

# Food for Thought

## What Affect Are GM Foods Having on the Health of Our Dogs?

By Sy Guth

### Introduction

In New Zealand, we like to think we don't need to be concerned about genetically modified (GM) foods because we consider ourselves to be "GM Free". It's true that we have not followed the suit of many other countries in growing GM crops. But, we are not GM Free when it comes to the foods we buy for both ourselves and our pets. GM foods are imported into New Zealand from our good neighbours the Australians who have followed the USA lead in growing genetically engineered (GE) crops and producing foods with GM ingredients. Many human grocery products are totally legal, and in fact, our government has agreed their import with the Australians. Most dog foods come from overseas and many of these contain GM ingredients that have been genetically modified to contain pesticides. Only by contacting the dog food companies individually can one find out if the food you are feeding your dog contains GM / GE ingredients

Why should we care about GM / GE ingredients? After all they are approved by the US FDA (Food and Drug Administration) and our own FSANZ and NZFSA. However, GM foods are, for the most part, unregulated worldwide. Going through the US FDA consultation procedures is voluntary. This article addresses Bt, one of the factors that has been introduced into the DNA in each cell of many modified crops and why we should care and how it can affect us and our animals. As breeders we may be influencing our dog's hereditary DNA by something as simple as the type of food we are feeding.

### What Foods Are Genetically Modified?

The World Health Organisation has written that "As of September 9, 2008, a total of 111 bioengineered food products have completed the US FDA "consultation procedures" on bioengineered foods. In addition to the tomato, the range of products includes soybean, corn, cotton, potato, flax, canola, squash, papaya, radicchio, sugar beet, rice, cantaloupe, and wheat. According to estimates by the Grocery Manufacturers of America, 'between 70% and 75% of all processed foods available in U.S. grocery stores may contain ingredients from genetically engineered plants. Breads, cereal, frozen pizzas, hot dogs and soda are just a few of them.'"

Our New Zealand government has approved the following foods for import with Australia - canola oil, corn, soybean, cotton, potato, rice, lucerne, sugar beet, and an anti-staling agent used in baked goods. The full list can be found at <http://www.greens.org.nz/factsheets/ge-foods-new-zealand-list>

### Differences in Digestive Anatomy

How do GM / GE foods react between the digestive systems of Carnivores (canine) and Omnivores/Herbivore (human) species. The human digestive system is designed to handle the digestion of plants and grains effectively. But how does genetically modified foods affect the canine who is not designed to digest plants and grains? Are GM foods more dangerous for carnivores than omnivores and herbivores?



Photo courtesy Wikimedia Commons



As humans we are equipped to eat both animal and plant foods. The human digestive process begins in the mouth where enzymes are secreted and start the digestion of food. The human saliva contains the carbohydrate digesting enzyme salivary amylase. This enzyme digests the majority of starches eaten. The human's stomach is single-chambered and represents about 21% to 27% of the total digestive system. The PH level is normally above 5 when there is food present. The stomach is the blender for mixing and liquefying ingested food and then regulates its passage into the small intestine.

The human small intestine is long measuring about 10 times the body length. The human colon or large intestine is a pouched structure and long which is in keeping with the type of colon found in herbivore creatures. The human colon absorbs water and electrolytes, produces vitamins and houses extensive bacterial fermentation of fibrous plant material and absorbs a significant amount of food energy. We can see from this that humans start the plant and grain digestive process in the mouth and it continues all the way through the system to the colon or large intestine.

Dogs, on the other hand, do not have any enzymes in their mouths because of the danger of damaging their oral cavity. Therefore, their digestive process starts in their stomach with enzymes that digest proteins and fats -- they do not have enzymes that digest starch and cellulose. The dogs have a single-chamber stomach and this part of the digestive system represents 60% to 70% of their total digestive system. The stomach secretes hydrochloric acid which keeps the PH level very low around 1 - 2 and breaks down proteins and kills dangerous bacteria in rotting flesh. All of the digestion of food in the canine is done in the stomach whilst the animal is lying down at rest. The small intestine is about 3 to 6 times the length of the dog and this is where the food molecules are absorbed into the system. The large intestine, known as the colon, is again short and used as a reservoir to hold salt and water. It has a largely proactive bacteria flora.

If there are no enzymes to digest plant material, can some of the genetically modified factors form botulism or other issues in the dog's stomach? How do the GM factors react with a low PH balance?

## Heredity: The New Understanding of Genes

As early as 20 to 30 years ago, scientists believed in what was termed "genetic determinism". The very short definition of this means that scientists believed that genes were stable carriers of information and not influenced by outside effects and that one gene was responsible for one trait, including diseased traits. They believed that genes were passed on from generation to generation without change. The only change within an individual was in cases where exposure to radiation or some other major event known to cause changes had occurred which caused a mutation, and this was usually identified as cancer.

Dr J. Craig Venter, Leading Humane Genome expert brings us up to date with his statement:

"You cannot define the function of genes without defining the influence of the environment. The notion that one gene equals one disease, or that one gene produces one key protein, is flying out of the window." (Times, February 12, 2001)



Photo courtesy Wikimedia Commons

Massive amounts of evidence from both genetic and biochemical research has proved the old genetic determinism theory is totally inaccurate. PSRAST (Physicians and Scientists for responsible Application of Science and Technology) in their article *The New Understanding of Genes* summarise the new findings as follows:

- "... **no gene works in isolation.** It is thus a well proven fact that the same gene may have different effects in different individuals, because the influences of other genes modify how it will express itself.
- "... **genes may change in response to the conditions** of the organism and the environmental situation. And these adaptive genetic changes may be passed over to the following generations.
- "According to the "new genetics", the expression of one single gene into its corresponding protein is the result of a very complex process of feed-back and feed-forward interactions. The expression of a gene is the result of a complicated network of interactions that involves not only the whole cell but the whole organism and even the environment.
- "... it is impossible to predict the effects of the insertion of a foreign gene. Unexpected complications may occur in many different ways. **This includes unpredictable appearance of harmful substances in GE foods.**"

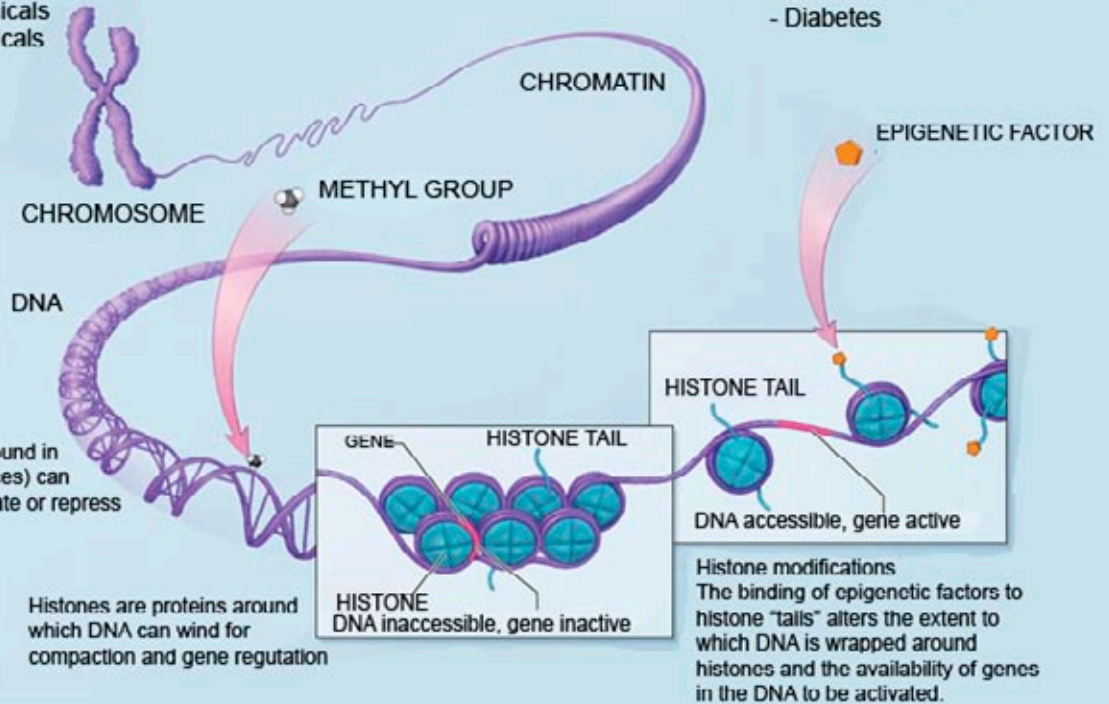
## EPIGENETIC MECHANISMS

are affected by these factors and processes:

- Development (in utero, childhood)
- Environmental chemicals
- Drugs / Pharmaceuticals
- Aging
- Diet

DNA methylation  
Methyl group (an epigenetic factor found in some dietary sources) can tag DNA and activate or repress genes

Histones are proteins around which DNA can wind for compaction and gene regulation



## HEALTH ENDPOINTS

- Cancer
- Autoimmune disease
- Mental disorders
- Diabetes

Fig 1

An interesting branch of cellular study is called *Epigenetics*. The word, epigenetics was actually coined by C.H.Waddington in 1942. The word has recently been used to describe how cells differ from their original totipotent phase in early embryonic development. Why should this be of interest to dog breeders? Because understanding the basics of epigenetics provides the understanding that as breeders we may be influencing our dog's DNA by something as simple as the type of food we are feeding, if that food contains genetically modified ingredients. If this sounds silly to you, then read on to the end of this article and you may change your mind.

Fertilisation in humans and dogs begins with a single egg being fertilised by a sperm. From this very simple beginning, the cells divide into what will finally become a recognisable human or a dog. In other words, we and our dogs are nothing more or less than billions of cells. Those cells are made up of DNA. It is the DNA that can be affected by environmental influences as noted by epigenetics. The molecular basis of epigenetics is complex and some of the readers may wish to explore this subject in much greater depth, but my aim is to keep this information as simple as possible and the following diagram from Wikipedia Commons gets the point across nicely. Fig 1

What is important to note is that epigenetic mechanisms and factors (cell development, environmental chemicals, drugs, aging, and diet) can activate or repress genes. In other words, factors such as chemical pesticides can attach to genes and alter their activity. Once altered, these genes can then be passed along to off-spring. So where we believe that a puppy inherits a diseased trait, this defect may have started with the modification of a gene due to diet or pesticide exposure in one of the parents just the generation beforehand. This most certainly is food for thought and opens up the proverbial can of worms in terms of breeding practices. It should also cause us to pause and reflect on whether the heredity problem is far bigger than the current popular tarring and feathering of line-breeding. What we can see from the ability of the epigenetic mechanisms and factors is that ANY DOG, be it a purebred or a mongrel can be affected

by this change in genes through tagging and binding of epigenetic mechanisms and factors.

## Bt Modified Corn

One definition of genetically modified foods used by the World Health Organisation is "foods produced from crops whose genetic makeup has been altered through a process called recombinant DNA, or gene splicing, to give the plant a desirable trait. The modification is usually done in the lab using molecular techniques or genetic engineering." The first genetically modified crops began appearing in the 1990s.

One of the first GE crops was the Flavr Savr tomato, a genetically modified organism (GMO), introduced to the market in 1994. It was modified to suppress the enzyme that causes ripening. It was later taken off the market due to production issues.

The most controversial modification spliced into the plant DNA or gene is a "built-in" pesticide, Bt. When bugs and insects bite the plant, the poison, called Bt, splits open in their stomach and kills them. Bt is produced from soil bacteria *Bacillus thuringiensis*. Bt has a history of being safe to use and organic farmers use it as a natural insect control. The problem arises in the GM plants because the Bt-toxin is thousands of times more concentrated as well as being designed to be more toxic and cannot be washed off. The Bt-toxin is in EVERY cell in the plant. It also has properties of an allergen. The traditional Bt-toxin sprays have been confirmed in studies to be harmful usually resulting in human symptoms like allergies and flu-like symptoms. These same symptoms are being reported by farm workers throughout India from handling cotton modified with Bt-toxin.

What using Bt modified seeds mean to farmers worldwide and especially those in third-world countries is that the crops do not need to be sprayed with pesticides or not sprayed as heavily as they previously did. How big the impact to our bodies and our dogs from



this new form of injection of carcinogenic into our food supply has not been thoroughly studied to determine the effects. One kernel of corn contains a BILLION cells. Each cell has the modified DNA containing the pesticide. The conglomerates manufacturing the modified seeds, such as Monsanto, declare that GM food is safe.

However, Jeanette Fitzsimons, when she was an MP, in a speech reported "The 2007 reanalysis by Seralini and others of Monsanto's data on Bt corn MON 863 found toxic effects on the livers and kidneys of rats. Seralini's work was supported by a local Environmental Science and Research (ESR) internal evaluation, but ignored by the New Zealand Food Safety Authority (NZFSA). It matters who funds the safety research."

"Last July Austrian researchers studied the effects of a Bt corn combining MON 810 and NK603 on breeding mice and found effects on the kidneys and 'time related negative reproductive effects of the GM maize'. (Velimirov et al 2008)"

"Finally, just last November Italian scientists concluded from their study that: the consumption of MON 810 maize ... Induced alterations in intestinal and peripheral immune response of weaning and old mice. (Finamore et al, 2008)."

I've just mentioned Bt here, but the list of modified corn allowed into New Zealand can include any of the following toxins modified into the genes by different corporations -- Bt-176, MIR162, MIR604, MON 810, MON 863, MON 89034, Bt-11, DAS-59122-7, T25, GA21, NK603, LY038, DBT418, MON 88017. The list of other GM foods allowed into New Zealand can be found using the link to the Green Party's website, that I provided earlier.

## Can Genetically Modified Foods Be Affecting Our Dogs Heredity Factors and Their Health?

There is a strong suspicion and some proof among scientists that modified DNA from one species can transect into another species' DNA -- eg modified DNA from corn can adhere to DNA in a dog or human and change the effects of their DNA. Remember what we said in the previous section -- DNA can be affected by environment, specifically pesticides.

In Jeffrey Smith's books *Seeds of Deception* and *Genetic Roulette* he writes the following: "Another problem is that inserted genes may transfer from food into gut bacteria or internal organs. Animal studies demonstrate that ingested DNA can travel through the body, even into the foetus via the placenta. Trans-genes from GM crops fed to animals have been found in their blood, liver, spleen, and kidneys. The only published human feeding trial on GM food verified that genetic material inserted into GM soy transfers into the DNA of our intestinal bacteria."

Jeremy Rifkin writes in *The Biotech Century*, "A four-year study at the University of Jena in Germany conducted by Hans-Hinrich Kaatz revealed that bees ingesting pollen from transgenic rapeseed had bacteria in their gut with modified genes. This is called a "horizontal gene transfer." Commonly found bacteria and microorganisms in the human gut help maintain a healthy intestinal flora. These, however, can be mutated. Mutations may also be able to travel internally to other cells, tissue systems and organs throughout the human body. Not to be underestimated, the potential domino effect of internal and external genetic pollution can make the substance of science-fiction horror movies become terrible realities in the future. The same is true for the bacteria that maintain the health of our soil - and are vitally necessary for all forms of farming - in fact for human sustenance and survival."

"A study by the UK Ministry of Agriculture, Fisheries and Food (MAFF) recommended that due to the secondary horizontal transfer of transgenic DNA on livestock and human beings, no genetically

modified food be fed to animals since it can render our common infectious diseases untreatable via the food chain."

*Study Proves Three Monsanto Corn Varieties' Noxiousness to the Organism* -- A study published in the *International Journal of Biological Sciences* demonstrates the toxicity of three genetically modified corn varieties from the American seed company Monsanto.

"For the first time in the world, we've proven that GMO are neither sufficiently healthy nor proper to be commercialized. ... Each time, for all three GMOs, (MON810, MON863 and NK603) the kidneys and liver, which are the main organs that react to a chemical food poisoning, had problems," indicated Gilles-Eric Seralini, an expert member of the Commission for Biotechnology Re-evaluation, created by the EU in 2008."

"The gene inserted into GM soy transfers into the DNA of bacteria living inside our intestines and continues to function. This means that long after we stop eating GMOs, we may still have potentially harmful GM proteins produced continuously inside of us. Put more plainly, eating a corn chip produced from Bt corn might transform our intestinal bacteria into living pesticide factories, possibly for the rest of our lives. When evidence of gene transfer is reported at medical conferences around the US, doctors often respond by citing the huge increase of gastrointestinal problems among their patients over the last decade. GM foods might be colonizing the gut flora of North Americans". *Institute for Responsible Technology (IRT), Genetically Modified Foods Pose Huge Health Risk, May 22nd, 2009.*

IRT also gathered the following from doctors around the US and the world:

- 🟡 American Academy of Environmental Medicine (AAEM) "Several animal studies indicate serious health risks associated with GM food" including infertility, immune problems, accelerated aging, insulin regulation, and changes in major organs and the gastrointestinal system.
- 🟡 The experience of actual GM-fed experimental animals is scary. When GM soy was fed to female rats, most of their babies died within three weeks — compared to a 10% death rate among the control group fed natural soy. The GM-fed babies were also smaller, and later had problems getting pregnant.
- 🟡 When male rats were fed GM soy, their testicles actually changed color — from the normal pink to dark blue. Mice fed GM soy had altered young sperm. Even the embryos of GM fed parent mice had significant changes in their DNA. Mice fed GM corn in an Austrian government study had fewer babies, which were also smaller than normal.



Photo courtesy Wikimedia Commons

- Reproductive problems also plague livestock. Investigations in the state of Haryana, India revealed that most buffalo that ate GM cottonseed had complications such as premature deliveries, abortions, infertility, and prolapsed uteruses. Many calves died. In the US, about two dozen farmers reported thousands of pigs became sterile after consuming certain GM corn varieties. Some had false pregnancies; others gave birth to bags of water. Cows and bulls also became infertile when fed the same corn.
- In the US population, the incidence of low birth weight babies, infertility, and infant mortality are all escalating.
- AAEM states, "Multiple animal studies show significant immune dysregulation," including increase in cytokines, which are "associated with asthma, allergy, and inflammation" — all on the rise in the US.

## GM Studies and Adverse Effects of GM Foods on Humans and Animals

### The first report of human deaths from GM food

The first documented cases of human deaths in the US go back to 1984. In 1989 in the US, a few people reported to their doctors with symptoms more severe than these doctors had previously seen. The symptoms included hair loss, great pain, muscle weakness, and muscle lock. The blood analysis from these patients showed an abnormally large white blood cell count. By chance a few of the doctors had contacted the Mayo Clinic seeking any information that they might have on the symptoms. A doctor at the Mayo Clinic put the doctors in touch with each other. It was determined that the patients all had one thing in common -- they had all taken the supplement L-tryptophan (an amino acid) made by Showa Denko in Japan. The findings from these doctors was published in the New York Times and once the article was out, thousands of people reported the same symptoms to such a degree that it was classified as an epidemic. An epidemic that no one knew about until the article appeared. 37 people died and about 1500 were permanently disabled to the point that they could no longer work. Over a four year period it was finally proven that Showa Denko had modified the amino acid in order to speed up the production. At first they blamed the illnesses on a filtration system that had been changed and this seemed to satisfy the cause of the illness, but a leaked confidential paper showed that Showa Denko had been modifying the product all the way back to 1984 and the symptoms related back to the same period, so the connection with genetic modification was made. The company settled claims for over 2 Billion US dollars. Evidence was destroyed so that further investigation was not possible. Surprisingly the US FDA did not know about the modification. *Reference - Jeffrey Smith, Seeds of Deception*



### Animals dying in large numbers from Bt corn and cotton crops

"In India, animals graze on cotton plants after harvest. But when shepherds let sheep graze on Bt cotton plants, thousands died. Post mortems showed severe irritation and black patches in both intestines and liver (as well as enlarged bile ducts). Investigators said preliminary evidence "strongly suggests that the sheep mortality was due to a toxin. . . most probably Bt-toxin." In a small follow-up feeding study by the Deccan Development Society, all sheep fed Bt cotton plants died within 30 days; those that grazed on natural cotton plants remained healthy."

"In a small village in Andhra Pradesh, buffalo grazed on cotton plants for eight years without incident. On January 3rd, 2008, the buffalo grazed on Bt cotton plants for the first time. All 13 were sick the next day; all died within 3 days.

"Bt corn was also implicated in the deaths of cows in Germany, and horses, water buffaloes, and chickens in The Philippines.

"In lab studies, twice the number of chickens fed Liberty Link corn died; 7 of 20 rats fed a GM tomato developed bleeding stomachs; another 7 of 40 died within two weeks. Monsanto's own study showed evidence of poisoning in major organs of rats fed Bt corn, according to top French toxicologist G. E. Seralini. *Reference - Institute for Responsible Technology*

### Canine diseases on the rise

Autoimmune and other diseases are on the rise in dogs and there are alarming reports of dogs dying as young as a year old – why is this? In part, it may be explained by a study by researcher Dr. Sharyn Martin who has found that "a number of autoimmune diseases are enhanced by foreign DNA fragments that are not fully digested in the human stomach and intestines. DNA fragments are absorbed into the bloodstream, potentially mixing with normal DNA. The genetic consequences are unpredictable and unexpected gene fragments have shown up in GM soy crops."

Dr. Joe Cummins, Professor of Genetics at the University of Western Ontario, noting that animal experiments have demonstrated how exposure to such genetic elements may lead to inflammation, arthritis and lymphoma (a malignant blood disease) echoes Dr Martin's study. *Reference Nathan Batalion, ND, 50 Harmful Effects of Genetically Modified (GM) Foods.*

And if these foreign DNA fragments are not fully digested in the human stomach, imagine what is going on in our dog's stomach where they don't have the enzymes to digest grains and cellulose material. It has been said that 1 in 500 humans do not have the enzyme needed to digest a certain GM factor that can turn to botulism and potentially kill within a week or so. And still no adequate studies have been done on GM foods to prove their safety or dangers. The whole human race and animal kingdom have been turned into guinea pigs in one big experiment to find out the effects of GM foods.

### Birth defects in Geese

One of the more interesting reports on the effects of feeding GMO corn was made by Barbara H Peterson on her website where she writes: "For those who remember, I spoke some time ago about how I fed my geese GMO corn for a winter, and the following breeding season, they were aggressive, fighting all the time, and wouldn't sit a nest for long. One female had 2 babies, but lost both. One was physically deformed. I realized that the corn I was feeding was GMO, and started them on free-ranging, supplementing with beardless barley hay.

"Well, this year we have 17 new babies! All three females of breeding age sat nests and hatched babies. No fighting, and everything is normal in the goose kingdom. There is hope. So far it looks like my geese have made a full recovery."



This direct correlation to birth defects is relevant to the issues that have been mounting among dog breeders with reproduction issues - such as not becoming fertile, reabsorption, premature aborting of fetes, and the birth of deformed puppies.

#### More studies ...

GE Free Ireland Org has a list of 51 scientific studies done on GE foods and can be found at <http://www.gmfreeireland.org/health/studies.php>

## How Are We To Determine Scientifically If GM Foods Are Having An Effect On The Health Of Our Dogs?

Well known Canadian geneticist David Suzuki writes "The experiments simply haven't been done and we now have become the guinea pigs." He adds, "Anyone that says, "Oh, we know that this is perfectly safe," I say is either unbelievably stupid or deliberately lying." Reference *Institute for Responsible Technology*

Dr. Schubert tells us, "If there are problems, we will probably never know because the cause will not be traceable and many diseases take a very long time to develop." If GMOs happen to cause immediate and acute symptoms with a unique signature, perhaps then we might have a chance to trace the cause.

"This is precisely what happened during a US epidemic in the late 1980s. The disease was fast acting, deadly, and caused a unique measurable change in the blood — but it still took more than four years to identify that an epidemic was even occurring. By then it had killed about 100 Americans and caused 5,000-10,000 people to fall sick or become permanently disabled. It was caused by a genetically engineered brand of a food supplement called L-tryptophan.

"If other GM foods are contributing to the rise of autism, obesity, diabetes, asthma, cancer, heart disease, allergies, reproductive problems, or any other common health problem now plaguing Americans, we may never know. In fact, since animals fed GMOs had such a wide variety of problems, susceptible people may react to GM food with multiple symptoms. It is therefore telling that in the first nine years after the large scale introduction of GM crops in 1996, the incidence of people with three or more chronic diseases nearly doubled, from 7% to 13%.

"To help identify if GMOs are causing harm, the AAEM asks their "members, the medical community, and the independent scientific community to gather case studies potentially related to GM food consumption and health effects, begin epidemiological research to investigate the role of GM foods on human health, and conduct safe methods of determining the effect of GM foods on human health."

"Citizens need not wait for the results before taking the doctor's advice to avoid GM foods. People can stay away from anything with soy or corn derivatives, cottonseed and canola oil, and sugar from GM sugar beets — unless it says organic or "non-GMO. Reference - *Institute for Responsible Technology*

Following suit, if veterinarians formed a central depository where information on individual cases could be collected, this could be the beginning of determining the effect GM foods are having on our canine friends - which by all accounts are dying younger and in greater numbers than ever before.

As individuals concerned about the health of our dogs, we can contact the manufacture of the dog food we feed and ask the question "do you use any genetically modified ingredients in your dog foods?" If the answer comes back that they only use FDA approved ingredients, then you can be fairly certain that there are GM ingredients in the food.



If the answer comes back stating that they use no GM ingredients, then the food should be GM free and these companies will normally tell you that their ingredients can be traced to their source and are inspected before they are allowed into the manufacturing processing plant.

98% of the dry kibble dog food on the world market is comprised of 40% to 50% grain and potatoes - that is a lot of grain and starches our canine friends are consuming on an annual basis. And even the "grain-free" dog foods contain potatoes which may be from genetically modified crops - one needs to check with the manufacture of the food to determine if it is GM free.

If your dog is reacting badly to a dog food, try changing the food. Remember it takes at least two weeks for any dietary change to start to take effect and in the case of reactions to GM factors, it may take a long time to alleviate the symptoms. Some allergies take longer to become noticeable. Signs to look for are the fur turning a tan, pink, or purplish colour on parts of the body - most often the feet, mouth, and rear area. Skin irritation and dull coat are also signs that the dog is not doing well on the food being fed. If your dog turns their nose up at a certain food, this may be the dog saying that "what is in the food is not good for me." All dogs are individuals and some tolerate toxins better than others. Toxins may take several years to erupt into a disease or chronic problem.

"Up to now, living organisms have evolved very slowly, and new forms have had plenty of time to settle in. Now whole proteins will be transposed overnight into wholly new associations, with consequences no one can foretell, either for the host organism, or their neighbors.... going ahead in this direction may be not only unwise, but dangerous. Potentially, it could breed new animal and plant diseases, new sources of cancer, novel epidemics." *Dr George Wald. Nobel Laureate in Medicine, Higgins Professor of Biology, Harvard University*

The next article in the series "Food For Thought" will look at what specific vitamins, minerals and trace elements can have on providing optimum health for the canine at a cellular level. Deficiencies of these can affect the health of our dogs in given areas such as the reproduction system, nervous system, bones, antioxidants-detoxifiers, immune system, etc.



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