (www.completeandbalanced.com). As soon as I started reading the website, I knew I was at the right place. I explained Lily's situation to Hilary and she was able to make two custom recipes that fitted Lily's special needs perfectly. Since I've been giving her Hilary's recipe, Lily-Rose is doing great. Within 2 weeks her coat became very shiny, her teeth became whiter and no more bad breath or gas! Lily doesn't scratch from the allergies anymore and although she still has diabetes, we were able to reduce the amount of her daily insulin considerably. That is amazing! I am so grateful and so relieved. Once a week I make a big batch of food that will last a whole week, I put it into individual portions and freeze them. It's so easy and the peace of mind knowing that I am feeding her appropriately is wonderful! I highly recommend Hilary's recipes and Hilary's Blend supplement if you want to be sure you are doing the right thing for your dog. Thanks again Hilary!

Wendy Allain
Drummondville, Quebec

Research, Product Testing & Quality Assurance: 3 Types of Testing, 3 Different Purposes

By Hilary Watson BSc

There are three different types of pet nutrition testing: research trials, product testing and quality assurance testing. Each has a specific function. This brief article will provide the major distinctions between these different types of testing.

Research

Please also read Liz's article this month.

Research trials don't typically involve testing products. Research trials test a hypothesis or theory. They expand the current body of scientific knowledge. Research usually involves collaboration with a university or veterinary college. The research results are published in a peer reviewed scientific journal. Research doesn't always have an immediate practical application. It represents a significant financial investment that does not necessarily pay off in the short or long term. Failures are expected, and are welcome in the scientific community because they contribute to the body of knowledge. Research occasionally leads to incredible breakthroughs that change the way we feed our pets.

Very few companies do research in pet nutrition. Those that do research operate on a different plane than those that don't. Companies that do research have extensive networks in the global scientific community. They attend conferences to present their research and learn from other researchers. They collaborate with leading academics around the world. These few research-driven companies are all large multi-nationals who contribute greatly to the advancement of our understanding of pet nutrition.

Some examples of studies that would meet the definition of research include: measuring trans-epidermal water losses from the skin surface in dogs fed various levels of essential B-vitamins; measuring the antibody response to vaccination in puppies fed various antioxidants; evaluating the effects of pre-biotic fibre on bacterial populations in a dog's gut; measuring the effect of phosphorus restriction on life expectancy in dogs with kidney disease; assessing the effects of antioxidants on cognitive function in puppies or senior dogs. These research trials may lead to the development of new products, but they don't involve testing products. All these studies test a hypothesis or concept and they yield new information. Research trials typically cost hundreds of thousands of dollars and last many years.

Product Testing

Product testing is part of new product development and generally occurs before a product is launched into the market. Product testing is not as expensive as pure research and it happens over a shorter timeframe, usually days or weeks, or in a few cases several months. Unlike research, product testing always has a known expected outcome. Although failures are not welcome, they are considered part of normal product development. Significant failures can send product developers back to the drawing board to start product development over from scratch.

Some examples of product testing include palatability trials, digestibility trials, urine pH trials, metabolizable energy (ME) trials, AAFCO growth or maintenance trials, plus trials to make health claims, for example dental trials for dental claims, weight loss trials for weight loss claims etc. Also included in product testing is analytical testing which involves sending food samples to a laboratory for a full nutrient analysis.

Product testing ranges in price from $500 for a palatability test, to $4000 for a full nutrient analysis, to $25,000-50,000 for an AAFCO feeding trial, to $75,000 or more for trials for health claims. Unfortunately there are pet food companies that launch products into the market without doing any product testing at all.

Quality Assurance Testing

Quality Assurance (QA) testing is less expensive than product testing but it is an on-going expense. With QA testing, failures are not expected or welcome. In fact, the company's response to a QA failure tells a lot about the company. Is that product released for sale despite the QA failure, or is it quarantined and destroyed? Obviously, the purpose of QA testing is to prevent product failures.

Some examples of QA testing include: screening in-coming ingredients for mycotoxins, heavy metals and bacteria; analyzing in-coming ingredients for their nutrient content, testing fats for peroxides (rancidity); taking samples during a production run to analyze for moisture or nutrient content, as well as testing grinders, mixers, driers and other manufacturing equipment for proper function. Pet food companies vary widely in terms of the investment they make in QA testing. The fact that we continue to see pet food recalls (2 major petfood recalls in June 2010 alone) is testament to the fact that some companies' QA testing is still not adequate to catch product failures.

Conclusion

These three types of testing: research, product testing and QA testing are all important, but they serve different purposes. Research seeks to discover new knowledge by testing concepts or hypotheses. Product testing serves to evaluate important product parameters before a new product is launched into the marketplace. QA testing is on-going and is designed to catch quality failures so that only safe products are released for sale.

Each month, we'll review one nutrition research study published within the last 2 months. These reviews won't be limited to canine nutrition. We may review human, equine, livestock and zoo animal nutrition research if we find it interesting and relevant. The common denominator is that each study will be recently published in a peer-reviewed scientific journal and they will all provide new insight into some concept of nutrition.

Research Study of the Month

By Laura Scott MSc

Title of study:	*The glucose and insulin response to isoenergetic reduction of dietary energy sources in a true carnivore: the domestic cat (Felis catus)*
Authors:	*Adronie Verbrugghe, Myriam Hesta, Stephanie Van Weyenberg, Georgios A. Papadopoulus, Kris Gommeren, Sylvie Daminet, Tim Bosmans, Ingeborgh Polis, Johan Buyse and Geert P.J. Janssens*
Journal:	*British Journal of Nutrition*
Issue:	*2010 Mar 2:1-8*
Species:	*Cat*
Link:	*http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=7308072*

Background Information

Insulin is a hormone which causes cells in the liver, muscle, and fat tissue to take up glucose from the blood, storing it as glycogen in the liver and muscle. Insulin resistance is a state in which the body requires greater amounts of insulin to cause a normal glucose response. This can lead to a number of health risks such as hypertension, obesity and diabetes. Several studies have shown that diet can have an impact on insulin sensitivity. The "carnivore connection" theory indicates that human ancestors adapted metabolically to high protein, low carbohydrate diets during the Ice Age where due to low glucose intake, resistance to the glucose lowering effects of insulin offered survival advantages. With the agricultural revolution came higher carbohydrate foods and an increase in diabetes. The diet of domestic cats is undergoing a similar change as it shifts from high protein, low carbohydrate prey to more commercial diets with highly digestible carbohydrates.

Purpose of this Study and Study Design

The goal of this study is to determine the effect of diet composition on insulin resistance. Nine adult cats with normal body weight were divided into three groups and housed individually. Each group of cats was randomly assigned to each of the three diets at intervals of 3 weeks. The three diets were; low protein (28% protein, 43% fat and 29% carbohydrate), low fat (47% protein, 27% fat and 25% carbohydrate), and low carbohydrate (45% protein, 48% fat and 7% carbohydrate). The diets were isoenergetic, contained no dietary fibre, and were otherwise similar. At the end of each testing period an intravenous glucose tolerance test was administered to determine the effects on glucose and insulin metabolism. Blood was also collected for evaluation of total cholesterol, TAG, NEFA, urea, creatinine, plasma leptin, plasma glucose and serum insulin.

Study Results

There was no difference between the diets on plasma glucose or basal serum insulin concentrations. There was a trend for serum insulin to be lower 45 and 60 minutes after administration of glucose for cats on the low protein diet. The Area Under the Curve (AUC) for insulin was higher in the low carbohydrate diet. In addition, there was a tendency towards a delayed second insulin peak. The results suggest decreased insulin sensitivity in normal weight cats fed a low carbohydrate diet. These results seem to contradict previous studies which indicated that feeding reduced dietary carbohydrates improved insulin sensitivity. However, previous studies increased the amount of carbohydrates on top of an already high level in the control diet. Previous studies also did not use isoenergetic diets which may have resulted in confounding factors. In addition, this study used normal weight healthy cats, so the effect of a change in carbohydrates in the diet may not act the same to manage insulin sensitivity as to prevent it.

My thoughts

The results of this study suggest that normal weight, healthy cats tend towards decreased insulin sensitivity when fed a high protein, low carbohydrate diet. Decreased insulin sensitivity may be an evolutionary advantage for strict carnivores. Decreased insulin sensitivity in animals fed a high protein, low carbohydrate diet would allow greater amounts of glucose to circulate in the blood and be delivered to where it is needed in the body. For animals that are not strict carnivores (i.e. dogs) the same results may not be seen.

"Tessa"

Testimonial

Tessa was a pleasure except for one thing - she scratched non-stop. It was painful to watch and unbearable for her. Her itching and subsequent scratching was continual; she slept on our bed - we could not sleep at night for an entire year. She had dry skin, "brillo pad" hair, constantly chewed her paws, and had dandruff everywhere. Tuffs of hair were everywhere as a reminder of her misery. We tried prednisone, antihistamines, special veterinary diets, shampoos, sprays, and other drugs; we even gave her Ivermectin shots because we thought she had mites.

Tessa was only 6 months old and I didn't have the heart to keep her on heavy medications. I started reading everything I could about human and dog allergies. I made several changes that had a beneficial effect - I noticed that if I took a "sham Wow" and damped it, wiped her off with it, I could eliminate dust and pollen after walks. I changed her flea medication because I noticed increased scratching after application. I did a blood test, found out she was allergic to chicken and oatmeal. I had been bathing her in oatmeal shampoo – recommended as a skin conditioner. I had noticed she scratched more after shampooing and couldn't figure out why – I had no idea she might be allergic to oatmeal!

I started home cooking, eliminated all the food items that showed up in her blood test, and picked one protein source and one carbohydrate. I took copious notes and literally documented everything. I was told that it takes 3 months for an allergen (e.g., chicken) to leave the body so, I had to be patient. I started with duck and potato, then went to fish and rice, etc. and slowly built up the repertoire of food items. I eliminated all raw hides, bones, treats, etc.

After 3 months, I saw a change. Then, after each month - I noted bigger changes. Now over a year later: her skin is completely clear, no dandruff, her coat is glossy and soft. She does not have ear or eye infections. She has stopped scratching. I was "readying" myself this spring as the pollens came bursting out (we back onto an oak ridge and have a lot of plant life) but there's been no scratching this year. I understand now, that when you reduce the allergens in the food, you reduce the total allergen threshold. As a result, Tessa is completely fine with the pollens this year. Even though her blood test showed that she is allergic to some weed, grass and tree pollens, she isn't scratching at all.

I now home cook complete and balanced recipes using HILARY'S BLEND supplement and I am not using any drugs at all. Tessa is a new dog - it's unreal! I wish everyone knew about this because I understand that many dogs are put to sleep due to allergies - what a tragedy!!! On my many walks, trips to the park, and pet stores, I have met more and more people who are at their "wits end" due to their beloved pets continual ear/eye infections, biting paws, scratching, "hot spot" skin sores, etc. I tell all of them "Tessa's story" - I hope this helps other owners whose dogs have these kinds of problems.

Sue Zimmer

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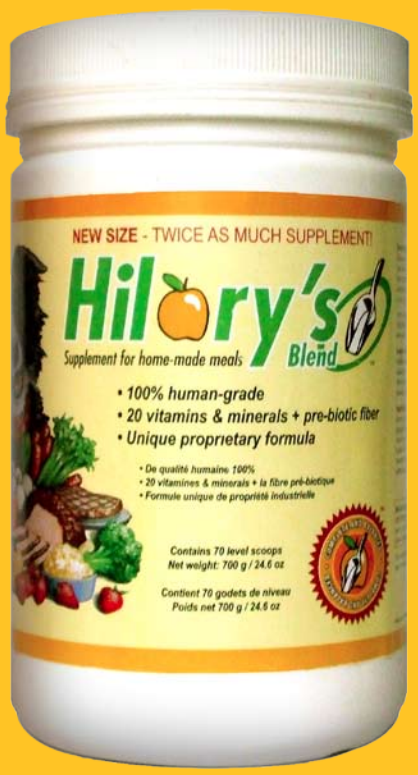

	Cookbook	Hilary's Blend 350g	Hilary's Blend 700g
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