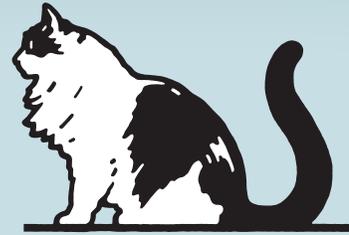


EMPYREAL® 75 UPDATE



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Clearing the Air on Corn

Bill Achor, Sales and Account Manager

We enjoyed a busy summer and fall travel schedule getting to talk with many of you in the industry on the benefits of Empyreal® 75 in your pet food formulations. We talked with old friends and made many new ones. We travelled to Super Zoo in Las Vegas for the first time with our booth. What an education! What was common in most of our discussions—whether it was with a groomer, a media publication or veterinary nutritionist—was the confusion centered on the use of grain, specifically corn, in premium pet food diets. Our conversations were, at most times, civil and informative and gave us hope that much of the industry—and even consumers—appreciate the value of corn in many premium pet food diets.

Our belief is that Empyreal 75 brings the best part of the corn to our consumer—the dog and cat! Finally something they can agree on. Everyone is tired of hearing about another pet food recall because someone wanted to cut corners. That's why we manufacture Empyreal 75 with only US sourced corn, grown within about 125 miles of our plant. We take the small portion of the endosperm and concentrate the protein without concentrating the impurities. Our patented process allows us to enzymatically remove almost all of the starch leaving only the best part of the corn behind the protein—with all the essential minerals, vitamins and antioxidants intact and ready to bring natural nutrition to your dog or cat formula. We don't use any chemicals or synthetic processing aids in our manufacturing process, which results in Empyreal 75 being pure protein. It is just that simple.

We had discussions about allergens and as many came to realize, corn does not even make the list of the Food and Drug Administration's (FDA) allergen list of ingredients of concern. So how did corn get so much bad press about causing allergic reactions to our four-footed friends? I am not sure, considering most

of the leading pet food brands contain some form of corn or grain product. It is unlikely that 85% of the companion animals eating those leading brands in the US suffer from allergic reactions due to consumption of corn or other grain products. If you are still worried, Empyreal 75 is gluten-free which might make some people happy.

Empyreal 75 is also rich in antioxidants. All those great things that dogs and cats can't spell like: lutein, zeaxanthin, cryptoxanthin and carotene. These are all Vitamin A building blocks that contribute to healthy skin and vision as well as support normal growth and development of your pet's immune system. Essential

"It is impossible for a man to learn what he thinks he already knows."

—Epictetus, Greek Philosopher

amino acids? Got those, too. No wonder it is a favorite among pet nutritionists.

So what if my dog or cat won't eat the stuff? We are not talking about ground-up brussels sprouts and broccoli here. Independent tests have shown that dogs like meat, "no kidding" but that Empyreal 75 did not impact their taste preference for a specific diet and amazingly, the more Empyreal 75 was included in the cat food, the more they liked it. Shiny bowl. Every time.

We understand that we did not convince everyone, but we did enjoy a few "high-fives" for our effort to shed some light on the fact that Empyreal 75 corn protein concentrate is for some, and it has the potential to become the pure protein pet food ingredient of choice.

Onward and Upward,
Bill



Each shipment of Empyreal® 75 is exactly like another. Same nutrient composition. Same texture. Same everything. Dependably pure, every time.

EMPYREAL®
75
dependably pure.

Protein in the Diet

Dr. Edward Moser, Veterinarian and Board Certified Nutritionist

The food industry, including pet food, has taken the terms “protein” and “amino acids” and turned them into marketing terms. Type in the phrases “pet food + protein” or “amino acids + pet food” into an Internet search engine and see what pops up. While there is some information about what protein and amino acids are and the role they play in the diet, most of the dialogue appears to be about what or whose protein and amino acid source is best for your pet. Everyone seems to have an opinion and a quick scan of the top 20 hits will tell you that not everyone agrees. What’s a person to believe? What is the truth? How do I make a decision?

Protein is one of six food fractions required by all animals. Fat, carbohydrate, minerals, vitamins and water make up the remaining requirements. All proteins are composed of amino acids. There are twenty amino acids commonly found as protein components. Ten of which have been shown to be essential for both dogs and cats:

In addition, the amino acid taurine is not incorporated into proteins but is found in the body as a free amino acid and is an essential nutrient for cats and conditionally essential for dogs. Conditionally essential meaning they are not ordinarily required in the food except during certain physiological or pathological conditions when they may not be synthesized in adequate amounts.

According to the 2006 National Research Council’s (NRC) *Nutrient Requirements of Dogs and Cats*, dietary protein is required for two reasons. First, dietary protein provides amino acids that dogs and cats cannot synthesize (these are known as essential amino acids) but are required for the synthesis of the proteins of the body. Second, dietary protein provides dispensable amino acids which supply nitrogen and carbon to support protein turnover.

Protein turnover is the ongoing process of protein catabolism and synthesis of new proteins. Adequate protein turnover is essential to maintain healthy metabolism and immune system; as well as to support lean body mass. It is sensitive to essential amino acids and total dietary protein intake and slows when intake is inadequate.

How much protein is desirable in the pet diet?

In general, dietary protein requirements depend on protein quality, protein digestibility, energy intake, dietary energy, protein ratio, prior nutritional status, age, growth rate, reproductive status, body weight and body condition score, and activity level. A key difference between the nutritional needs of cats and dogs is the quantitatively higher crude protein requirement for cats. This is because their amino acids catabolic enzymes function at a relatively high level of activity, regardless of protein intake. Therefore, consistent feeding of high protein diets is necessary to maintain normal health and condition of cats.

The 2009 Association of American Feed Control Officials (AAFCO) Dog and Cat Food Nutrient Profiles were designed to establish practical minimum and some maximum nutrient levels for dog and cat foods formulated from non-purified, commercially available ingredients. They address profiles for two categories: growth and reproduction (gestation/lactation) and maintenance. These levels differ from the values in NRC’s *Nutrient Requirements of Dogs and Cats*, which are based on experimental non-commercial type diets.

AAFCO has established that canine foods containing commonly used protein ingredients should contain at least 22% DM protein for growth/reproduction and 18% DM protein for adult maintenance. Growing kittens and adult cats have higher protein requirements than dogs. For cats the minimum percentages are 30% and 26% DM protein. (All presume a caloric density of 3500 kcal ME/kg.)

AAFCO recommendations are meant to be interpreted to be a daily allowance, not an absolute minimum but also not necessarily the optimal level for all life cycle situations, superimposed disease state or altered physiological condition. The protein content of commercially available pet foods varies from about 15% DM to over 60% DM. The ingredients used as protein sources also vary with diet moisture content, physical form and diet purpose.

In my next article I will discuss the role of protein in different life stages of the pet and the role of protein in several wellness related areas such as weight management, diabetes, food allergies and kidney disease.

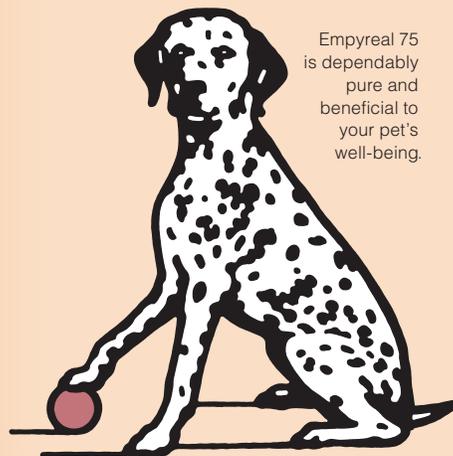
Market Commentary

Lee Bohling, Sales Manager Protein Ingredients

What words would you use to describe the futures market? Stressful, wild, confusing...I am sure people would use many colorful adjectives to express their views, but at least no one can say it is boring. From Nov. 9 -17 we have seen a trading range of \$.955 in corn, \$1.7275 in beans and \$45.10 in SBM. The recent sell-off has taken grains back down to where prices were in mid-October. Everyone has a different threshold for risk, and these kinds of markets will certainly test one's resolve. My bias is that grains will make another run to their highs as fundamentals have not changed, and those fundamentals will come into play later in the year. Once spring approaches, we will have an acreage battle as corn and beans will compete for space. In the interim, we will continue to have to deal with the global economic influences and the emotion that comes with them. Grains markets continue to react to global economic news. Talk of China battling inflation, and their intent to raise interest rates to slow down their economy and slow the rise of food prices, put grains in the recent tailspin.

It is important to stay disciplined during times like this and not let yourself get caught up in the emotion. The current sell-off in grains has given end users an opportunity to get coverage at levels that are considerably less than what we thought possible at the start of November. The technical traders wanted to go down and fill the gaps that were left at current levels when the market rallied around Oct. 8th. If you are in need of coverage in corn or SBM over the next six months, I would recommend getting some coverage at these levels. I still expect corn to go back into the \$5.75- \$6 range by spring and for beans to challenge the \$13 range also. Key resistance on March corn (CH) at \$5.75-5.80; March beans (SH) at \$12.50 and \$13 and Jan SBM(SMF) at \$341 and \$350.

Compared to other grains and proteins that have seen a lot of movement, Empyreal® 75 price has been very flat. We are projecting Empyreal 75 price to stay relatively stable over the next few months even with the large amount of volatility in the market as a whole. Please give us a call if you have any questions.



Empyreal 75 is dependably pure and beneficial to your pet's well-being.



Superior extrusion qualities, reduced drying costs and a range of other powerful, functional benefits will work near miracles on your production processes.

Going.



Going.



Gone.



Highly palatable. Highly digestible.
Empyreal 75 appeals to both dogs and cats.

From its design to its processing, Empyreal 75 is pure on purpose.



A consistent, natural source of high protein, but remarkably low in ash.

Who Knew?

Eric Bell, Product Line Manager

Wendy M. Sealey, Ph.D. Research Physiologist, US Fish and Wildlife Service, Bozeman Fish Technology Center

Empyreal[®] 75 is helping in the recovery of endangered species. Many of you may not know that in addition to pet food, Empyreal 75 is also widely used in the commercial aquaculture market. Fish nutrition researchers at Bozeman Fish Tech Center (BFTC), including Gibson Gaylord and Wendy Sealey (USFWS), and USDA Agricultural Research Service scientist Rick Barrows, utilize experience gained with a wide variety of fish species to address the general lack of nutritional information available for most endangered fish species. These researchers have examined a number of alternative ingredients, including Empyreal 75, with the goal of improving the understanding of both aquatic animal nutritional needs and a variety of ingredients that can supply them. Although much of the research to date examining the effects of alternative ingredients focuses on commercial aquaculture species, some less-studied threatened and endangered species (T&E) are also seeing the benefits of this research.

Last year Empyreal 75 was included in diet development work conducted for a variety of T&E species including Pallid sturgeon, June sucker and woundfin with good results. For example, Pallid sturgeon exhibited better growth rates in diets

low in fishmeal (~15%), with Empyreal 75 & chicken meal supplying the additional protein than in a high fishmeal diet (~47%). These species represent just some of the diversity of life histories observed for T&E species currently being brought into refuge and cultured in attempts to preserve and protect the species from extinction.



Pallid sturgeon

The potential benefits of an increased understanding of alternative ingredients to threatened and endangered species are obvious when you look at fish feeding at its most basic level. Most fish are opportunistic feeders and thus, in their natural environment, are able to obtain a variety of feedstuffs to meet their nutritional needs.

When fish are cultured in captivity, dependence on a limited number of feedstuffs increases the necessity of identifying and quantifying both the beneficial (nutrient) and problematic (non-nutrient and anti-nutrient) portions of those feedstuffs to maintain normal physiological function and minimize environmental effects. Thus, by an improved understanding not only of the basic biology of the fish species, but also dietary components in an increased number of ingredients, diets more suited for imperiled species can be developed. We are proud to be part of the solution.

Mycotoxin Research Update

Dr. Gene Peters, Principal Research Microbiologist

The 6th World Mycotoxin Forum was held November 8-10 in Noordwijkerhout, Netherlands. Experts from around the world converged to discuss various aspects on mycotoxins including analysis, detoxification, and regulation. Much progress has been made in the area of analysis of mycotoxins over the past few years, with significant focus on simultaneous detection of multiple mycotoxins and detection interferences. The science of mycotoxin detoxification is still emerging, and there is still significant need for development of solutions that are both highly effective at reducing mycotoxin levels as well as not affecting the nutritional value of the products. Additional needs to reach effective detoxification are detection, identification and determination of the toxicology of the breakdown products of the mycotoxins.

In our efforts to address these issues, we have expanded our team and invested in research focused on mycotoxin control strategies in the Empyreal[®] 75 process. Since the last mycotoxin update, we've added expertise in bio-, organic, and analytical chemistry to our multidisciplinary research team studying these challenges. Dr. Yumin Chen is a biochemist and joined our group in August of this year. Yumin is working full time on mycotoxin mitigation, currently exploring new ways to detoxify mycotoxins. Additionally, Dr. Xiangsheng Meng, an organic chemist, and Dr. Hadi Yehia, an analytical chemist, are devoting a significant part of their time contributing to the efforts in identifying mycotoxin controls.

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Biographies

Yumin Chen, Ph.D.

Yumin Chen graduated with a bachelor's degree from the department of food engineering, Shandong Institute of Light Industry, in 1996. In 1999 he received a M.S. from the Institute of Oceanology, Chinese Academy of Sciences, with research on the antioxidant activity of seaweed polyphenols. He continued studies on the antioxidant activity of polyphenols and their interactions with proteins at the department of chemistry and biochemistry, Miami University, and received his Ph.D. degree in 2004. From 2004 to 2007, he studied the cardiotoxicity of anticancer drugs as a postdoctoral fellow at the toxicology department of University of Kentucky. From 2007 to 2009, he studied the cardiotoxicity of polymeric gene delivery materials as a research scientist at the chemistry department of Virginia Tech. Prior to joining Cargill, he worked as a contract chemist at the Nutrition Division of Kraft Food, Inc.

Xiangsheng Meng, Ph.D.

Xiangsheng Meng is a Principal Research Scientist at Dayton R&D department in Cargill; he joined the Dayton team in April 2010. He previously worked at the Cargill R&D Department in Minneapolis for 16 years. Currently he is responsible for development and operation improvement of Corn Milling processes. Dr. Meng has focused on applying new technology to existing processes as well as exploring new products. Xiangsheng received his Ph.D. degree in organometallic chemistry from University of Notre Dame in 1990.

Hadi Yehia, Ph.D.

Hadi N. Yehia has been a Senior Research Scientist at Dayton R&D department in Cargill since October 2006. He is responsible for constant development and operation improvement of Corn Milling processes through discovering and applying new technologies. In 2003, Hadi received a M.S. in chemistry from the University of Texas at Dallas (UTD). In 2004, he joined United Technologies Research Center for one year of Industrial Practicum, where he worked on hydrogen fuel cell research. In 2006, he completed his thesis, "Single-walled carbon nanotube interactions with HeLa cells," at UTD and graduated with a Ph.D. in analytical chemistry.

Gene Peters, Ph.D.

Dr. Gene Peters is a Principle Research Scientist with Cargill, Inc. He received his Ph.D. in microbial physiology and genetics from the University of Iowa in 1996, studying the microbiology and chemistry of the corn wet milling process. After graduation, Gene joined Cargill as a post-doctoral scientist, and has since acquired 14 years of industrial experience in process microbiology and chemistry. Gene currently leads a team of scientists focusing on the molecular aspects of corn milling. One focus of this team is mycotoxin control in pet food and feed ingredients.

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Current research is focusing on reduction strategies for the mycotoxins deoxynivalenol (DON) and zearalenone (ZEA). Our team has investigated the effect of the Empyreal 75 process on minimizing DON levels in the product. Our research has produced exciting results, discovering that the Empyreal 75 process has the capability to decrease DON up to 88%, as compared to corn gluten meal (CGM) derived from similar contaminated protein-containing wet milling streams. Our team is now working to optimize the parameters in the Empyreal 75 process that makes the major contributions to this observed decrease and provide the technical capabilities that are critical in the event of a DON excursion.

Moreover, our team is studying ways to detoxify DON by changing its molecular structure either via a hydrolysis or

substitution reactions. We are currently engaged in laboratory scale experiments, gathering data to evaluate the feasibility of implementing these technologies on an industrial scale. Accurate, prompt analysis of DON is of vital importance to the success of our experiments and manufacture. Previously, we were using quick and sensitive ELISA and lateral flow assays. Now we have expanded the in-house capabilities for DON measurement with HPLC-based analysis.

For zearalenone, we have recently initiated work reviewing the current state of knowledge on detoxification of zearalenone, and analytical techniques available to quantify zearalenone, to serve as a launching point in our detoxification studies. As we make progress in this area, we will update in future newsletters.

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