The "With" rule allows an ingredient name to appear on the label, such as "with real chicken," as long as each such ingredient constitutes at least 3% of the food by weight, excluding water for processing.

The "flavor" rule allows a food to be designated as a certain flavor as long as the ingredient(s) are sufficient to "impart a distinctive characteristic" to the food. Thus, a "beef flavor" food may contain a small quantity of digest or other extract of tissues from cattle, or even an artificial flavor, without containing any actual beef meat at all.

The ingredient list is the other major key to what's really in that bag or can. Ingredients must be listed in descending order of weight. The ingredient names are legally defined. For instance, "meat" refers to only cows, pigs, goats and sheep, and only includes specified muscle tissues. Detailed definitions are published in AAFCO's *Official Publication*, revised annually, but can also be found in many places online.

The guaranteed analysis provides a very general guide to the composition of the food. Crude protein, fat, and fiber, and total moisture are required to be listed. Some companies also voluntarily list taurine, Omega fatty acids, magnesium, and other items that they deem important — by marketing standards.

PET FOOD STANDARDS AND REGULATIONS

The National Research Council (NRC) of the Academy of Sciences set the nutritional standards for pet food that were used by the pet food industry until the late 1980s. The original NRC standards were based on purified diets, and required feeding trials for pet foods claimed to be "complete" and "balanced." The pet food industry found the feeding trials too restrictive and expensive, so AAFCO designed an alternate procedure for claiming the nutritional adequacy of pet food, by testing the food for compliance with "Nutrient Profiles." AAFCO also created "expert committees" for canine and feline nutrition, which developed separate canine and feline standards.

While feeding trials are sometimes still done, they are expensive and time-consuming. A standard chemical analysis may also be used to make sure that a food meets the profiles. In either case, there will be a statement on the label stating which method was used. However, because of the "family rule" in the AAFCO book, a label can say that feeding tests were done if it is "similar" to a food that was actually tested on live animals. There is no way to distinguish the lead product from its "family members." The label will also state whether the product is nutritionally adequate (complete and balanced), and what life stage (adult or growth) the food is for. A food that says "all life stages" meets the growth standards and can be fed to all ages.

Chemical analysis, however, does not address the palatability, digestibility, or biological availability of nutrients in pet food. Thus it is unreliable for determining whether a food will provide an animal with sufficient nutrients. To compensate for the limitations of chemical analysis, AAFCO added a "safety factor," which was to exceed the minimum amount of nutrients required to meet the complete and balanced requirements.

In 2006, new NRC standards were published; but it will take several years for AAFCO's profiles to be updated and adopted, let alone accepted by the states.

The pet food industry loves to say that it's more highly regulated than human food, but that's just not true. Pet food exists in a bit of a regulatory vacuum; laws are on the books, but enforcement

is another story. The FDA has nominal authority over pet foods shipped across state lines. But the real "enforcers" are the feed control officials in each state. They are the ones who actually look at the food and, in many instances, run basic tests to make sure the food meets its Guaranteed Analysis, the chart on the label telling how much protein, fat, moisture, and fiber are present. But regulation and enforcement vary tremendously from state to state. Some, like Texas, Minnesota, and Kentucky, run extensive tests and strictly enforce their laws; others, like California, do neither.

THE MANUFACTURING PROCESS: HOW PET FOOD IS MADE

Dry Food

The vast majority of dry food is made with a machine called an extruder. First, materials are blended in accordance with a recipe created with the help of computer programs that provide the nutrient content of each proposed ingredient. For instance, corn gluten meal has more protein than wheat flour. Because the extruder needs a consistent amount of starch and low moisture to work properly, dry ingredients — such as rendered meat-and-bone-meal, poultry by-product meal, grains, and flours — predominate.

The dough is fed into the screws of an extruder. It is subjected to steam and high pressure as it is pushed through dies that determine the shape of the final product, much like the nozzles used in cake decorating. As the hot, pressurized dough exits the extruder, it is cut by a set of rapidly whirling knives into tiny pieces. As the dough reaches normal air pressure, it expands or "puffs" into its final shape. The food is allowed to dry, and then is usually sprayed with fat, digests, or other compounds to make it more palatable. When it is cooled, it can be bagged.

Although the cooking process kills bacteria in the ingredients, the final product can pick up more bacteria during the subsequent drying, coating, and packaging process. Some experts warn that getting dry food wet can allow the bacteria on the surface to multiply and make pets sick. **Do not mix dry food with water, milk, canned food, or other liquids.**

A few dog foods are baked at high temperatures (over 500oF) rather than extruded. This produces a sheet of dense, crunchy material that is then broken into irregular chunks, much like crumbling crackers into soup. It is relatively palatable without the sprayed-on fats and other enhancers needed on extruded dry food.

Semi-moist foods and many pet treats are also made with an extruder. To be appealing to consumers and to keep their texture, they contain many additives, colorings, and preservatives; they are not a good choice for a pet's primary diet.

Wet Food

Wet or canned food begins with ground ingredients mixed with additives. If chunks are required, a special extruder forms them. Then the mixture is cooked and canned. The sealed cans are then put into containers resembling pressure cookers and commercial sterilization takes place. Some manufacturers cook the food right in the can.

Wet foods are quite different in content from dry or semi-moist foods. While many canned foods contain by-products of various sorts, they are "fresh" and not rendered or processed (although they are often frozen for transport and storage). Wet foods usually contain much more protein, and it's often a little higher quality, than dry foods. They also have more moisture, which is better for cats. They are packaged in cans or pouches.

COMPARING FOOD TYPES

Because of the variation in water content, it is impossible to directly compare labels from different kinds of food without a mathematical conversion to "dry matter basis." The numbers can be very deceiving. For instance, a canned food containing 10% protein actually has much more protein than a dry food with 30% protein.

To put the foods on a level playing field, first calculate the dry matter content by subtracting the moisture content given on the label from 100%. Then divide the ingredient by the dry matter content. For example, a typical bag of dry cat food contains 30% protein on the label, but 32% on a dry-matter basis (30% divided by its dry matter content, 100-6% moisture = 94%). A can of cat food might contain 12% protein on the label, but almost 43% on a dry-matter basis (12% divided by its dry matter content, 100-72% moisture = 28%). Dry food typically contains less than 10% water, while canned food contains 78% or more water.

PET FOOD INGREDIENTS

Animal Protein

Dogs and cats are carnivores, and do best on a meat-based diet. The protein used in pet food comes from a variety of sources. When cattle, swine, chickens, lambs, or other animals are slaughtered, lean muscle tissue is trimmed away from the carcass for human consumption, along with the few organs that people like to eat, such as tongues and tripe.

However, about 50% of every food animal does not get used in human foods. Whatever remains of the carcass — heads, feet, bones, blood, intestines, lungs, spleens, livers, ligaments, fat trimmings, unborn babies, and other parts not generally consumed by humans — is used in pet food, animal feed, fertilizer, industrial lubricants, soap, rubber, and other products. These "other parts" are known as "by-products." By-products are used in feed for poultry and livestock as well as in pet food.

The nutritional quality of by-products, meals, and digests can vary from batch to batch. James Morris and Quinton Rogers, of the University of California at Davis Veterinary School, assert that, "[pet food] ingredients are generally by-products of the meat, poultry and fishing industries, with the potential for a wide variation in nutrient composition. Claims of nutritional adequacy of pet foods based on the current Association of American Feed Control Officials (AAFCO) nutrient allowances ('profiles') do not give assurances of nutritional adequacy and will not until ingredients are analyzed and bioavailability values are incorporated."[iii]

Meat or poultry "by-products" are very common in wet pet foods. Remember that "meat" refers to only cows, swine, sheep, and goats. Since sheep and goats are rare compared to the 37 million cows and 100 million hogs slaughtered for food every year, nearly all meat by-products come from cattle and pigs.

The better brands of pet food, such as many "super-premium," "natural," and "organic" varieties, do not use by-products. On the label, you'll see one or more named meats among the first few ingredients, such as "turkey" or "lamb." These meats are still mainly leftover scraps; in the case of poultry, bones are allowed, so "chicken" consists mainly of backs and frames—the spine and ribs, minus their expensive breast meat. The small amount of meat left on the bones is the meat in the pet food. Even with this less-attractive source, pet food marketers are very tricky when talking about meat, so this is explained further in the section on "Marketing Magic" below.

Meat meals, poultry meals, by-product meals, and meat-and-bone meal are common ingredients in dry pet foods. The term "meal" means that these materials are not used fresh, but have been rendered. While there are chicken, turkey, and poultry by-product meals there is no equivalent term for mammal "meat by-product meal" — it is called "meat-and-bone-meal." It may also be referred to by species, such as "beef-and-bone-meal" or "pork-and-bone-meal."

What is rendering? As defined by *Webster's Dictionary*, to render is "to process as for industrial use: to render livestock carcasses and to extract oil from fat, blubber, etc., by melting." In other words, raw materials are dumped into large vat and boiled for several hours. Rendering separates fat, removes water, and kills bacteria, viruses, parasites, and other organisms. However, the high temperatures used (270°F/130°C) can alter or destroy natural enzymes and proteins found in the raw ingredients.

Because of persistent rumors that rendered by-products contain dead dogs and cats, the FDA conducted a study looking for pentobarbital, the most common euthanasia drug, in pet foods. They found it. Ingredients that were most commonly associated with the presence of pentobarbital were meat-and-bone-meal and animal fat. However, they also used very sensitive tests to look for canine and feline DNA, which were *not* found. Industry insiders admit that rendered pets and roadkill were used in pet food some years ago. Although there are still no laws or regulations against it, the practice is uncommon today, and pet food companies universally deny that their products contain any such materials. However, so-called "4D" animals (dead, dying, diseased, disabled) were only recently banned for human consumption and are still legitimate ingredients for pet food.

Vegetable Protein

The amount of grain and vegetable products used in pet food has risen dramatically over time. Plant products now replace a considerable proportion of the meat that was used in the earliest commercial pet foods. This has led to severe nutritional deficiencies that have been corrected along the way, although many animals died before science caught up.

Most dry foods contain a large amount of cereal grain or starchy vegetables to provide texture. These high-carbohydrate plant products also provide a cheap source of "energy" — the rest of us call it "calories." Gluten meals are high-protein extracts from which most of the carbohydrate has been removed. They are often used to boost protein percentages without expensive animal-source ingredients. Corn gluten meal is the most commonly used for this purpose. Wheat gluten is also used to create shapes like cuts, bites, chunks, shreds, flakes, and slices, and as a thickener for gravy. In most cases, foods containing vegetable proteins are among the poorer quality foods.

A recent fad, "low-carb" pet food, has some companies steering away from grains, and using potatoes, green peas, and other starchy vegetables as a substitute. Except for animals that are allergic to grains, dry low-carb diets offer no particular advantage to pets. They also tend to be very high in fat and, if fed free-choice, will result in weight gain. Canned versions are suitable for prevention and treatment of feline diabetes, and as part of a weight loss program, as well as for maintenance.

Animal and Poultry Fat

There's a unique, pungent odor to a new bag of dry pet food — what is the source of that smell? It is most often rendered animal fat, or vegetable fats and oils deemed inedible for humans. For example, used restaurant grease was rendered and routed to pet foods for several years, but a more lucrative market is now in biodiesel fuel production.

These fats are sprayed directly onto extruded kibbles and pellets to make an otherwise bland or distasteful product palatable. The fat also acts as a binding agent to which manufacturers add other flavor enhancers such as "animal digests" made from processed by-products. Pet food scientists have discovered that animals love the taste of these sprayed fats. Manufacturers are masters at getting a dog or a cat to eat something she would normally turn up her nose at.

WHAT HAPPENED TO THE NUTRIENTS?

Cooking and other processing of meat and by-products used in pet food can greatly diminish their nutritional value, although cooking increases the digestibility of cereal grains and starchy vegetables.

To make pet food nutritious, pet food manufacturers must "fortify" it with vitamins and minerals. Why? Because the ingredients they are using are not wholesome, their quality may be extremely variable, and the harsh manufacturing practices destroy many of the nutrients the food had to begin with.

Proteins are especially vulnerable to heat, and become damaged, or "denatured," when cooked. Because dry foods ingredients are cooked twice — first during rendering and again in the extruder — problems are much more common than with canned or homemade foods. Altered proteins may contribute to food intolerances, food allergies, and inflammatory bowel disease.

ADDITIVES IN PROCESSED PET FOODS

Many chemicals are added to commercial pet foods to improve the taste, stability, characteristics, or appearance of the food. Additives provide no nutritional value. Additives include emulsifiers to prevent water and fat from separating, antioxidants to prevent fat from turning rancid, and artificial colors and flavors to make the product more attractive to consumers and more palatable to their companion animals.

A wide variety of additives are allowed in animal feed and pet food, not counting vitamins and minerals. Not all of them are actually used in pet food. Additives can be specifically approved, or they can fall into the category of "Generally Recognized as Safe" (GRAS).

Anticaking agents	Curing agents	Grinding agents
Antigelling agents	Drying agents	Humectants
Antimicrobial agents	Emulsifiers	Leavening agents
Antioxidants	Essential oils	Lubricants
Color additives	Flavor enhancers	Palatants
Condiments	Flavoring agents	Pelleting agents and binders

Petroleum derivatives	Seasonings	Sweeteners
pH control agents	Spices	Texturizers
Preservatives	Stabilizers	Thickeners

CHEMICAL VS. NATURAL PRESERVATIVES

All commercial pet foods must be preserved so they stay fresh and appealing to our animal companions. Canning is itself a preserving process, so canned foods need little or no additional help. Some preservatives are added to ingredients or raw materials by the suppliers, and others may be added by the manufacturer. The U.S. Coast Guard, for instance, requires fish meal to be heavily preserved with ethoxyquin or equivalent antioxidant. Evidently, spoiling fish meal creates such intense heat that ship explosions and fires resulted.

Because manufacturers need to ensure that dry foods have a long shelf life (typically 12 months) to remain edible through shipping and storage, fats used in pet foods are preserved with either synthetic or "natural" preservatives. Synthetic preservatives include butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), propyl gallate, propylene glycol (also used as a less-toxic version of automotive antifreeze), and ethoxyquin. For these antioxidants, there is little information documenting their toxicity, safety, interactions, or chronic use in pet foods that may be eaten every day for the life of the animal. Propylene glycol was banned in cat food because it causes anemia in cats, but it is still allowed in dog food.

Potentially cancer-causing agents such as BHA, BHT, and ethoxyquin are permitted at relatively low levels. The use of these chemicals in pet foods has not been thoroughly studied, and long term build-up of these agents may ultimately be harmful. Due to questionable data in the original study on its safety, ethoxyquin's manufacturer, Monsanto, was required to perform a new, more rigorous study. This was completed in 1996. Even though Monsanto found no significant toxicity associated with its own product, in July 1997 the FDA's Center for Veterinary Medicine requested that manufacturers voluntarily reduce the maximum level for ethoxyquin by half, to 75 parts per million. While some pet food critics and veterinarians believe that ethoxyquin is a major cause of disease, skin problems, and infertility in dogs, others claim it is the safest, strongest, most stable preservative available for pet food. Ethoxyquin is approved for use in human food for preserving spices, such as cayenne and chili powder, at a level of 100 ppm — but it would be very difficult for even the most hard-core spice lover to consume as much chili powder every day as a dog would eat dry food. Ethoxyquin has never been tested for safety in cats. Despite this, it is commonly used in veterinary diets for both cats and dogs.

Many pet food makers have responded to consumer concern, and are now using "natural" preservatives such as Vitamin C (ascorbate), Vitamin E (mixed tocopherols), and oils of rosemary, clove, or other spices, to preserve the fats in their products. The shelf life is shorter, however — only about 6 months.

Individual ingredients, such as fish meal, may have preservatives added before they reach the pet food manufacturer. Federal law requires fat preservatives to be disclosed on the label; however, pet food companies do not always comply with this law.

DANGER AHEAD

Potential Contaminants

Given the types of things manufacturers put in pet food, it is not surprising that bad things sometimes happen. Ingredients used in pet food are often highly contaminated with a wide variety of toxic substances. Some of these are destroyed by processing, but others are not.

- *Bacteria*. Slaughtered animals, as well as those that have died because of disease, injury, or natural causes, are sources of meat, by-products, and rendered meals. An animal that died on the farm might not reach a rendering plant until days after its death. Therefore the carcass is often contaminated with bacteria such as *Salmonella* and *E. Coli*. Dangerous *E. Coli* bacteria are estimated to contaminate more than 50% of meat meals. While the cooking process may kill bacteria, it does not eliminate the endotoxins some bacteria produce during their growth. These toxins can survive processing, and can cause sickness and disease. Pet food manufacturers do not test their products for bacterial endotoxins. Because sick or dead animals can be processed as pet foods, the drugs that were used to treat or euthanize them may still be present in the end product. Penicillin and pentobarbital are just two examples of drugs that can pass through processing unchanged. Antibiotics used in livestock production are also thought to contribute to antibiotic resistance in humans.
- *Mycotoxins*. Toxins from mold or fungi are called mycotoxins. Modern farming practices, adverse weather conditions, and improper drying and storage of crops can contribute to mold growth. Pet food ingredients that are most likely to be contaminated with mycotoxins are grains such as wheat and corn, and fish meal.
- *Chemical Residue*. Pesticides and fertilizers may leave residue on plant products. Grains that are condemned for human consumption by the USDA due to residue may legally be used, without limitation, in pet food.
- *GMOs*. Genetically modified plant products are also of concern. By 2006, 89% of the planted area of soybeans, 83% of cotton, and 61% of maize (corn) in the U.S. were genetically modified varieties. Cottonseed meal is a common ingredient of cattle feed; soy and corn are used directly in many pet foods.
- *Acrylamide*. This is a carcinogenic compound formed at cooking temperatures of about 250˚F in foods containing certain sugars and the amino acid asparagine (found in large amounts in potatoes and cereal grains). It is formed in a chemical process called the Maillard reaction. Most dry pet foods contain cereal grains or potatoes, and they are processed at high temperatures (200–300°F at high pressure during extrusion; baked foods are cooked at well over 500°F); these are perfect conditions for the Maillard reaction.[iv,v] In fact, the Maillard reaction is considered *desirable* in the production of pet food because it imparts a palatable taste, even though it reduces the bioavailability of some amino acids, including taurine and lysine.[vi] The content and potential effects of acrylamide formation in pet foods are unknown.

Pet Food Recalls

When things go really wrong and serious problems are discovered in pet food, the company usually works with the FDA to coordinate a recall of the affected products. While many recalls have been widely publicized, quite a few have not.

- *In 1995*, Nature's Recipe recalled almost a million pounds of dry dog and cat food after

consumers complained that their pets were vomiting and losing their appetite. The problem was a fungus that produced vomitoxin contaminating the wheat.

- *In 1999*, Doane Pet Care recalled more than a million bags of corn-based dry dog food contaminated with aflatoxin. Products included Ol' Roy (Wal-Mart's brand) and 53 other brands. This time, the toxin killed 25 dogs.
- *In 2000*, Iams recalled 248,000 pounds of dry dog food distributed in 7 states due to excess DL-Methionine Amino Acid, a urinary acidifier.
- *In 2003*, a recall was made by Petcurean "Go! Natural" pet food due to circumstantial association with some dogs suffering from liver disease; no cause was ever found.
- *In late 2005*, a similar recall by Diamond Foods was announced; this time the moldy corn contained a particularly nasty fungal product called aflatoxin; 100 dogs died.
- *Also in 2005*, 123,000 pounds of cat and dog treats were recalled due to *Salmonella* contamination.
- *In 2006*, more than 5 million cans of Ol' Roy, American Fare, and other dog foods distributed in the southeast were recalled by the manufacturer, Simmons Pet Food, because the cans' enamel lining was flaking off into the food.
- *Also in 2006*, Merrick Pet Care recalled almost 200,000 cans of "Wingalings" dog food when metal tags were found in some samples.
- *In the most deadly recall of 2006*, 4 prescription canned dog and cat foods were recalled by Royal Canin (owned by Mars). The culprit was a serious overdose of Vitamin D that caused calcium deficiency and kidney disease.
- *In February 2007*, the FDA issued a warning to consumers not to buy "Wild Kitty," a frozen food containing raw meat. Routine testing by FDA had revealed *Salmonella* in the food. FDA specifically warned about the potential for illness in humans, not pets. There were no reports of illness or death of any pets, and the food was not recalled.
- *In March 2007*, the most lethal pet food in history was the subject of the largest recall ever. Menu Foods recalled 95 brands including Iams, Eukanuba, Hill's Science Diet, Purina Mighty Dog, and many store brands including Wal-Mart's — 60 million individual cans and pouches. Thousands of pets became sick and an estimated 20% died from acute renal failure caused by the food. Cats were more frequently and more severely affected than dogs. The toxin was initially believed to be a pesticide, the rat poison "aminopterin" in one of the ingredients, but the investigation is ongoing.

Nutrition-Related Diseases

The idea that one pet food provides all the nutrition a companion animal will ever need for its entire life is a dangerous myth.

Today, the diets of cats and dogs are a far cry from the variable meat-based diets that their ancestors ate. The unpleasant results of grain-based, processed, year-in and year-out diets are common. Health problems associated with diet include:

- *Urinary tract disease*. Plugs, crystals, and stones are more common in cats eating dry diets, due to the chronic dehydration and highly concentrated urine they cause. "Struvite" stones

used to be the most common type in cats, but another more dangerous type, calcium oxalate, has increased and is now tied with struvite. Manipulation of manufactured cat food formulas to increase the acidity of urine has caused the switch. Dogs can also form stones as a result of their diet.

- *Kidney disease*. Chronic dehydration associated with dry diets may also be a contributing factor in the development of kidney disease and chronic renal failure in older cats. Cats have a low thirst drive; in the wild they would get most of their water from their prey. Cats eating dry food do not drink enough water to make up for the lack of moisture in the food. Cats on dry food diets *drink* more water, but the *total water intake* of a cat eating canned food is twice as great.[vii]
- *Dental disease*. Contrary to the myth propagated by pet food companies, dry food is not good for teeth.[viii] Given that the vast majority of pets eat dry food, yet the most common health problem in pets is dental disease, this should be obvious. Humans do not floss with crackers, and dry food does not clean the teeth.
- *Obesity*. Feeding recommendations or instructions on the packaging are sometimes inflated so that the consumer will end up feeding — and purchasing — more food. One of the most common health problems in pets, obesity, may also be related to high-carb, high-calorie dry foods. Both dogs and cats respond to low-carb wet food diets. Overweight pets are more prone to arthritis, heart disease, and diabetes. Dry cat food is now considered the cause of feline diabetes; prevention and treatment include switching to a high protein, high moisture, low-carb diet.
- *Chronic digestive problems*. Chronic vomiting, diarrhea, constipation, and inflammatory bowel disease are among the most frequent illnesses treated. These are often the result of an allergy or intolerance to pet food ingredients. The market for "limited antigen" or "novel protein" diets is now a multi-million dollar business. These diets were formulated to address the increasing intolerance to commercial foods that pets have developed. Even so, an animal that tends to develop allergies can develop allergies to the new ingredients, too. One twist is the truly "hypoallergenic" food that has had all its proteins artificially chopped into pieces smaller than can be recognized and reacted to by the immune system. Yet there are documented cases of animals becoming allergic to this food, too. It is important to change brands, flavors, and protein sources every few months to prevent problems.
- *Bloat*. Feeding only one meal per day can cause the irritation of the esophagus by stomach acid, and appears to be associated with gastric dilitation and volvulus (canine bloat). Feeding two or more smaller meals is better.
- *Heart disease*. An often-fatal heart disease in cats and some dogs is now known to be caused by a deficiency of the amino acid taurine. Blindness is another symptom of taurine deficiency. This deficiency was due to inadequate amounts of taurine in cat food formulas, which in turn had occurred due to decreased amounts of animal proteins and increased reliance on carbohydrates. Cat foods are now supplemented with taurine. New research suggests that some dog breeds are susceptible to the same condition. Supplementing taurine may also be helpful for dogs, but as yet few manufacturers are adding extra taurine to dog food.
- *Hyperthyroidism*. There is also evidence that hyperthyroidism in cats may be related to diet. This is a relatively new disease that first surfaced in the 1970s. Some experts theorize that excess iodine in commercial cat food is a factor. New research also points to a link between

the disease and pop-top cans, and flavors including fish or "giblets." This is a serious disease, and treatment is expensive.

Many nutritional problems appeared with the popularity of cereal-based commercial pet foods. Some have occurred because the diet was incomplete. Although several ingredients are now supplemented, we do not know what ingredients future researchers may discover that should have been supplemented in pet foods all along. Other problems may occur from reactions to additives. Others are a result of contamination with bacteria, mold, drugs, or other toxins. In some diseases the role of commercial pet food is understood; in others, it is not. The bottom line is that diets composed primarily of low quality cereals and rendered meals are not as nutritious or safe as you should expect for your cat or dog.

PET FOOD INDUSTRY SECRETS

Co-Packing

The 2007 Menu Foods recall brought to light some of the pet food industry's dirtiest secrets.

Most people were surprised — and appalled — to learn that all Iams/Eukanuba canned foods are not made by The Iams Company at all. In fact, in 2003 Iams signed an exclusive 10-year contract for the production of 100% of its canned foods by Menu.

This type of deal is called "co-packing." One company makes the food, but puts someone else's label on it. This is a very common arrangement in the pet food industry. It was first illustrated by the Doane's and Diamond recalls, when dozens of private labels were involved. But none were as large or as "reputable" as Iams, Eukanuba, Hill's, Purina, Nutro, and other high-end, so-called "premium" foods.

The big question raised by this arrangement is whether or not there is any real difference between the expensive premium brands and the lowliest generics. The recalled products all contained the suspect ingredient, wheat gluten, but they also all contained by-products of some kind, including specified by-products such as liver or giblets.

It's true that a pet food company that contracts with a co-packer can provide its own ingredients, or it can require the contractor to buy particular ingredients to use in its recipes. But part of the attraction of using a co-packer is that it can buy ingredients in larger bulk than any one pet food maker could on its own, making the process cheaper and the profits larger. It's likely that with many of the ingredients that cross all types of pet foods, those ingredients are the same.

Are one company's products — made in the same plant on the same equipment *with ingredients called the same name* — really "better" than another's? That's what the makers of expensive brands want you to think. The recalled premium brands claim that Menu makes their foods "according to proprietary recipes using specified ingredients," and that "contract manufacturers must follow strict quality standards." Indeed, the contracts undoubtedly include those points. But out in the real world, things may not go according to plan. How well are machines cleaned between batches, how carefully are ingredients mixed, and just how particular are minimum-wage workers in a dirty smelly job going to be about getting everything just perfect?

Whatever the differences are between cheap and high-end food, one thing is clear. The purchase price of pet food does not always determine whether a pet food is good or bad or even safe. However, the very cheapest foods can be counted on to have the very cheapest ingredients. For

example, Ol' Roy, Wal-Mart's store brand, has now been involved in 3 serious recalls.

Menu manufactures canned foods for many companies that weren't affected by the recall, including Nature's Variety, Wellness, Castor & Pollux, Newman's Own Organics, Wysong, Innova, and EaglePack. It's easy to see from their ingredient lists that those products are made from completely different ingredients and proportions. Again, the issue of cleaning the machinery out between batches comes up, but hopefully nothing so lethal will pass from one food to another.

Animal Testing

Another unpleasant practice exposed by this recall is pet food testing on live animals. Menu's own lab animals, who were deliberately fed the tainted food, were the first known victims. Tests began on February 27 (already a week after the first reports); animals started to die painfully from kidney failure a few days later. After the first media reports, Menu quickly changed its story to call these experiments "taste tests." But Menu has done live animal feeding, metabolic energy, palatability, and other tests for Iams and other companies for years. Videotapes reveal the animals' lives in barren metal cages; callous treatment; invasive experiments; and careless cruelty.

Although feeding trials are not required for a food to meet the requirements for labeling a food "complete and balanced," many manufacturers use live animals to perform palatability studies when developing a new pet food. One set of animals is fed a new food while a "control" group is fed a current formula. The total volume eaten is used as a gauge for the palatability of the food. Some companies use feeding trials, which are considered to be a much more accurate assessment of the actual nutritional value of the food. They keep large colonies of dogs and cats for this purpose, or use testing laboratories that have their own animals.

There is a new movement toward using companion animals in their homes for palatability and other studies. In 2006, The Iams Company announced that it was cutting the use of canine and feline lab animals by 70%. While it proclaims this moral victory, the real reasons for this switch are likely financial. Whatever the reasons, it is a very positive step for the animals.

Finally, it is important to remember that the contamination that occurred in the Menu Foods recall could have happened anywhere at any time. It was not Menu's fault; the toxin was unusual and unexpected. All companies have quality control standards and they do test ingredients for common toxins before using them. They also test the final products. However, there is a baseline risk inherent in using the raw materials that go into pet foods. When there are 11 recalls in 12 years, it's clear that "freak occurrences" are the rule, not the exception.

Marketing Magic

A trip down the pet food aisle will boggle the mind with all the wonderful claims made by pet food makers for their repertoire of products. Knowing the nature of the ingredients helps sort out some of the more outrageous claims, but what's the truth behind all this hype?

- *Niche claims.* Indoor cat, canine athlete, Persian, 7-year old, Bloodhound, or a pet with a tender tummy, too much flab, arthritis, or itchy feet — no matter what, there's a food "designed" just for that pet's personal needs. Niche marketing has arrived in a big way in the pet food industry. People like to feel special, and a product with specific appeal is bound to sell better than a general product like "puppy food." The reality is that there are only two basic standards against which all pet foods are measured: adult and growth, which includes

gestation and lactation. Everything else is marketing.

- *"Natural" and "Organic" claims*. The definition of "natural" adopted by AAFCO is very broad, and allows for artificially processed ingredients that most of us would consider very unnatural indeed. The term "organic", on the other hand, has a very strict legal definition under the USDA National Organic Program. However, some companies are adept at evading the intent of both of these rules. For instance, the name of the company or product may be intentionally misleading. Some companies use terms such as "Nature" or "Natural" or even "Organic" in the brand name, whether or not their products fit the definitions. Consumers should also be aware that the term "organic" does not imply anything at all about animal welfare; products from cows and chickens can be organic, yet the animals themselves are still just "production units" in enormous factory farms.
- *Ingredient quality claims*. A lot of pet foods claim they contain "human grade" ingredients. This is a completely meaningless term — which is why the pet food companies get away with using it. The same applies to "USDA inspected" or similar phrases. The implication is that the food is made using ingredients that are passed by the USDA for human consumption, but there are many ways around this. For instance, a facility might be USDA-inspected during the day, but the pet food is made at night after the inspector goes home. The use of such terms should be viewed as a "Hype Alert."
- *"Meat is the first ingredient" claim*. A claim that a named meat (chicken, lamb, etc.) is the #1 ingredient is generally seen for dry food. Ingredients are listed on the label by weight, and raw chicken weighs a lot, since contains a lot of water. If you look further down the list, you're likely to see ingredients such as chicken or poultry by-product meal, meat-and-bone meal, corn gluten meal, soybean meal, or other high-protein meal. Meals have had the fat and water removed, and basically consist of a dry, lightweight protein powder. It doesn't take much raw chicken to weigh more than a great big pile of this powder, so in reality the food is based on the protein meal, with very little "chicken" to be found. This has become a very popular marketing gimmick, even in premium and "health food" type brands. Since just about everybody is now using it, any meaning it may have had is so watered-down that you may just as well ignore it.
- *Special ingredient claims*. Many of the high-end pet foods today rely on the marketing appeal of people-food ingredients such as fruits, herbs, and vegetables. However, the amounts of these items actually present in the food are small; and the items themselves may be scraps and rejects from processors of human foods — not the whole, fresh ingredients they want you to picture. Such ingredients don't provide a significant health benefit and are really a marketing gimmick.

Pet food marketing and advertising has become extremely sophisticated over the last few years. It's important to know what is hype and what is real to make informed decisions about what to feed your pets.

WHAT CONSUMERS CAN DO

- *Write or call* pet food companies and the Pet Food Institute and express your concerns about commercial pet foods. Demand that manufacturers improve the quality of ingredients in their products.

- *Print out a copy* of this report for your veterinarian to further his or her knowledge about commercial pet food.
- *Direct your family and friends* with companion animals to www.api4animals.org to alert them to the dangers of commercial pet food. Print out copies of API's Fact Sheet on Selecting a Good Commercial Food or download more copies of this report.
- *Stop buying commercial pet food;* or at least stop buying dry food. Dry foods have been the subject of many more recalls, and have many adverse health effects. If that is not possible, reduce the quantity of commercial pet food and supplement with fresh, organic foods, especially meat. Purchase one or more of the many books available on pet nutrition and make your own food. Be sure that a veterinarian or a nutritionist has checked the recipes to ensure that they are balanced for long-term use.
- *If you would like to learn* about how to make healthy food for your companion animal, visit www.api4animals.org and type "Sample Diets" into the search box for simple recipes and important nutritional information.
- *Please be aware* that API is not a veterinary hospital, clinic, or service. API does not and will not offer any medical advice. If you have concerns about your companion animal's health or nutritional requirements, please consult your veterinarian.

Because pet food manufacturers frequently change the formulations of their products, and API cannot conduct the necessary testing, we are unable to offer endorsements for particular brands of pet food. Many of our staff choose to make their own pet food, or to purchase natural or organic products from feed and specialty pet stores or online, but we cannot recommend brands that would be right for your companion animal or animals.

For Further Reading about Animal Nutrition

The Animal Protection Institute recommends the following books (listed in alphabetical order by author), many of which include recipes for home-prepared diets:

- Michelle Bernard. 2003. *Raising Cats Naturally — How to Care for Your Cat the Way Nature Intended.* Available at www.raisingcatsnaturally.com.
- Chiclet T. Dog and Jan Rasmusen. 2006. *Scared Poopless: The Straight Scoop on Dog Care.* Available at www.dogs4dogs.com. ISBN-10: 0977126501, ISBN-13: 978-0977126507.
- Rudi Edalati. 2001. *Barker's Grub: Easy, Wholesome Home-Cooking for Dogs.* ISBN-10: 0609804421, ISBN-13: 978-0609804421.
- Jean Hofve, DVM. 2007. *What Cats Should Eat.* Available at www.littlebigcat.com.
- Richard H. Pitcairn, DVM, and Susan Hubble Pitcairn. 2005. *Dr. Pitcairn's New Complete Guide to Natural Health for Dogs and Cats.* Rodale Press, Inc. ISBN-10: 157954973X, ISBN-13: 978-1579549732. Note: The recipes for cats were not revised in this new edition and date back to 2000; they may contain too much grain, according to recent research.
- Kate Solisti. 2004. *The Holistic Animal Handbook: A Guidebook to Nutrition, Health, and Communication.* Council Oaks Books. ISBN-10: 1571781536, ISBN-13: 978-1571781536.
- Donald R. Strombeck. 1999. *Home-Prepared Dog & Cat Diets: The Healthful Alternative.* Iowa

State University Press. ISBN-10: 0813821495, ISBN-13: 978-0813821498. Note: Veterinary nutritionists have suggested that the taurine and calcium are too low in some of these recipes. Clam juice and sardines are poor sources of taurine; use taurine capsules instead.

- Celeste Yarnall. 2000, *Natural Cat Care: A Complete Guide to Holistic Health Care for Cats*; and 1998, *Natural Dog Care: A Complete Guide to Holistic Health Care for Dogs.* Available at www.celestialpets.com.

The books listed above are a fraction of all the titles currently available, and the omission of a title does not necessarily mean it is not useful for further reading about animal nutrition.

Please note: The Animal Protection Institute is not a bookseller, and cannot sell or send these books to you. Please contact your local book retailer, an online bookstore, or the website indicated, who can supply these books based on the ISBN provided for each title.

Who to Write

AAFCO Pet Food Committee
David Syverson, Chair
Minnesota Department of Agriculture
Dairy and Food Inspection Division
625 Robert Street North
St. Paul, MN 55155-2538
www.aafco.org

FDA Center for Veterinary Medicine
Sharon Benz
7500 Standish Place
Rockville, MD 20855
301-594-1728
www.fda.gov/cvm/

Pet Food Institute
2025 M Street, NW, Suite 800
Washington, DC 20036
202-367-1120
Fax 202-367-2120

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Information on Reprints:

API receives many requests to reprint all or portions of our "What's Really in Pet Food" report in newsletters, on websites, and elsewhere.

Permission is usually granted under the following conditions:

- Full acknowledgment is made to the Animal Protection Institute as the source of the material.
- API's copyright is preserved.
- Our URL — www.api4animals.org — is included in the reprint.
- Under no circumstances is the reprint to be used for fundraising of any kind.

Please email or write first for permission so that we can track your requests. *Thank you.*

Footnotes:

[i] Pet Food Institute. *Fact Sheet* 1994. Washington: Pet Food Institute, 1994.

[ii] Association of American Feed Control Officials. *Official Publication*, 2007. Regulation PE3, 120–121.

[iii] Morris, James G., and Quinton R. Rogers. Assessment of the Nutritional Adequacy of Pet Foods Through the Life Cycle. *Journal of Nutrition*, 124 (1994): 2520S–2533S.

[iv] Tareke E, Rydberg P, Karlsson P, et al. Analysis of acrylamide, a carcinogen formed in heated foodstuffs. *J Agric Food Chem*, 2002 Aug 14; 50(17): 4998–5006.

[v] Mottram DS, Wedzicha BL, Dodson AT. Acrylamide is formed in the Maillard reaction. *Nature*, 2002 Oct 3; 419(6906): 448–9.

[vi] Hand MS, Thatcher CD, Remillard RL, et al., eds. *Small Animal Clinical Nutrition, 4th Edition*. 2002. Topeka, KS: Mark Morris Institute.

[vii] Seefelt SL, Chapman TE. Body water content and turnover in cats fed dry and canned rations. *Am J Vet Res*, 1979 Feb; 40(2): 183–5.

[viii] Logan, et al., Dental Disease, in: Hand et al., eds., *Small Animal Clinical Nutrition, Fourth Edition*. Topeka, KS: Mark Morris Institute, 2000.

EXHIBIT "BB"

WRRC Waste Reduction Resource Center

GO BACK

Meat Processing: Operations

Meat Processing Operations

EXHIBIT "BB"

Beef Processing Description

"Beef" is meat from full-grown cattle that are about two years of age. A live steer weighs about 1,000 pounds and yields about 450 pounds of edible meat. At least 50 breeds of beef cattle exist, but fewer than 10 make up most cattle produced. The live weight of cattle slaughtered for meat production varies from 550 to 1,300 pounds, depending on the age and breed of the animal. During the last few decades, the basic slaughtering procedure has become more automated and efficient. Processing rates in the United States average 350 head per hour (Slavell and Smith, 1999). The diagram following this section illustrates the flow of beef processing.

Pre-handling of Cattle: Most processors schedule receipt from producers of the live animals for slaughter to provide a continuous supply of animals for processing. Live animals are received from the supplier at the meat plant and are placed in holding areas where they are rested for typically one day before slaughter. This practice eliminates the need for feeding and reduces manure accumulation in the holding pens. Water is provided to minimize weight loss. The holding areas should have adequate facilities for livestock inspection including walkways over pens, crushes and other containment structures. These areas may be covered or totally enclosed to provide some protection from weather conditions and primarily to reduce runoff from precipitation events. Water pollutant concentrations from this activity depend on whether the pens are scraped (dry cleaned) prior to washing with water.

Sick animals and those unfit for human consumption are identified and removed from the normal processing flow. Processors should have separate isolation and holding pens for the unhealthy animals. The cows are weighed prior to processing so the yield can be accurately determined.

Stunning & Bleeding: After leaving the holding areas, the animals are located in a stunning or immobilization area where they are rendered unconscious. Cattle stunning in the United States is usually done by a bolt pistol or electric shock. The anesthetized animals are then shackled and hoisted (hind quarters up) onto a overhead rail or dressing trolley. Bleeding (exsanguination) or sticking is conducted with the blood collected in a trough or floor drain for disposal or further processing.

Dressing & Hide Removal: The bled carcasses are conveyed to the slaughter area where dressing (cleaning) and evisceration occurs. Dressing is performed from the overhead position or by placing the carcass in a cradle. The skin is removed from the head and the head separated from the body. The fore and hind feet are then removed to prevent contamination of the carcass with manure and dirt dropped from the hooves (shanking or legging). Each leg is then skinned. The remaining hide is removed from the carcass with electric or air-powered rotary skinning knives. The hides are preserved by salting or chilling on ice before being sent to a tannery for processing into leather.

Evisceration: The skinned carcasses are opened to remove the viscera (internal body organs). The abdomen is opened from the top to bottom where the internal organs are loosened and removed from the body. The abdominal organs are inspected and the stomach and intestine are emptied of manure and cleaned for further processing. A handsaw is used to halve the remaining carcass by cutting through the center of the backbone. The inedible materials are collected and sent to a rendering plant for manufacture of feed materials. The beef sides are washed to remove any remaining blood or bone dust and the carcasses are physically or chemically decontaminated. The simplest physical decontamination method

involves spraying with high pressure water or steam. Chemical decontaminants include acetic and lactic acids, and aqueous solutions of chlorine, hydrogen peroxide and inorganic acids.

Carcass Storage: Clean carcasses are then conveyed to a cold storage area for rapid chilling. A thorough chilling is essential within the first 24 hours of slaughtering otherwise the carcasses may sour. Air chilling is the most common method for cooling beef sides. The most desirable temperature for chilling beef is 32□F or 0□C. Since warm carcasses will raise the temperature of a chilled room, it is good practice to lower the temperature of the room to 5 degrees below freezing before the carcasses are brought in for storage. Beef undergoes maturation and should be held for at least a week at 32□F/0□C before butchery in retail establishments.

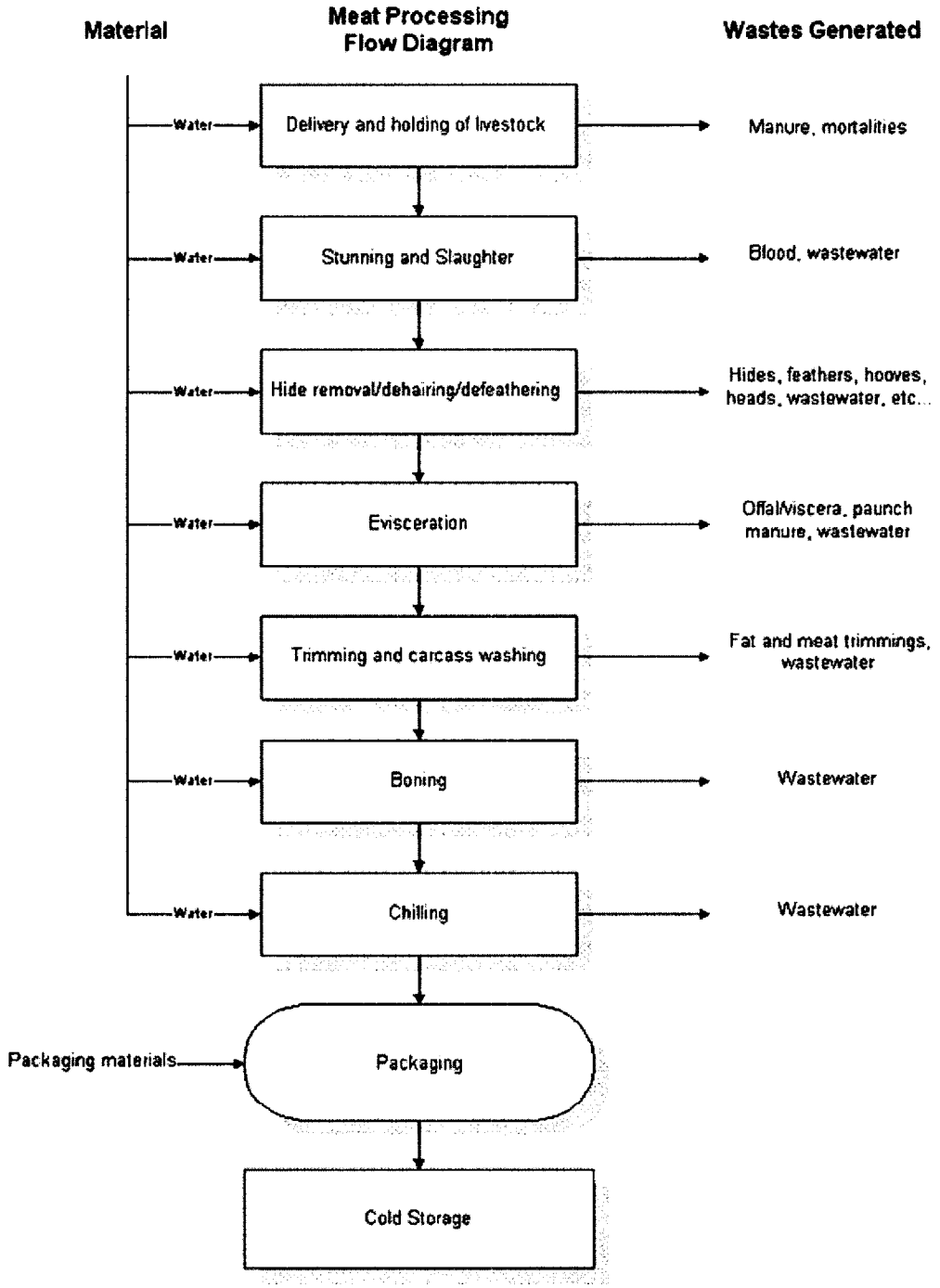
Cutting: Carcass cutting and boning typically occurs after chilling, since a cold carcass is easier to handle and cut. In the past, beef sides remained intact up to the time of butchery; however, current practice is to break down the carcasses into primal joints (wholesale cuts) then vacuum pack. Preparation of primal joints in processing plants reduces refrigeration and transport costs and is a convenient pre-packing operation for retailers.

Inspection: Carcasses and viscera are inspected to determine if they are suitable for human consumption. Each carcass and its components are identified and kept together wherever possible until inspection is complete.

Cleaning: Federal and state regulations require equipment and facilities used for processing of live animals for human consumption be completely cleaned at least every eight hours of operation to maintain sanitary conditions. The daily schedule for meat processors consists of one or two eight-hour production shifts followed by a six- to eight-hour cleaning period. For a typical cleanup procedure, equipment, walls and floor surfaces are initially rinsed with water to remove loose solids. The surfaces are then scrubbed with detergents and sanitizers and rerinsed.

Byproducts: At various stages in the process, inedible byproducts such as bone, fat, heads, hair and condemned offal are generated. These materials are sent to a rendering plant on- or off-site for processing into feed products. Refer to the **Rendering Process Description** for further information on this subject.

Specific information on meat processing wastes is contained in the **Environmental Impacts** Section.



Pork Processing Description ▲TOP

Approximately 100 million hogs are processed annually in the United States. The live weight of swine slaughtered for meat production averages 250 pounds per animal. Up to 70 percent of the pig carcass can be used, which is greater than other farm animal species. This high recovery rate is due to the fact that a hog has one stomach (where a cow has four) and is dressed with the feet and skin intact instead of removed. However, some processors remove the feet before processing. Additionally, the portion of edible components is higher than that of cattle. The diagram following this section illustrates the flow of pork processing.

Animal Pre-handling: Swine are delivered to the processing plant from the market or farm and placed in holding yards for one to two days. They are generally made to fast for a day to reduce intestinal contents. Most processors schedule receipt from producers of the live animals for slaughter to provide a continuous supply of animals for processing. Live animals are received from the supplier at the meat plant and are placed in holding areas where they are rested for

typically one day before slaughter. This practice eliminates the need for feeding and reduces manure accumulation in the holding pens. Water is provided to minimize weight loss.

The holding areas should have adequate facilities for livestock inspection including walkways over pens, crushes and other containment structures. These areas may be covered or totally enclosed to provide some protection from weather conditions and primarily to reduce runoff from precipitation events. Water pollutant concentrations from this activity depend on whether the pens are scraped (dry cleaned) prior to washing with water. Sick animals and those unfit for human consumption are identified and removed from the normal processing flow. Processors should have separate isolation and holding pens for the unhealthy animals. The pigs are weighed prior to processing so the yield can be accurately determined.

Stunning and Bleeding: Hogs must be rendered completely unconscious prior to being shackled and hoisted for exsanguination (bleeding). Stunning must be conducted with a federally acceptable device (mechanical, chemical or electrical) and is typically done by electric shock or anesthetization using carbon dioxide. In large commercial operations, a series of chutes and restrainer conveyors move the animals into position for stunning. Once unconscious, the animals are bled, usually with a hollow knife that directs the blood to a collection trough. The blood is then pumped to an agitated tank for further processing.

Dehairing and Finishing: Before further processing, hair is removed from the carcasses by scalding in hot water followed by scraping. Carcasses are then singed to take out any remaining hair. In large operations, the carcasses are transported through a scalding tub by an automated conveyor moving at a calibrated speed to ensure proper scalding times. In these automated systems, the carcasses are continually moved and turned for uniform scalding. In small plants without automation, hair condition is checked periodically during the scalding period. Some processors also remove hair by passing the carcass through gas flames to singe the hair. Rotating brushes remove the remaining hair, then the carcasses are scraped a final time and thoroughly washed from the hind feet to the head.

Some processors skin the hogs after exsanguination. The head and belly of the carcass are hand-skinned and the legs are either hand-skinned or removed. The pigskins are trimmed, salted, folded and stored in 50-gallon drums.

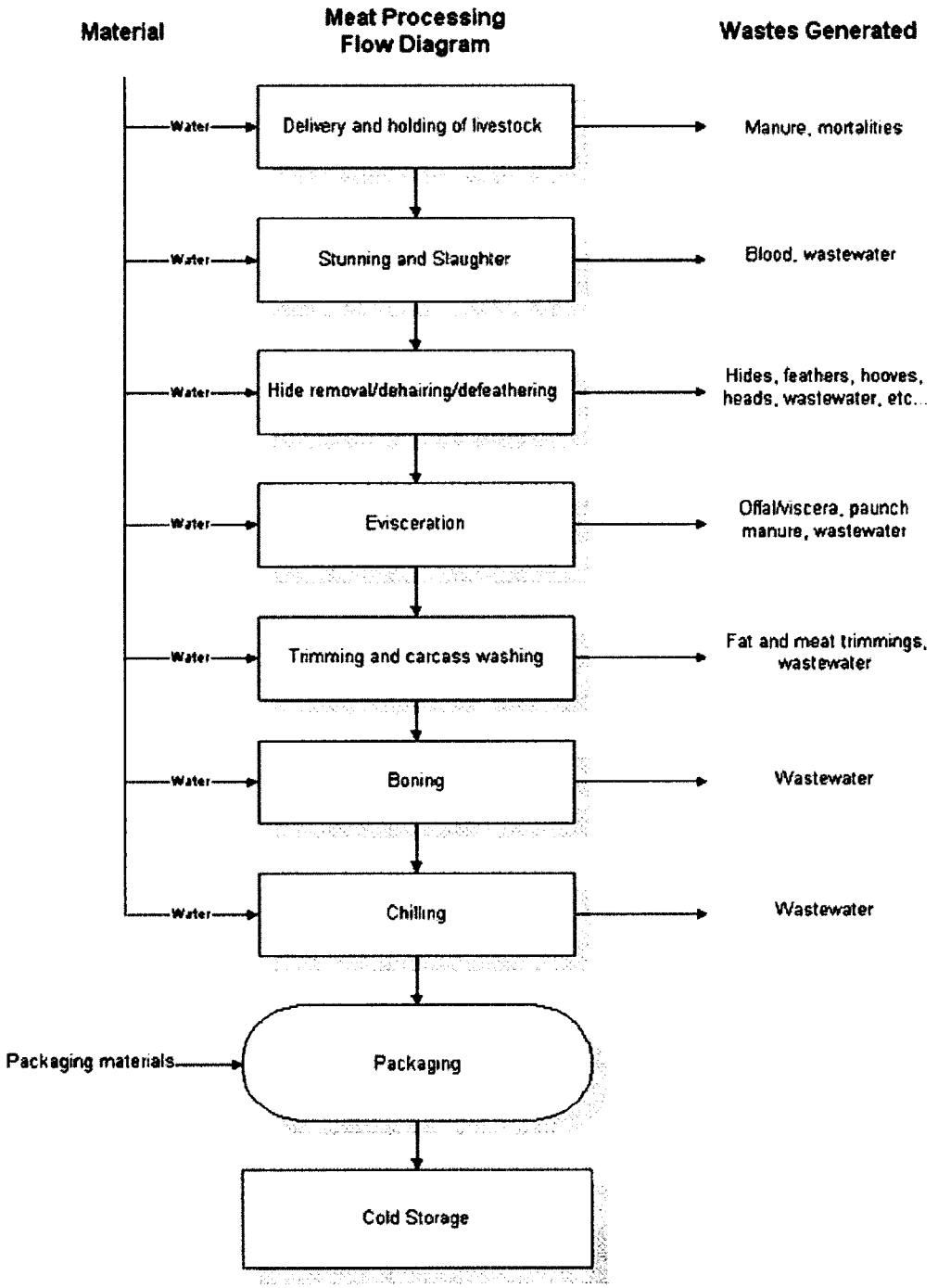
Evisceration and Splitting: After dehairing and hide finishing, the carcasses are eviscerated to remove the abdominal organs. All of the internal organs are inspected, and those intended for human consumption are separated and the remainder discarded into a rendering barrel. After evisceration, the heads are separated and the carcasses split in half. The carcass is washed from the top down to remove any bone dust, blood or bacterial contamination. After sanitizing, the carcass is inspected a final time and the inspection stamp applied to the wholesale cut.

Chilling: Inspected carcasses are placed in coolers at 0-1□C (32-34□F) with air velocity typically at 5-15 mph for a 24-hour chill time. For thorough chilling, the internal ham temperature should be at least 3□C or 37□F. Spray chilling is permitted by the USDA to reduce cooler shrink. Spray solutions may contain chlorine, which acts as a sanitizer. Some carcasses are sent directly to a freezer, which reduces shrinkage. After adequate chilling has occurred, cutting and boning is performed.

Cleaning: Federal and state regulations require equipment and facilities used for processing of live animals for human consumption be completely cleaned at least every eight hours of operation to maintain sanitary conditions. The daily schedule for meat processors consists of one or two eight-hour production shifts followed by a six to eight-hour cleaning period. For a typical cleanup procedure, equipment, walls and floor surfaces are initially rinsed with water to remove loose solids. The surfaces are then scrubbed with detergents and sanitizers and rerinsed.

Byproduct Processing: Edible offal and casings (intestinal tract) are separated from the viscera and sent for cleaning and further processing. At various stages in processing, inedible materials such as bone, fat, heads, hair and condemned offal are generated. These materials are sent to a rendering plant for processing into feed and tallow. See the **Rendering Process Description** for further information.

Specific information on meat processing wastes is contained in the **Environmental Impacts** Section.



Poultry Processing Description ▲TOP

More than seven billion birds are processed annually in the United States (USDA), with daily averages of 20,000 at individual plants. Poultry slaughtering consists of hanging, stunning, bleeding, scalding, defeathering, picking and washing. The diagram following this section illustrates the flow of poultry processing.

Receiving and Hanging: Birds are transported to the processing plant with the delivery scheduled so the poultry is processed on the day of receipt. Birds are not fed for one to four hours before slaughter to ensure their crops are empty for cleaner production. Live birds are delivered by truck from the supplier in cages where they are unloaded onto a dock area. The live bird holding areas are usually covered and have cooling fans to reduce bird weight loss and mortality during hot weather conditions (Sams, 2001). Birds are removed from the cages and then transported by conveyor to the live hang area inside the processing plant. The empty crates are returned to a wash area where they are cleaned and disinfected before leaving the facility. Washing and sanitizing of cages and trucks is common in turkey processing but not

in the broiler chicken industry (USEPA, 1975).

Employees lift live poultry from the supply conveyer and hang the birds by their feet from a shackle conveyor. For the best poultry quality, the live birds should not be stressed prior to slaughter. Thus, noise and light are kept to a minimum in the hang room. Many processors use red lights in the hanging room so that employees can see but birds cannot.

Bleeding and Defeathering: From the hang room, the birds are conveyed to the kill room. Upon arrival, the birds are lowered into an electric water vat where they are anesthetized. A machine usually equipped with a circular saw blade then cuts the throats. Bleeding may take 1-3 minutes but must be complete to produce the desirable white or yellow skin color in the final dressed bird.

The birds enter a hot water scald tank with troughs and flumes to keep them totally submerged. Scalding loosens the feathers and makes for easier plucking and fine feather removal. Scalding temperatures and times vary from 123□F to140□F and from 30 to 90 seconds. The higher temperatures require shorter scald times; however, elevated temperatures may result in removal of portions of the skin. Optimum conditions should be established for the type of bird being dressed. The FDA requires a minimum of one quart of hot water be used per bird for feather removal; however, many processors use much more.

Additional defeathering is performed by a mechanical device with rotating rubber fingers that beat and rub the feathers away from the carcass. Water washes away the feathers and acts as a lubricant. Carcasses are then singed for final hair and feather removal. The defeathered birds are washed with water and scrubbed with mechanical rubber fingers. Blood and feathers are collected and sent to rendering either on- or off-site for transformation into byproduct meal.

Evisceration and Inspection: The carcasses are removed from the kill line by cutting off the feet and rehanging on shackles in the evisceration line. A mechanical arm removes the internal organs of the bird. Each bird is inspected for signs of disease and the viscera from the body cavity is also presented for USDA inspection. The giblets (hearts, livers and gizzards) are removed and further processed. The remaining organs are sent to offal or waste. The giblets are trimmed and washed, packed in a giblet bag, and returned to the body cavity. The whole bird is removed from the conveyor, weighed and classified. (Chlorination for Poultry and Meat Processing, Severn Trent Services, Capitol Controls, 2000)

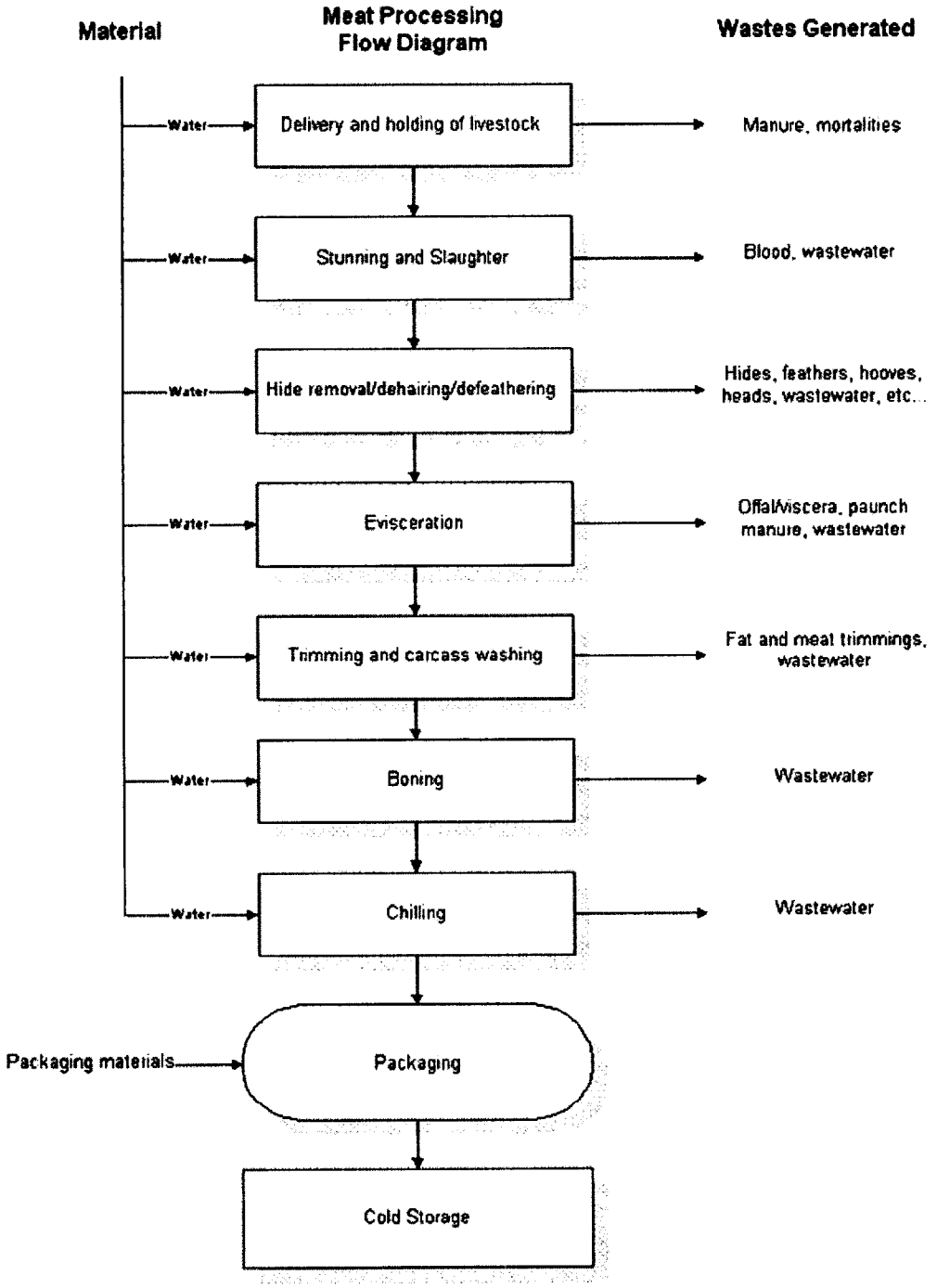
Cutting and Deboning: After a chicken has been eviscerated and cleaned, it is either prepared for packaging as a whole bird or sent through additional cutting and deboning steps. The cutting only prepares a bone-in product, while the cutting and deboning produce boneless cuts. In the cutting process, the wings and legs/thighs are removed from the carcass and the back is cut away from the breast. Bones are not removed. At this point parts can be packaged as a consumer product, bulk-packed for delivery to other processors, or shipped for further processing into a variety of products, including breaded or marinated goods. For additional information on further processing for poultry, refer to **4.5.2 Poultry Further Processing Operations, EPA's Meat and Poultry Products Industry Overview**.

Within-plant processing of cut-up parts generally involves creating a boneless product. Deboning involves cutting meat away from the bone with knives, and trimming and cleaning with bladed knives or scissors. The deboned parts are generally packaged as a fresh or flash-frozen consumer product.

Chilling: Birds passing inspection are thoroughly washed inside and out and then rapidly chilled at 30-35□F to preserve quality and prevent spoilage. Chilling is performed with cold water or ice slush. The birds absorb small amounts of moisture and are sized and graded for quality. The FDA requires a chilled water flow rate of about two gallons per bird.

Packaging: No matter how a bird is packaged, it is almost always placed in a large cardboard box for shipping. Packaging is necessary to get the processed product from the plant to the consumer. The graded poultry is packaged fresh in boxes containing crushed ice. Birds must be kept below 40□F and quickly transported to retail distributors since the product's shelf-life may be only a few days. Poultry is often frozen to prolong storage life. The birds are vacuum-packed in low-moisture and low oxygen transmission bags or films, since the chicken fat is highly susceptible to microorganism growth.

Specific information on poultry processing wastes is contained in the **Environmental Impacts** Section.



Fish Processing Description ▲TOP

The fish and shellfish processing industry includes marketing of fish, shellfish and marine plant and animals as well as byproducts such as fish meal and oil. Fish meal is used as a livestock feed and the oil is used in margarine and paints. Fish canning and byproduct manufacturing are conducted at 136 plants in the United States. Exports of canned fish and fish meal are increasing due to the diminishing supply in other countries. About 30 percent of fish processed for human consumption is marketed as fresh; the remainder is frozen fish and filets in ready-to-eat meals and other convenience products.

Fish processing most commonly occurs at onshore facilities; however, some takes place at sea or aboard fishing vessels. This description covers on-shore operations. Additionally, some industry sectors operate seasonally. Salmon processing typically occurs less than 100 days of the year during the harvesting season with plants operating at full capacity.

The diagram following this section illustrates the flow of seafood processing.

Pretreatment: Fish are kept on ice in boxes before delivery to the processing plant. Upon arrival, the fish may be re-iced and placed in cold storage until required for further processing. Pretreatment involves ice removal, washing, grading according to size and de-heading. Large fish may also be scaled before additional processing. Some fish such as mackerel are skinned by immersing into a warm caustic bath. The effluent from this process has a high organic load and has to be neutralized before discharge.

Filleting: The filleting areas are generally separated from the pretreatment department to prevent workers and materials from the nonsterile pretreatment from contaminating the sterile filleting area. Filleting is performed by machines with mechanical knives that cut the fillets from the backbone and remove the collarbone. Some fillets may be skinned at this step in the process.

Trimming and Inspection: In the trimming department, pin bones are removed and operators inspect the fillets. Any defects and any inferior parts are removed. Offcuts are collected and minced. Depending upon the final product, the fillets can be cut into portions according to weight or final product requirements. The fillets are inspected to ensure they meet product standards.

Fresh Packaging/Storage: Fresh products are packaged in boxes with ice which is separated from the product by a layer of plastic. Fillets or pieces can be individually frozen and wrapped in plastic. The most common method is packaging in 12-25 lb blocks in waxed cartons. The blocks are typically frozen and kept in cold storage.

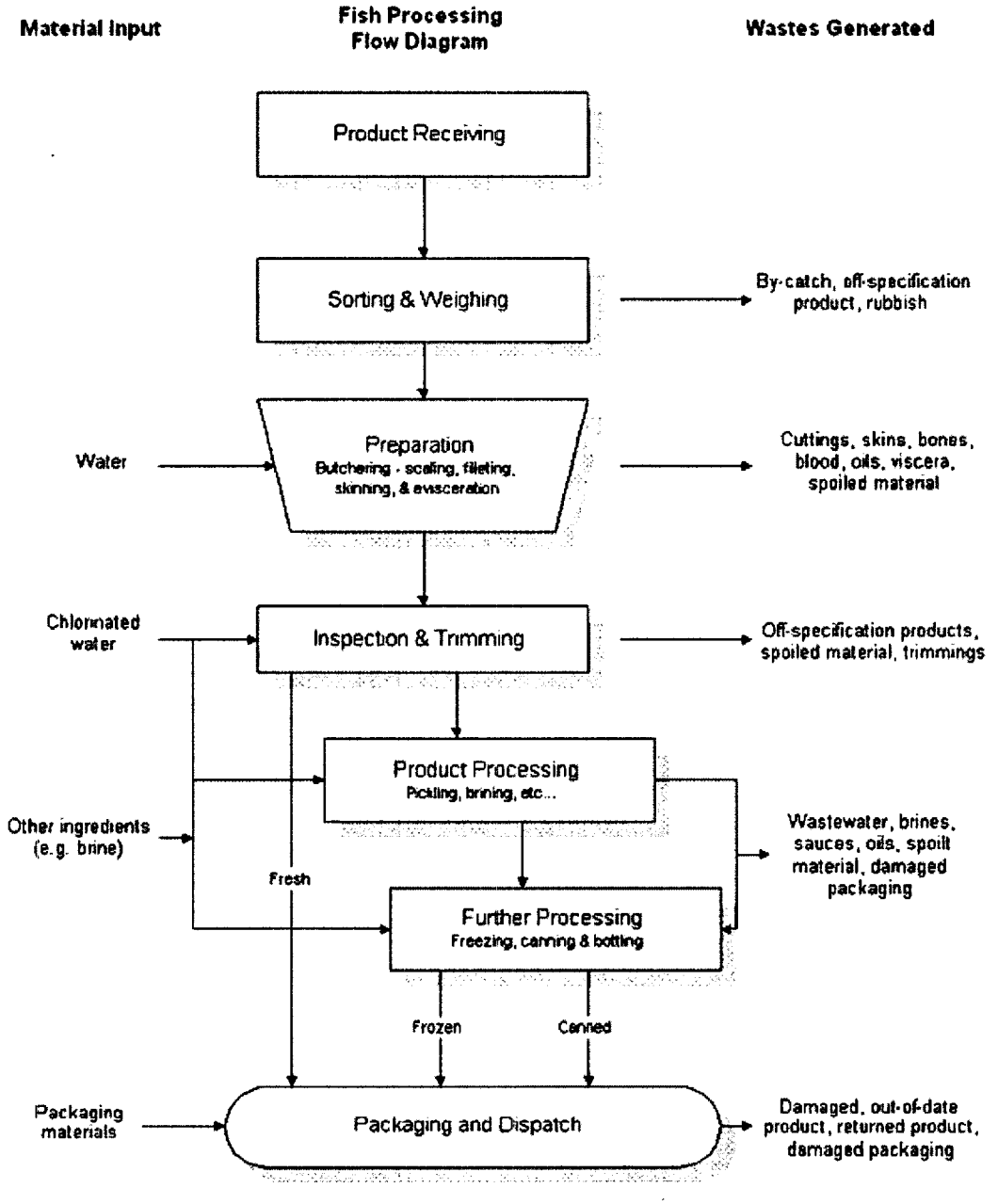
Canning: Canning is performed by two methods: precooking and raw pack. Precooking begins with thawing of the fish which are then eviscerated, washed and cooked. Cooking occurs with steam, oil, hot air or smoke for up to 10 hours, depending upon the fish size. The cooked fish are then cooled. Refrigeration may be used to reduce cooling time. After cooling, the head, fins, bones and undesirable meat are removed and the remainder is cut/chopped and placed in cans. Oil, brine and/or water are added to the cans which are sealed and pressure-cooked before shipment.

The raw pack method begins with thawing and weighing of the fish. They are then washed and possibly brined as well as "nobbed," which is the removal of the head, viscera and tails. The fish are placed in cans, then cooked, drained and dried. After drying, liquid (oil, brine, water, sauce) is added to the cans. Finally, the cans are sealed, washed and sterilized with steam or hot water and then stored.

Fish Meal and Oil Production: Most large canneries also operate a fish meal plant, where the fish not suitable for canning are combined with offal and processed into fish meal. Fish meal is derived from the dry components of the fish and the oil from the oily component. The water that makes up the remainder of the fish matter is evaporated during the process. Most fish meal and oil production processes are automated and continuous. Production rates vary according to season and types of fish being processed.

The fish byproducts are cooked in a process that coagulates the protein and releases the water and oil. The mixture is screened and the liquid from the mixture is squeezed out through a perforated casing. The pressed cake is shredded and dried with steam or direct flame dryers. The meal passes through a vibrating screen and to a hammer mill where it is ground to the desired size. The ground meal is automatically weighed and bagged. The meal is used in animal and pet feed due to its high protein content.

The oil is further processed by passing through a decanter to remove sludge which is then fed back into the meal dryer. Oil is separated from the liquid by centrifuge and is "polished" by using hot water washes and additional centrifuging. The removed water is evaporated to concentrate the solids and the remaining oil is refined to remove any impurities. See the Rendering Process Description for additional information on byproduct manufacturing. Discussion of wastes generated from meat and fish processing is included in the **Environmental Impacts** section.



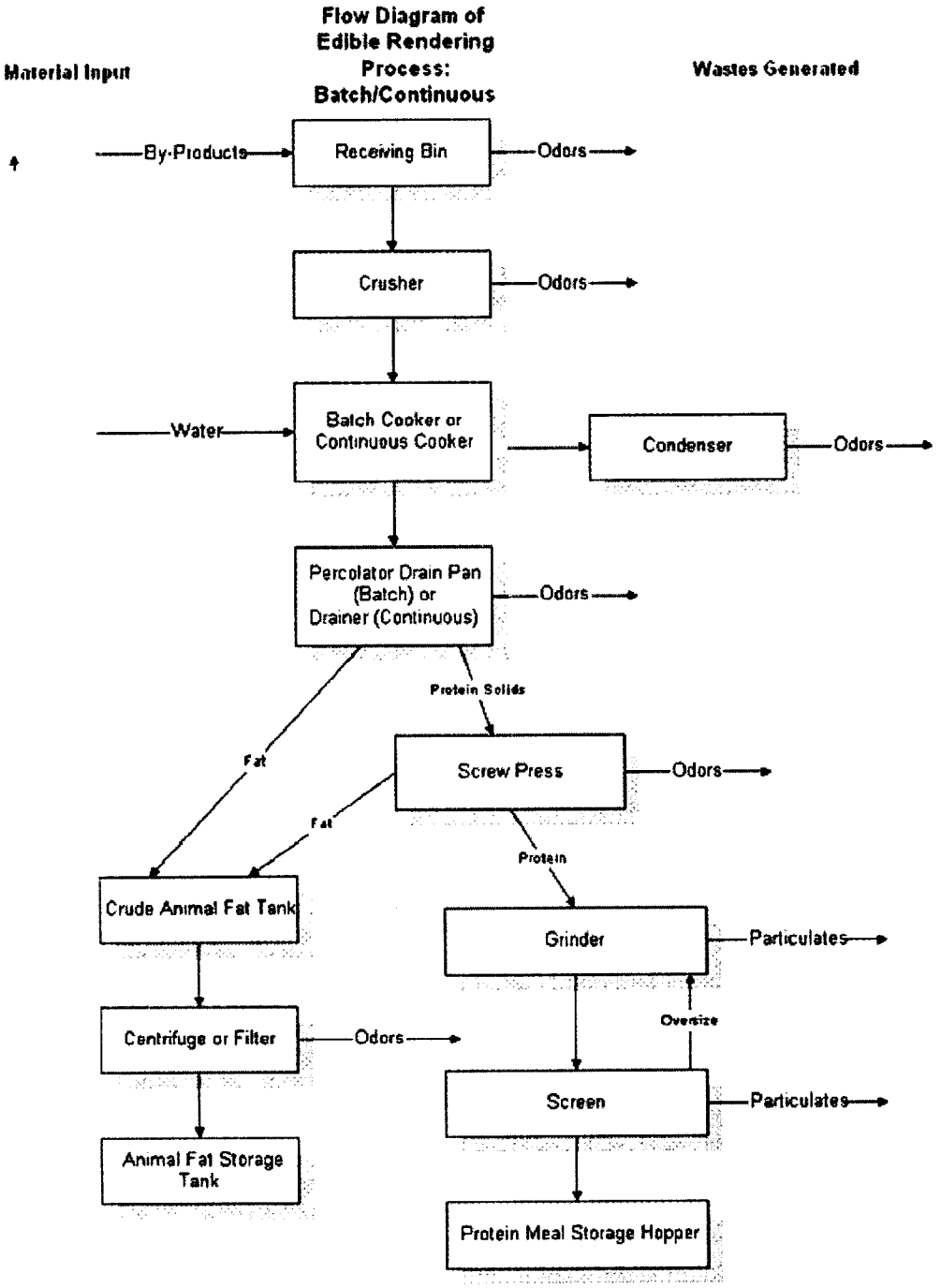
Rendering Process Description ▲TOP

Having commercial value, meat byproducts contribute significantly to the profits of slaughter operations. The United States produces an average seven million tons of rendered products annually with a value of $3 billion. Use of byproducts also reduces the overall environmental impacts of processing operations. Rendering converts meat, poultry and fish byproducts into marketable goods for agricultural and industrial use. Materials include viscera, meat scraps, bone, blood, feathers and dead animals.

Rendering involves cooking, separating and drying processes where edible (fit for human consumption) and inedible (not suitable for human consumption) animal derivatives are made into useful commodities. Edible rendering facilities process fatty animal tissue into edible fats and proteins. The inedible rendering plants produce tallow and grease, which are used in livestock and poultry feed, soap and production of fatty acids. Currently, an estimated 150 independent, off-site rendering facilities and 100 integrated plants (rendering on-site at processing plant) are operating in the United States. The independent renderers gather raw materials from small slaughterhouses, supermarkets and butcher shops where the on-site processors receive offal and other goods directly from plant operations.

Edible Rendering: The diagram following this section illustrates the flow of edible byproduct processing. Animal

byproducts are chopped or ground into small pieces then cooked. As the material is heated, moisture and fats are released. The proteinaceous solids are separated from the melted fat and water by a centrifuge. The edible fat is then separated from the water with additional centrifuging. The water is discharged as sludge and the fat is pumped to storage.



Inedible Rendering: The diagram following this section illustrates the flow of inedible byproduct processing. Inedible rendering is performed by wet or dry processing. Wet methods separate the fat from the raw materials by boiling in water. Water and live steam are used to cook the raw substances for fat separation. Dry rendering is a batch or continuous process that dehydrates the matter to release the fat. Following dehydration, the melted fat and protein solids are separated. At present, only dry rendering is used in the United States. Wet rendering is no longer used due to its high energy consumption and related costs and adverse effects on the fat quality.

In batch rendering of nonedible foodstuffs, multiple cookers are used. Raw material is crushed to 1-2 inches diameter and cooked. The final contents are screened and pressed to separate the fats from the protein solids. The solids, called

"cracklings," are ground to produce protein meal. The fat is centrifuged or filtered to remove any remaining protein solids and is then stored in a tank.

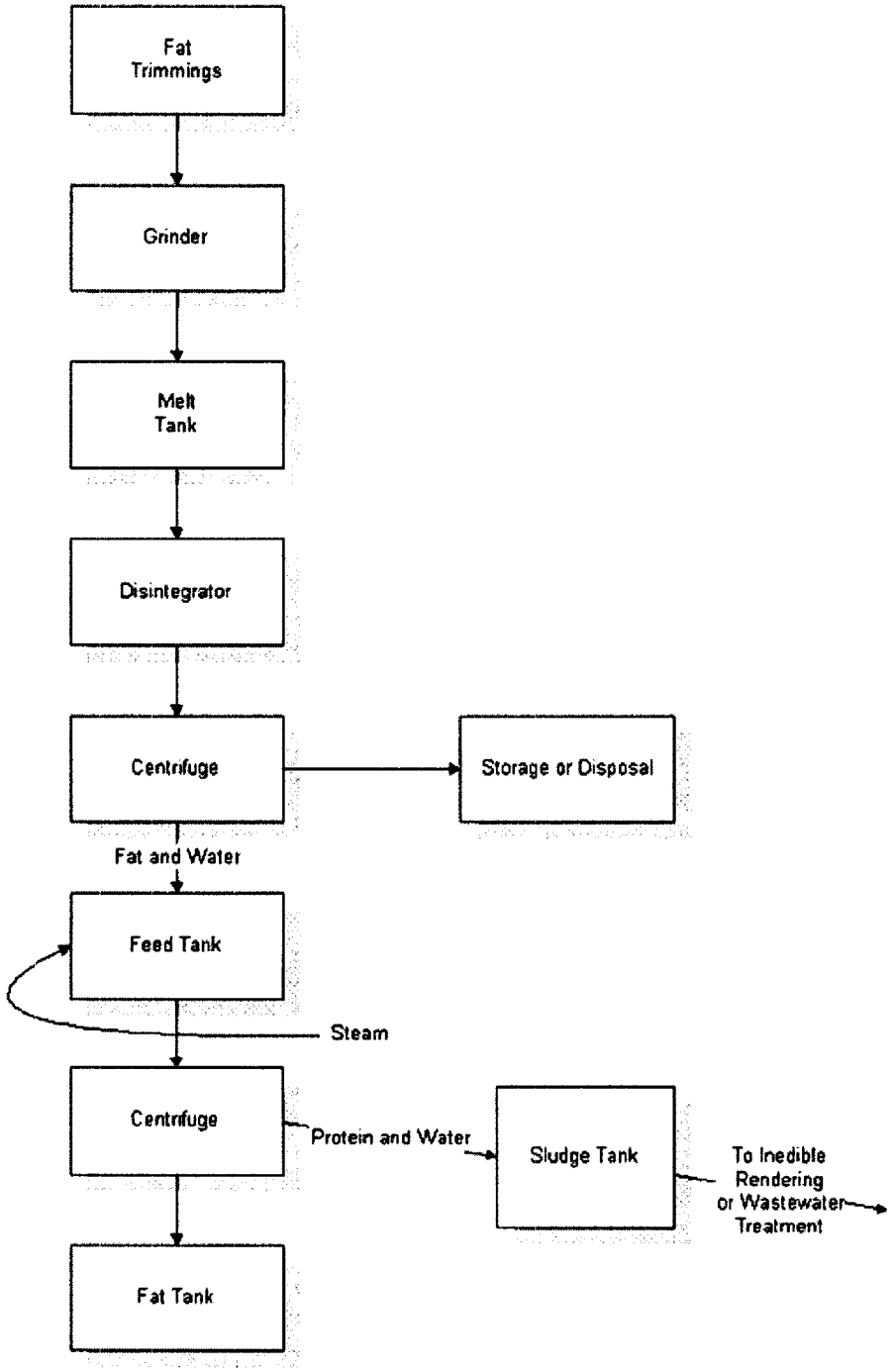
Since the 1960s, continuous rendering systems have been installed to replace batch systems at some plants. This system is similar to the batch configuration except that a single, continuous cooker is used rather than several parallel batch cookers. Continuous cookers cook the material faster than batch cookers and usually produce a higher quality of fat. From the cooker, the material is filtered to remove any solids and the fat is placed in an animal fat storage tank.

Inedible Products Processing: Blood processing and drying is an auxiliary process in meat rendering operations. Whole blood from animal slaughterhouses is used to recover protein as blood meal, which is a valuable ingredient in animal feed due to its high lysine content. Poultry feathers and hog hair are rendered to convert keratin into amino acids. Restaurant grease is also used as another raw feed material.

Many of the byproducts from meat processing can be processed further into value added products. For example, pet food from viscera, gelatin from head pieces, meat meal from hoofs, chicken parts, bone and horn, glue from hides and blood meal and small goods from blood like adhesives. Significant environmental gains can be achieved from maximizing the utilization of these materials so that they become a resource rather than a waste.

The efficient recovery and segregation of blood is an important means of reducing the pollution loads in wastewaters, since blood is a highly polluting substance. An operation with an efficient blood recovery system will have a 40 percent lower polluting load than one that allows blood to flow to the wastewater stream (Nielsen, 1989).

Inedible Rendering Process



▲TOP

EXHIBIT "CC"

FDA/Center for Veterinary Medicine
Survey #1, qualitative analyses for pentobarbital residue
Dry dog food samples purchased in Laurel, MD, area, March - June 1998

KEY

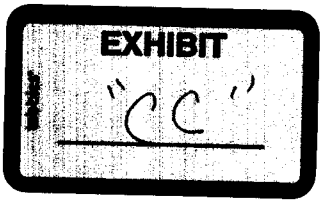
Yes = confirmed for presence of pentobarbital
No = failed to confirm for presence of pentobarbital
No result = analyses failed quality assurance requirements

Rendered ingredients:

AD = animal digest
AF = animal fat
BBM = beef and bone meal
BT = beef tallow
MBM = meat and bone meal

NOTES

3-4 ppb = Estimated limit for confirming pentobarbital with highest confidence
ppb = parts-per-billion pentobarbital, by weight (nanograms per gram)
n = not given or not legible



Rendered ingredients (position in ingredient list)	Confirmed for the presence of pentobarbital?	Brand Name	Formulation Name	Lot Number
Beef Meal(1)	yes	Nutro	Premium	10:19 2AR7JJ
Beef Meal(1)	yes	Nutro	Premium	00:512BA7256259101069704
MBM(2) AF(6) AD(7)	yes	Ol'Roy	Krunchy Bites & Bones	V033
MBM(2) AF(5) AD(8)	yes	Ol'Roy	Premium Formula with Chicken Protein and Rice	V093
MBM(2) AF(5) AD(8)	yes	Ol'Roy	Premium Formula with Chicken Protein and Rice	V071
MBM(2) AF(6) AD(9)	yes	Ol'Roy	High Performance with Chicken Protein and Rice	V073
MBM(2) AF(6) AD(9)	no result	Ol'Roy	High Performance with Chicken Protein and Rice	V073
MBM(2) AF(6) AD(7)	yes	Ol'Roy	Krunchy Bites & Bones	V153
MBM(2) AF(5)	yes	Trailblazer	Chunk Premium Quality	029813:30\A/2
MBM(2) AF(5)	yes	Trailblazer	Chunk Premium Quality	A5981315\A/R (?)
MBM(2) AF(5)	yes	Trailblazer	Bite Size Ration	A5889911A\A/1
MBM(2) AF(5)	yes	Trailblazer	Bite Size Ration	030800113\A/2
MBM(2) AF(4)	no	Pedigree	Mealtime	814EL0011E
MBM(2) AF(4)	no	Pedigree	Mealtime	816GL154D
MBM(2) AF(6)	no	Pedigree	Meaty Chunks with Rice and Vegetables	811FL0027E
MBM(2) AF(6)	no	Pedigree	Meaty Chunks with Rice and Vegetables	811FL2211E
MBM(2) AF(3)	yes	Dad's	Bite Size Meal	17:42
MBM(2) AF(3)	yes	Dad's	Bite Size Meal	7:12
MBM(2) AF(6)	yes	Weis Value	Chunky and Moist	Feb 0599x
MBM(2) AF(6)	yes	Weis Value	Puppy Food	99N132
BBM(2) AF(5)	no	Friskies	Come'n Get It	8104LP-61156
BBM(2) AF(6)	no	Friskies	Alpo	8015LP 60501
BBM(2) AF(6)	no	Friskies	Alpo	8096LP-60531
MBM(3) AF(5) AD(6)	yes	Super G	Chunk Style	V113
MBM(3) AD(5) AF(6)	no	Ol'Roy	Lean Formula	V013
MBM(3) AD(5) AF(6)	no	Ol'Roy	Lean Formula	V073
MBM(3) AF(5)	no result	Richfood	High Protein Dog Meal	1R04018
MBM(3) AF(5)	no	Richfood	High Protein Dog Meal	1R03308
MBM(3) AF(5) AD(6)	yes	Richfood	Chunk Style	1R0478
MBM(3) AF(5) AD(6)	yes	Richfood	Chunk Style	3R05088
MBM(3) AF(5)	no	Richfood	Gravy Style Dog Food	3R010598
MBM(3) AF(5)	yes	Richfood	Gravy Style Dog Food	3R06078
MBM(3) AF(5) Beef Dgst(7)	no	Super G	Gravy Style Dog Food	V013

Rendered ingredients (position in ingredient list)	Confirmed for the presence of pentobarbital?	Brand Name	Formulation Name	Lot Number
MBM(3) AF(5) Beef Dgst(7)	no	Super G	Gravy Style Dog Food	V093
MBM(3) AF(5) AD(6)	yes	Super G	Chunk Style	V003
MBM(3) AF(5) AD(6)	yes	Super G	Chunk Style	V113
MBM(3) AF(4)	yes	Pet Essentials	Chunk Style	0-0046-L9
MBM(3) AF(4)	yes	Pet Essentials	Chunk Style	D-1106-L9
MBM(3) AF(5)	yes	America's Choice	Krunchy Kibble	3R
MBM(3) AF(5)	yes	America's Choice	Krunchy Kibble	R
MBM(3) AF(5) AD(6)	yes	Weis Value	Crunchy Dog Food	99N052
MBM(3) AF(5) Beef Dgst(7)	yes	Weis Value	Gravy Style Dog Food	N092
MBM(3) AF(7) AD(8)	yes	Weis Value	High Protein Dog Food	N072
BBM(3) AD(4) AF(5)	yes	Ol'Roy	Meaty Chunks and Gravy	K5 0825
BBM(3) AD(4) AF(5)	no	Ol'Roy	Meaty Chunks and Gravy	V90051
BBM(3) AF(4) AD(5)	yes	Ken-L Ration	Gravy Train Beef, Liver and Bacon Flavor	W20351
BBM(3) AF(4) AD(5)	yes	Ken-L Ration	Gravy Train Beef, Liver and Bacon Flavor	W31203
BBM(3) AF(6)	no	Purina	Mainstay	U2326-L8
BBM(3) AF(6)	no	Purina	Mainstay	U1529-L6
BBM(3) BT(4)	no result	Purina	Dog Chow	E1837-L2
BBM(3) AF(6)	no	Friskies	Come'n Get It	8082L9-62159
BBM(3) AF(4)	yes	Ken-L Ration	Gravy Train	W12123
BBM(3) AF(4)	yes	Ken-L Ration	Gravy Train	W11525
BBM(3) BT(4)	no	Purina	Little Bites	U0502L4
BBM(3) BT(4)	no	Purina	Little Bites	U1201-L4
BBM(3) AF(5) AD(9)	no	Heinz	Kibbles 'n Bits Jerky	L70600
BBM(3) AF(5) AD(9)	yes	Heinz	Kibbles 'n Bits Jerky	L2 228
BBM(3) AF(5) AD(9)	no	Heinz	Kibbles 'n Bits 'n Bits 'n Bits	L200:38
BBM(3) AF(5) AD(9)	no	Heinz	Kibbles 'n Bits 'n Bits 'n Bits	L7 0448
MBM(4) AF(6)	yes	Weis Value	Kibbles Variety Mix	Mar 0999z
MBM(4)	yes	Kibble Select	Premium Dog Food	11P
MBM(4)	yes	Kibble Select	Premium Dog Food	1238
BBM(4) BT(6)	no	Fieldmaster	Fieldmaster	C1334-L3
BBM(4) AF(6)	no	Fieldmaster	Fieldmaster	U2108-L5
BBM(4) BT(6)	no	Purina	High Pro	U1829L6
BBM(4) BT(6)	no	Purina	High Pro	U1749-L6
BBM(4) AF(6)	no	Purina	Grrravy	U1643-L7
BBM(4) AF(6)	no	Purina	Grrravy	U1059-L6

Rendered ingredients (position in ingredient list)	Confirmed for the presence of pentobarbital?	Brand Name	Formulation Name	Lot Number
BBM(4) AF(6) AD(7)	yes	Heinz	Kibbles 'n Bits Puppy	L1-0343
BBM(4) BT(7) Dried AD (10)	no	Purina	Dog Chow Senior	U2055L3
BBM(4) BT(7) Dried AD (10)	no	Purina	Dog Chow Senior	U0303L4
BT(4) BBM(10)	no	Purina	Kibbles and Cheezy Chews	N-0113-L10-E
BT(4) BBM(10)	no	Purina	Kibbles and Cheezy Chews	N-19-58-L11-W
MBM(5) AF(7)	yes	Champ Chunx	Bite Size Dog Food	H20054
BBM(5) AF(6)	no	Purina	Kibbles and Chunks	N-20-37-L10-E
BBM(5) AF(6)	no	Purina	Kibbles and Chunks	I-21-10-L10-E
BBM(5) BT(6)	no	Purina	Butcher's Blend	N1224-L20
BBM(5) BT(6)	no	Purina	Butcher's Blend	N-1723-L20
BBM(5) AD(8)	no	Heinz	Kibbles 'n Bits Lean	L30906
BBM(5) AD(8)	yes	Heinz	Kibbles 'n Bits Lean	L2 1156
BT(5)	no	Purina	Dog Chow	U1239-L2
BT(5)	no	ProPlan	Beef and Rice Adult	U2053-L2
BT(5)	yes	ProPlan	Beef and Rice Adult	U0131 L2
BBM(6) BT(7)	no	Purina	Fit & Trim	U0557L3
BBM(6) BT(7)	no	Purina	Fit & Trim	U2133-L4
BT(6)	yes	ProPlan	Beef and Rice Puppy	E0601-L3
BT(6)	yes	ProPlan	Beef and Rice Puppy	E0359 L2
MBM(7) AF(9)	no	Ol'Roy	Dinner Rounds Soft Dry Dog Food	8D30PB1
MBM(7) AF(8)	yes	Reward	Dinner Rounds Dog Food	8C19PA1
MBM(7) AF(8)	no	Reward	Dinner Rounds Dog Food	8D23PB1

Survey #2, quantitative analyses for pentobarbital residue
Dry dog food samples purchased in Laurel, MD, area, December 2000

KEY

QUANTITATIVE ANALYSES

ppb = parts-per-billion pentobarbital, by weight (nanograms per gram)
--- = not found above 1 ppb limit of detection
a = found in 1-2 ppb range, but not accurately measurable

QUALITATIVE ANALYSES

yes = confirmed for presence of pentobarbital
no = failed to confirm for presence of pentobarbital
blank = not analyzed by qualitative method

Rendered ingredients:

AD = animal digest
AF = animal fat
BBM = beef and bone meal
BT = beef tallow
MBM = meat and bone meal

NOTES

1 ppb = Lowest concentration for detecting pentobarbital with some confidence
2 ppb = Lowest concentration for measuring pentobarbital accurately
3-4 ppb = Estimated limit for confirming pentobarbital with highest confidence
n = not given or not legible

Rendered ingredients (position in ingredient list)	Measured (ppb)	Confirmed for presence of pentobarbital?	*Brand Name*	Formulation Name	Lot Number
MBM(2) AF(5) BBM(6) AD(8)	10.0	yes	Old Roy	Puppy Formula, Beef Flavor	0407003
MBM(2) AF(5) AD(8)	---		Old Roy	Premium Chicken and Rice	0409002
MBM(2) AF(5) AD(8)	32.0	yes	Old Roy	Puppy Formula, Chicken and Rice	0415002
MBM(2) AF(5) AD(8)	a	no	Richfood	Dog Food Chunk Style	50 09:50 1
MBM(2) AF(6) AD(9)	a		Old Roy	High Performance Chicken and Rice	0417002
MBM(2) AF(5)	---		Pedigree	Meaty Chunks Mealtime	046DT0117C
MBM(2) AF(5) AD(7)	a		Safeway	High Protein	0650 EA
MBM(2) AF(6) AD(9)	3.9	yes	Richfood	High Protein Dog Meal	50 22:34 1
MBM(2) AF(6)	---		Pedigree	MealTime Large Crunchy Bites	935CK0906E
MBM(2) AF(8) AD(9)	a	no	Safeway	Puppy food	EB2206
MBM(2) AF(6) AD(9)	15.0	yes	Weis	Total High Energy Chicken and Rice	?17 09:23 2
BBM(2) AF(5) MBM(7)	---		Friskies	Come and Get it–Beef, Chicken, Liver	0269LP70610
BBM(2) BT(6) AD(8)	---		American Fare	Bites and Bones	C1800 L1
MBM(3) AD(5) AF(6)	3.9	yes	Old Roy	Lean Formula	0409003
MBM(3) AD(4) AF(5)	---		Old Roy	Meaty Chunks and Gravy	V80333
MBM(3) AF(5) AD(7)	---		Safeway	Tasty Nuggets	EB 22:00
MBM(3) AF(5) Beef Digest(7)	4.5	yes	Super G	Gravy Style Dog Food	n
MBM(3) AF(5) AD(6)	16.4	yes	Super G	Chunk Style Dog Food	0415003
BBM(3) AF(4) AD(5)	---		Heinz	KenL Ration Gravy Train Beef Liver and Bacon	W3 0819
BBM(3) AF(5) AD(9)	a		Heinz	Kibbles N Bits Original, Chicken and Beef	L72111
BBM(3) AF(6) AD(8)	25.1	yes	Heinz	Kibbles and Bits Beefy Bits	L22027
BBM(3) BT(4)	---		Purina	Dog Chow Little Bites	C 0202 L2
AF(3)	---		Hills	Science Diet Senior, 7+, small bites	K02350044
AF(3)	8.4	yes	Dad's	Bite Size Meal Chicken and	n

				Rice	
BT(3)	11.6	yes	PetGold	Master Diet Puppy Formulation	11:17 EA
MBM(4) AF(6)	---		Safeway	Small Bites	00:14 EC
MBM(4) AF(6)	---		Weis	Total Pet Kibbles	n
MBM(4)	---		Dad's	Kibble Select	n
BBM(4) AF(6) AD(7)	2.8	no	Heinz	Kibbles and Bits Puppy	L70222
BBM(4) BT(6)	---		Fieldmaster	Adult	C2258L4
BBM(4) BT(5)	---		Purina	Puppy chow, Beef Flavor	C0559 L1
BBM(4) BT(6)	---		Purina	Kibbles and Chunks Beef Flavor	C234 L1
AF(4)	---		Neura	Special Diet Formulation 300	SM017311:37
Rendered ingredients (position in ingredient list)	**Measured (ppb)**	**Confirmed for presence of pentobarbital?**	***Brand Name***	**Formulation Name**	**Lot Number**
AF(4)	---		Nature's Recipe	Easy to Digest	NT B 18:41
AF(4)	---		Friskies	Alpo Lamb Meal Rice and Barley	0237UA20635
AF(4)	---		Pedigree	Mealtime with Lamb and Rice	045C50933C
AF(4)	---		Hills	Science Diet Large Breed Adult	K07360152
AF(4) MBM(5) AD(6)	---		Heinz	KenL Ration Choice Blend	W4 1947
BT(4)	---		PetGold	Master Diet Adult Formulation	EA 09:25
MBM(5) AF(6)	---		American Fare	High Protein	C0935 L6
BBM(5) BT(7) AD(8)	---		Purina	Dog Chow Senior 7+	C 2159 L2
BBM(5) BT(6) AD(8)	---		American Fare	Adult Formulation	n
BBM(5) BT(7) AD(8)	---		Purina	One Beef and Rice	C 0405 L2
BBM(5) BT(6)	---		Purina	Butchers Blend	N 0751 L20
AF(5)	---		Hills	Science Diet Large Breed Canine, Puppies	142K51737
AF(5)	---		Safeway	Lamb Meal and Rice	EB1556
AF(5)	a		Neura	Special Diet Formulation 200	SM002714:27
BT(5) AD(9)	---		ProPlan	Beef and Rice, Adult Formulation	V0621L2
BT(5) BBM(6)	---		Safeway	Kibbles and Munchy Chews	F061414
BT(5) BBM(6)	---		American Fare	Kibbles and Munchy Morsels	C1931 L2
MBM(6) AF (7)	---		Heinz	Reward Dinner Rounds	P1 1238
AF(6) BBM(8)	---		Friskies	Alpo Complete Puppy	0007UA22125
AF(6)	---		Nature's Recipe	Lifestages Senior Lamb and Rice	V80449
AF(6)	---		Hills	Science Diet Sensitive Stomach	K12251603
AF(6)	---		Hills	Science Diet Sensitive Skin	K15350650
AF(6)	---		Pedigree	Puppy	0420S1702C
BT(6) AD(8)	---		American Fare	Puppy Formulation	D 0756 L8
BT(7)	---		Safeway	Select Adult Dog Formulation (Nutra Balance)	E2200L3
BT(7)	---		Maxximum Nutrition	Lamb and Rice Formula	n
Meat Meal(7)	---		Flavorite	Kibbles Dog Food	3104269

February 28, 2001
Edited for Typographical Errors -- March 1, 2002

EXHIBIT "DD"

February 28, 2002
Edited for Typographical Errors, March 1, 2002

Food and Drug Administration/Center for Veterinary Medicine
Report on the risk from pentobarbital in dog food

The low levels of exposure to sodium pentobarbital (pentobarbital) that dogs might receive through food is unlikely to cause them any adverse health effects, Food and Drug Administration scientists concluded after conducting a risk assessment.

During the 1990s, FDA's Center for Veterinary Medicine (CVM) received reports from veterinarians that pentobarbital, an anesthetizing agent used for dogs and other animals, seemed to be losing its effectiveness in dogs. Based on these reports, CVM officials decided to investigate a plausible theory that the dogs were exposed to pentobarbital through dog food, and that this exposure was making them less responsive to pentobarbital when it was used as a drug.

The investigation consisted of two parts. First, CVM had to determine if dog food could contain residues of the drug. Second, if residues were found, the Center had to determine what risk, if any, the residues posed to dogs.

In conjunction with this investigation, the Center wanted to determine if pet food contained rendered remains of dogs and cats.

How pentobarbital can get into dog food

Because in addition to producing anesthesia, pentobarbital is routinely used to euthanize animals, the most likely way it could get into dog food would be in rendered animal products.

Rendered products come from a process that converts animal tissues to feed ingredients. Pentobarbital seems to be able to survive the rendering process. If animals are euthanized with pentobarbital and subsequently rendered, pentobarbital could be present in the rendered feed ingredients.

In order to determine if pentobarbital residues were present in animal feeds, CVM developed a sophisticated process to detect and quantify minute levels – down to 2 parts per billion of pentobarbital in dry dog food. To confirm that the methods they developed worked properly, CVM scientists used the methods to analyze dry commercial dog foods purchased from retail outlets near to their Laurel, MD, laboratories. The scientists purchased dog food as part of two surveys, one in 1998 and the second in 2000. They found some samples contained pentobarbital (see the attached tables).

Dogs, cats not found in dog food

Because pentobarbital is used to euthanize dogs and cats at animal shelters, finding pentobarbital in rendered feed ingredients could suggest that the pets were rendered and used in pet food.

CVM scientists, as part of their investigation, developed a test to detect dog and cat DNA in the protein of the dog food. All samples from the most recent dog food survey (2000) that tested positive for pentobarbital, as well as a subset of samples that tested negative, were examined for the presence of remains derived from dogs or cats. The results demonstrated a complete absence of material that would have been derived from euthanized dogs or cats. The sensitivity of this method is 0.005% on a weight/weight basis; that is, the method can detect a minimum of 5 pounds of rendered remains in 50 tons of finished feed. Presently, it is assumed that the pentobarbital residues are entering pet foods from euthanized, rendered cattle or even horses.

Finding levels of pentobarbital residues in dog food

Upon finding pentobarbital residues in dog food, the researchers undertook an assessment of the risk dogs might face. Dogs were given known quantities of pentobarbital for eight weeks to determine if consumption of small amounts of pentobarbital resulted in any physiological changes that could indicate potential effects on health. In short, the scientists wanted to find the level of pentobarbital dogs could be exposed to that would show no biological effects. The most sensitive indicator that pentobarbital had an effect is an increase in the production of certain enzymes collectively called cytochrome P450.

Virtually all animals produce enzymes as a normal response to metabolize naturally occurring and man-made chemicals in their environment. Barbituates, such as pentobarbital, are especially efficient at causing the liver to produce these enzymes. In dogs, the most sensitive biological response to pentobarbital is an increase in the production of cytochrome

P450 enzymes, which is why the scientists chose that as the best indicator of biological effect. If a low level of pentobarbital did not cause a dog to produce additional cytochrome P450 enzymes, then scientists could assume that the pentobarbital at that low level had no significant effect on the dog.

In CVM's study, experimental animals were each dosed orally with either 50, 150, or 500 micrograms pentobarbital/day for eight weeks. The results were compared with control animals, which were not exposed to pentobarbital.

Several significant pentobarbital-associated effects were identified in this study:

1. Dogs that received 150 and 500 micrograms pentobarbital once daily for eight weeks had statistically higher liver weights (relative to their bodyweights) than the animals in the control groups. Increased liver weights are associated with the increased production by the liver of cytochrome P450 enzymes;

2. An analysis showed that the activity of at least three liver enzymes was statistically greater than that of the controls at doses of approximately 200 micrograms pentobarbital per day or greater.

But researchers found no statistical differences in relative liver weight or liver enzyme activity between the group receiving 50 micrograms pentobarbital per day and the controls. Based on the data from this study, CVM scientists were able to determine that the no-observable-effect level – which is the highest dose at which no effects of treatment were found – for pentobarbital was 50 micrograms of pentobarbital per day.

Adverse health effects unlikely

For the purposes of CVM's assessment the scientists assumed that at most, dogs would be exposed to no more than 4 micrograms/kilogram body weight/day based on the highest level of pentobarbital found in the survey of dog foods. In reality, dogs are not likely to consume that much. The high number was based on the assumption that the smallest dogs would eat dog food containing the greatest amount of pentobarbital detected in the survey of commercial pet foods-- 32 parts per billion.

However, to get to the exposure level of 50 micrograms of pentobarbital per day, which is the highest level at which no biological response was seen, a dog would have to consume between 5 to 10 micrograms of pentobarbital per kilogram of body weight. But the most any dog would consume, based on the survey results, was 4 micrograms pentobarbital per kilogram of body weight per day.

It should be emphasized that induction of cytochrome P450 enzymes is a normal response to many substances that are naturally found in foods. It is not an indication of harm, but was selected as the most sensitive indicator to detect any biological effect due to pentobarbital.

Thus, the results of the assessment led CVM to conclude that it is highly unlikely a dog consuming dry dog food will experience any adverse effects from exposures to the low levels of pentobarbital found in CVM's dog food surveys.

Appendix

EXHIBIT "EE"

CommonDreams.org
NEWSCENTER
Breaking News & Views for the Progressive Community

Our Readers' Most Forwarded Article of the Week
Cheney Is Wrong About Me, Wrong About War
by George S. McGovern

Published on Sunday, January 6, 2002 in the Los Angeles Times

Outcry Over Pets in Pet Food

The practice of boiling down euthanized dogs and cats for industrial fat and protein causes an uproar in St. Louis

by Stephanie Simon

ST. LOUIS -- It started with footage of Blacky and Scoop, melt-your-heart dogs with no one to claim them, alone at the city pound--and due to be put to death within hours. "No one wants them. Alive, that is," the reporter said.

The film then cut to a rendering plant that boils down the city's euthanized dogs, along with dead pigs and cows from local farms and leftover bones, hooves and innards from slaughterhouses. The end products are used to make cosmetics and fertilizer, gelatin and poultry feed, pharmaceuticals and pet food.

It was the pet food that got people. The report last month by KMOV-TV's Jamie Allman--headlined "What's Getting Into Your Pets"--suggested that dead dogs and cats from local shelters were ending up in kibble. As proof, Allman aired footage of a tanker truck entering the rendering plant, a truck emblazoned with the motto "Serving the Pet Food Industry."

Pet owners went nuts.

Thousands turned to KMOV's online polls to register their disgust. Scores more called animal control departments to demand an end to the practice. The St. Louis Post-Dispatch ran a cartoon showing a mangled collar poking out of a bowl of dog food. "It was unbelievable, the amount of reaction we got," Allman said.

Also See:
The Dark Side of Recycling
by Keith Woods / Earth Island Journal - Fall 1990

Food not Fit for a Pet
by Wendell O. Belfield DVM / Earth Island Journal - Spring 1996

The Millstadt Rendering Co., a small family business that for decades had been taking the region's euthanized animals free, in what the owners thought was a public service, reeled in the face of so much rage. "A disaster for the industry," groaned Clifton Smith, a consultant to the firm. "There's too many people out there who think their pets are like children."

Hoping to free themselves from the public-relations fiasco, the rendering plant announced just before Christmas that it would stop accepting euthanized dogs and cats.

But the local animal shelters couldn't stop euthanizing. And so in counties and small towns throughout the region, animal carcasses began to pile up.

"We were taken flat-footed," said Chris Byrne, an animal control official in St. Louis County.

Every solution was pricey. Hauling the animals to the nearest industrial-scale crematory would cost the county more than $57,000 a year. Building a crematory

EXHIBIT "EE"

would cost up to $100,000. And there would be the contentious question of where to put it.

In the short term, with freezer space limited, the county has been forced to send its dead dogs and cats to a landfill. The city of St. Louis has taken the same route, arranging for a refrigerated trash truck to pick up the carcasses.

This makeshift solution has prompted still more concerns. If the landfills are not properly lined, the decaying corpses could leach into ground water. If they're not promptly covered, scavengers can pick off the dead dogs and cats. And, as some have pointed out, chucking Fido in a dump scarcely seems a more dignified end than cooking him in a vat with dead cows.

It's a conundrum for animal control officers like Richard Steveson, who has to find a way to dispose of up to 3,500 animals a year in St. Louis. "I like for everything to be done as humanely as possible, even though the animal has already expired," Steveson said. But, given the alternatives, he figures rendering was as good a method as any. He didn't know that the rendered material could end up in pet food, he said. "But even if I had, I don't know what I would have done about it."

Lost in all the emotion have been the facts about rendering--and about pet food.

Rendering has long been considered one of the most environmentally friendly ways to dispose of animal carcasses, because it recycles them into useful fat and protein. By far the bulk of rendered material comes from slaughterhouses. But some plants also mix in road kill, the trimmings from supermarket delis, dead farm animals and euthanized pets from shelters. Los Angeles city and county shelters send more than 120,000 dead dogs and cats to be rendered in a typical year.

Members of The Pet Food Institute, who make 95% of the dog and cat food sold in the United States, use rendered material from livestock in their chow. But they insist there are no ground up pets in their pet food.

"It's a matter of good business," spokesman Stephen Payne said. "We've decided that if this is upsetting to people--and it clearly is--we should take extraordinary measures to make sure it never happens."

Still, it is not illegal to use rendered material from dogs and cats in pet food. And while no one keeps official figures, there's some evidence it happens.

The Food and Drug Administration has found "very, very low levels" of sodium pentobarbital--the chemical used to euthanize animals--in some brands of dog food, said Stephen Sundloff, director of the FDA's Center for Veterinary Medicine. The agency is investigating whether the traces are "of any significance at all," Sundloff said.

Overall, experts see little health risk in rendered pets entering the animal (or human) food chain, because the high temperatures used in the process kill most agents of disease.

As for the Millstadt Rendering Co., its owners are trying to get back to business as usual.

They maintain that the TV report unfairly linked their product to pet food (the tanker truck with the pet industry logo, they say, was headed to a separate rendering plant that handles restaurant grease). Still, they acknowledge they have no idea where their product ends up. It's sold to brokers who sell it to manufacturers. The way they look at it, they don't need to know the details--and the public probably doesn't want to.

"We don't have anything to hide," Smith said, "but people really don't want to hear about rendering. It's an ugly thing."

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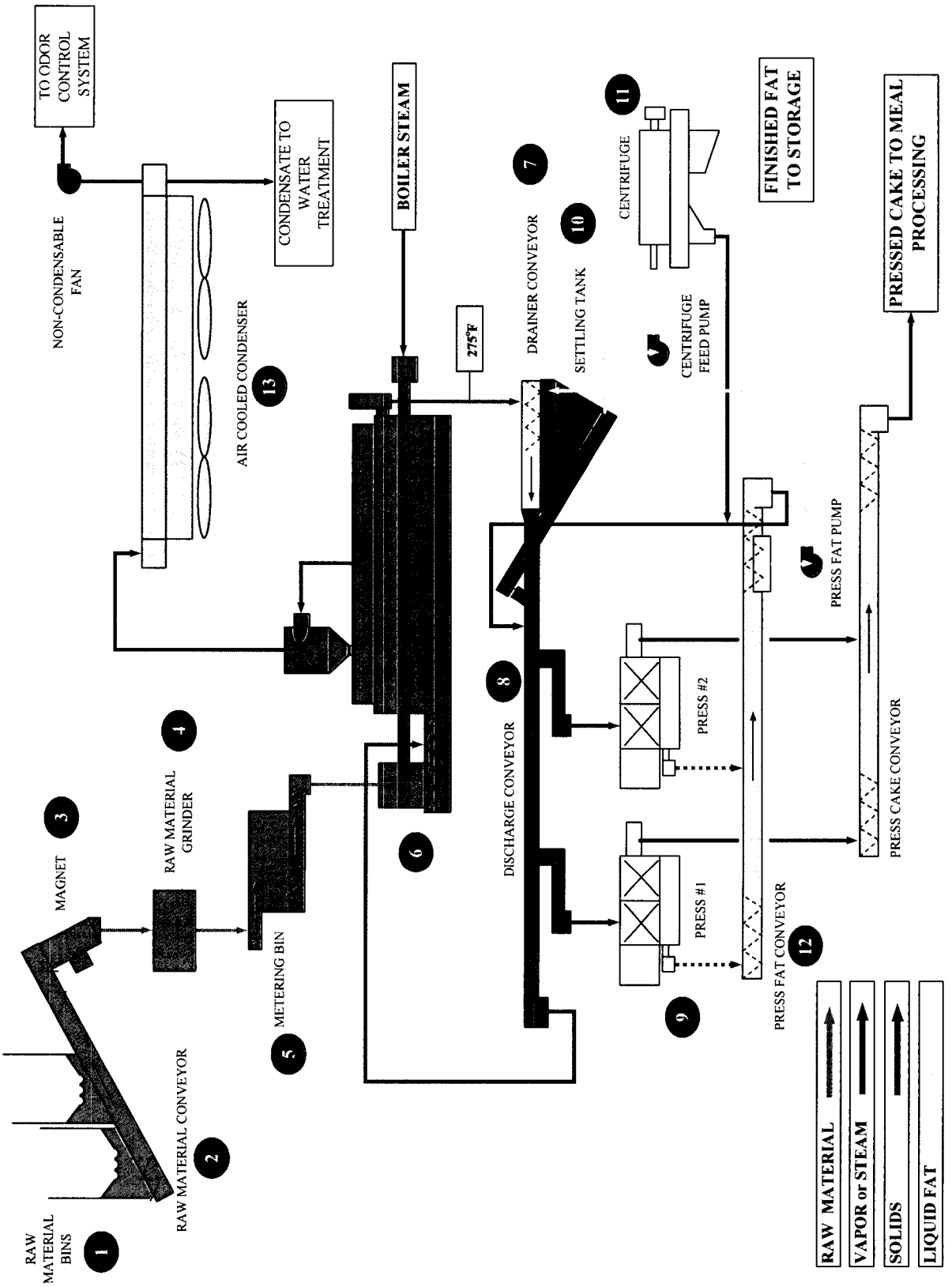
EXHIBIT "FF"



CONTINUOUS SYSTEM

EXHIBIT "FF"

DESCRIPTION OF A CONTINUOUS RENDERING SYSTEM

Material to be rendered is received for temporary storage in Raw Material Bins (**1**). Raw material is conveyed from the bins by a Raw Material Conveyor (**2**) and discharged across a Magnet (**3**) to remove ferrous metal contaminants.

A Raw Material Grinder (**4**) then reduces the raw material to a uniform particle size for material handling and improved heat transfer in the cooking step.

The ground raw material is fed at a controlled rate from a Metering Bin (**5**) into a Continuous Cooker (**6**). The Continuous Cooker is an agitated vessel generally heated by boiler steam. It brings the raw material to a temperature between 250°F and 280°F, evaporating moisture and freeing fat from protein and bone.

A dehydrated slurry of fat and solids is discharged from the Continuous Cooker at a controlled rate. The discharged slurry is transported to a Drainer Conveyor (**7**). The Drainer Conveyor separates liquid fat from the solids, which are then conveyed from the Drainer Conveyor by a Discharge Conveyor (**8**). In the Discharge Conveyor, solids from the Drainer Conveyor are combined with the solids discharge from the Settling Tank (**10**) and from the decanter-type Centrifuge (**11**).

The solids from the Discharge Conveyor go to the Screw Presses (**9**), which reduce the solids' fat content to about 10 to 12 percent. Solids that bypass the Screw Presses are recycled back to the Cooker. Solids discharged from the Screw Presses in the form of Pressed Cake go to the Pressed Cake Conveyor for transport to further processing into meal. The fat removed in the Screw Presses goes to the Press Fat Conveyor (**12**), which separates large particles from the liquid fat and returns them to the Discharge Conveyor. The fat from the Press Fat Conveyor is pumped to the Settling Tank (**10**).

Fat discharged from the Drainer Conveyor (**7**) goes into the Settling Tank (**10**). In the Settling Tank the heavier bone and protein particles settle to the bottom, where they are discharged by screw conveyor into the Discharge Conveyor (**8**).

Liquid fat from the Settling Tank is pumped to the Centrifuge (**11**), which removes residual solid impurities from the fat. The solids from the Centrifuge go to the Discharge Conveyor (**8**). The clarified fat is transported to further processing or to storage as finished fat.

Water vapor exits the Continuous Cooker (**6**) through a vapor duct system that generally includes an entrainment trap to separate and return entrained particles to the Continuous Cooker. The vapor duct system transports the vapor stream to an Air Cooled Condenser (**13**), which condenses the water vapor. (Other forms of condensers, such as direct contact or indirect shell and tube units, may also be used.) Non-condensable gases are removed from the Condenser by a non-condensable fan.

Odorous gases generated at various points in the process are collected by a ductwork system and are transported along with the non-condensable gases from the Condenser to an Odor Control System (not shown) for neutralization of odorous components.

EXHIBIT "GG"

Director, Division of Compliance, HFV-230
Office of Surveillance and Compliance,CVM

"Assignment to Collect and Analyze Domestic-Import Samples Suspected of PCB and Dioxin Contamination"

CVM Assignment # VA9-DXN
ORA Clearance # 19960621

ALL: RFDDs, DDs, DIBs, DCBs, and Lab Directors:

ASSIGNMENT MEMORANDUM-TOP PRIORITY

Top Priority, takes precedence over work of this and other Centers. This assignment has the concurrence of ORA, concurrence # 19960621

Objective

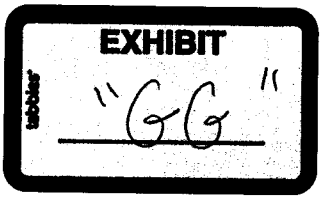
To collect and analyze animal feeds (medicated and non-medicated), feed ingredients, and pet foods to determine levels of polychlorinated biphenyl's (PCBs) and/or dioxins. To remove unsafe or violative product from consumer channels.

Background

FDA has received information that fat from a rendering company in Belgium was contaminated with dioxins and/or PCBs in January of 1999. This product was shipped to animal feed manufacturers and incorporated into animal feed distributed to poultry, hog and cattle farms in Belgium, France, and the Netherlands, with the majority of the product going to Belgium. Analysis of chickens and eggs in Belgium revealed PCBs and dioxins.

On June 4,1999 FDA issued an Import Bulletin to the field directing animal feed, and animal By-Products for animal food from France, Belgium and Netherlands; and egg-containing products, from Belgium offered for entry into the U.S. to be held at the port of entry. On June 11, 1999 FDA issued Import Alert 99-24 "Detention Without Physical Examination of Human Food Products and Animal Feeds Contaminated with Dioxin and/or PCB Compounds", [Attachment A].

CVM extended the import ban to all European countries (see Import Alert, Attachment A for a complete list) for animal feeds and pet foods because of the uncertainty on the extent of the contamination and the lack of measures to prevent exposed animals from being recycled into the feed supply. CVM is monitoring the situation in Europe daily and will update the field when more information becomes available.



Dioxins and PCBs persist in the environment. Any animals fed contaminated feed products and subsequently slaughtered may have levels of dioxins/PCBs remaining in slaughter by-products. These may be rendered and subsequently used in other animal feeds, allowing the dioxins/PCBs to continue to be recycled through the food chain. It is critical that human foods sampled and found to contain dioxin not be used for animal food. Any requests for reconditioning by this means must be sent to CVM for review.

SAMPLING

This assignment is requesting each district to accomplish the following:

1) Collect an official sample(s)of products in attachment C.

When at the firm, check to see if any of the products identified in attachment C as having been manufactured from the foreign manufacturer during 1999 are available. It may be advisable to first telephone the importer listed in attachment C to determine the actual location of the shipment.

The targeted products were selected from printouts of entries from January 1999 to about June 11 and focus on recently arrived large volume entries of high fat content feeds and pet foods.

Collect one product per consignee listed in Attachment C. In some cases multiple shipments for the same consignee are listed to provide the best chance the product will be available. Do not collect more than one sample per product from the same consignee. Where different products have been received by the same consignee, as identified on attachment C, collect one sample of each product.

Samples should not be split. Submit each sample to your district's servicing laboratory for PCB analysis. Do not send samples to another location unless specifically requested. The composite prepared by the field pesticide lab will be used for any subsequent dioxin analyses. CVM will determine which samples will go for necessary dioxin analysis after review of the PCB results.

2) If samples are not available at the firms listed in Attachment C:
If the firm has none of the product available, determine consignees where the product was shipped, shipping dates, quantity of product shipped and an estimate of the expected time the product would normally be available for sale. Record the lot number identified on the product distributed if available.

Districts should use discretion in attempting to follow-up at sub distribution points and issuing assignment for follow-up at sub-distribution point in foreign districts. For instance, consider the size and date of shipment and other pertinent information supplied by the referenced firm when considering the need to follow-up at consignees. Determine if the firm is expecting additional shipments of the product in the near future and when.

While the problem in Europe began in January of this year, it is likely that the consignees may not be able to identify specific codes and dates that the product was manufactured and/or received. Do the best you can.

3. If the firm can conclusively prove (through shipping records, etc.) that the product was manufactured and/or received prior to January 1999, or the product is not labeled as being of animal origin, or is a product of a country other than those listed in the Import Alert #99-24, do not sample. If no country of origin is labeled on the product, assume that the product origin is from the suspect country and collect an official sample.

Use the guidance in the IOM, Sample Schedule Chart 15, Veterinary Products, Feeds, & By-Products for Animal Feeds, for determining sample size.

Inform the firm management of the purpose of your visit and provide the firm with a copy of the FDA Talk Paper 99-27, "All Eggs and Egg-Containing Products From Belgium, France, and The Netherlands and Animal Feed from European Countries To Be Detained At Ports of Entry" (Attachment B), identifying the nature of dioxin/PCB problem in Europe. (Note - this attachment is a text file and needs to be printed out on FDA Talk Paper letterhead). Tell firm management that the samples are to be analyzed by FDA and that the removal of any product found to be violative is the responsibility of the firm. Ask firm management if they have any plans to recover distributed product or to hold sampled product. Report this information in the "Remarks" section of the collection report.

Ship samples for overnight delivery to your district's domestic pesticide servicing laboratory. Coordinate shipment with the lab especially for samples shipped on Thursdays or Fridays.