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# NEWS from NEOGEN

**FOR THE MEAT INDUSTRY**

**NEOGEN CORPORATION**
**a Leader in Food and Animal Safety Solutions**

## Neogen launches breakthrough system for rapid genomic pathogen detection

Neogen launched the breakthrough NeoSEEK™ system for rapid genomic detection and identification of emerging pathogens.

Neogen has developed a breakthrough pathogen detection and identification technology that provides next day, DNA-specific test results for seven pathogenic *E. coli* strains. The technology could be adapted to target almost any bacterium of concern in almost any food sample type.

Neogen's new NeoSEEK™ pathogen DNA detection method for *E. coli* strains is the first food safety laboratory technology developed through the close collaboration of Neogen's food safety research group and the company's GeneSeek research team. Acquired by Neogen in April 2010, GeneSeek is considered the leading commercial agricultural genetics laboratory in the United States.

"The NeoSEEK food safety technology is exactly the type of technology we envisioned developing when we acquired GeneSeek," said James Herbert, Neogen's chairman and CEO. "GeneSeek has been very successful in employing DNA genotyping technology for animal applications. Food safety applications are natural extensions of that technology. As recent worldwide food recalls have clearly shown, regulators and the food industry need a rapid, DNA-definitive test for bacterial pathogens. NeoSEEK provides that DNA-definitive test result."

Initially, Neogen will provide next-day results from enriched samples through its GeneSeek laboratory facilities for seven *E. coli* strains — O26, O45, O103, O111, O121, O145, and O157. Like the better known and widely regulated *E. coli* O157:H7 strain, these other six *E. coli* strains are known food safety concerns, and produce Shiga toxins, which are well known to cause severe illness.

The NeoSEEK technology uses mass spectrometry-based multiplexing to develop a "DNA bar code" for bacteria in a food sample, and then compares those results with the known genetic makeup of the target *E. coli* strains to identify and differentiate the target strains. NeoSEEK assays a total of 71 independent genetic markers to detect and identify, which provides actionable results much sooner than conventional cultural methods. The extreme sensitivity of the method allows a limit of detection far more sensitive than existing rapid methods for the pathogens.



*Read about GeneSeek's partnership with researchers to combat* E. coli *on page 3*

The technology is expandable and customizable to include any bacteria for which a genetic profile can be developed, whether they be dangerous food-borne pathogens, or spoilage microorganisms that present food quality and shelf-life concerns.

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To contact Neogen, call 800/234-5333 (USA /Canada) or 517/372-9200 • E-mail: foodsafety@neogen.com
Web: www.neogen.com • Corporate Headquarters: 620 Lesher Place, Lansing, Michigan 48912 USA

# Mycotoxin Impacts on Animals

## Neogen chats with Dr. Chidozie Amuzie, DVM, Ph.D.

***Michigan State University Department of Pathobiology and Diagnostic Investigation***

*Neogen:* What types of mycotoxin research does your lab conduct?

*Dr. Amuzie:* We are conducting research on the use of biomarkers to indicate the effect of mycotoxins on animals. The most consistent indices of effect are cytokines—which are proteins that cells use to communicate with each other. We have seen an increase in cytokines from DON and others have reported similar changes with aflatoxin. Both mycotoxins have been associated with forms of growth reduction/growth faltering. We have determined that in growing mice, cytokine increase is associated with a growth deficit and reduction in circulating growth-associated proteins.

*Neogen:* Why is this research important?

*Dr. Amuzie:* Mycotoxins, specifically aflatoxin, have been shown to impair growth rates in humans as well as livestock. If we can get a better understanding of the effect pathway of mycotoxins and the relevant concentrations of concern, we will be better able to assess animal and human safety. Currently we don't have as much knowledge about the effect of mycotoxins in chronic low-dose levels. We understand what can happen at extreme levels but low to mid levels we really don't have a good understanding. We also don't have a good understanding of the effects of other mycotoxins that are present at the same time in low concentrations. For instance, in various research observations it has been evident that other mycotoxins were impacting animal performance even though DON levels were considered relatively low.

The use of biomarkers of effect will allow the industry to determine when mycotoxins become a concern as well as identify the current mycotoxin exposure. This information could then be used in an iterative fashion, to refine mycotoxin regulations/guidance and enhance animal and human safety.

*Neogen:* Have there been any studies on the new grain-based co-products and by-products that the feed industry is using, like DDGS?

*Dr. Amuzie:* A few years ago there was a lot of interest in studying DDGS for optimal feeding levels. I think the interest is still there. However, neither I nor anyone known to me are actively performing studies in this area.

*Neogen:* How does the concern about mycotoxins vary between underdeveloped countries and developed countries?

*Dr. Amuzie:* As I said before, aflatoxin and other mycotoxins have been shown to impair growth in humans and animals due to elevated cytokine levels. Growth "faltering" has been reported in African countries. My sense is that the human population in developing countries is at increased risk due to monotonous diets, poorer quality grains and inadequate food supply. In addition, the concern for mycotoxins in some developed countries is based on other factors, such as resorting to the lowest precautionary concern level. The perception of risk due to mycotoxins is inherently tied to sociopolitical and economic realities in developed countries. Since the science on mycotoxins is similar across countries, the regulatory differences across countries is, in my view, a reflection of risk perception/management differences. Unfortunately, these differences can and do create trade barriers.

*Dr. Chidozie Amuzie*

*Related Websites:*

- U.S. Wheat and Barley Scab Initiative, Fusarium Focus: *scabusa.org*
- U.S. National Library of Medicine: Research papers by Dr. Amuzie: *www.ncbi.nlm.nih.gov/pubmed?term=amuzie percent20cj*
- MSU Department of Microbiology & Molecular Genetics: *www.mmg.msu.edu/about-microbiology.html*
- Society of Toxicology newsletter: *www.toxicology.org/ai/pub/SP11/SP11.asp*

*Dr. Chidozie Amuzie is an instructor/resident in Michigan State University's Department of Pathobiology and Diagnostic Investigation. Dr. Amuzie earned a double major Ph.D. from Michigan State University in Comparative Medicine and Integrative Biology, and Environmental and Integrative Toxicological Sciences. He also received a DVM from the University of Nigeria. Dr. Amuzie is a member of the American Association for the Advancement of Science, Society of Toxicology, Society of Toxicologic Pathology, and African Society for Toxicological Sciences. Dr. Amuzie has the distinction of being awarded the 2009 McClellan Award for his research. Dr. Amuzie's extensive experience includes over 10 co-authored peer reviewed papers on mycotoxins as well as presentations at U.S. and Canadian Fusarium Head Blight Forum, California Animal Nutrition Conference and others.*

# GeneSeek partners with researchers to combat E. coli

Neogen's GeneSeek subsidiary is a participant in USDA-funded research that seeks to better understand the role cattle genetics may play in food contamination by the pathogen *E. coli* O157:H7. GeneSeek is considered the leading commercial agricultural genetics laboratory in the United States.

Researchers have shown that while some cows have no *E. coli* O157:H7 in their systems, others present a greater risk for beef contamination by shedding higher concentrations of the pathogen in their feces. The existence of the pathogen does not cause illness in cattle, but *E. coli* O157:H7 is a significant cause of foodborne illness in humans.

"Researchers believe that if genetic markers for 'supershedders' of *E. coli* O157:H7, or animals that do not carry the microorganism, can be established, genetic and breeding programs can be developed to help minimize the risk that the pathogen presents to consumers of beef products," said James Herbert, Neogen's chairman and CEO. "Since *E. coli* O157:H7 was first identified as a major health risk, now more than 20 years ago, risk mitigation has focused on improving the beef industry's processing practices and product testing. We may now have the tools to work with the beef industry to minimize the problem at the source."

The research is being conducted by University of Nebraska-Lincoln scientists, in partnership with USDA's Meat Animal Research Center in Clay Center, Neb., and Lincoln-based GeneSeek. GeneSeek will perform genotyping on the cattle genetic samples.

"While epidemiologically oriented approaches have provided extensive information about the transmission patterns of the organism, they have essentially failed to come up with meaningful and effective preharvest interventions that work in beef production," said University of Nebraska food microbiologist Andy Benson, who is heading the research team. "On the other hand, breeding strategies, which have heretofore never been considered as an approach, could be implemented as an intervention with potentially huge payoffs, ultimately reducing numbers of 'supershedders' that are released into feeding operations.

"Many producers are already using sophisticated approaches to manage their breeding programs," Benson continued. "For them, it would be yet another gene and another trait on their list of things they want to breed for or breed against."

# New member joins Neogen's team

*Dave Melton is the newest member of the meat, poultry and seafood sales team.*

Melton

*How has your transition been to the meat, poultry and seafood team?*

Learning about Neogen's vast array of product offerings has been an exciting but big undertaking. Luckily, I joined such a welcoming and knowledgeable team, and everyone has been helpful during my transition.

*What has been the biggest challenge for you?*

Neogen offers hundreds of products and learning about each test's capabilities, testing protocol and certifications has been a challenge. In spite of the challenge, it's great to work for a company that offers so many solutions for the people who produce everything from the burger I have for dinner to the eggs I eat for breakfast.

*What's your favorite part of the job and why?*

I get a lot of satisfaction from helping customers meet their goals. My goal is to make my customers' jobs easier and help them find the best solutions to fit their needs.

*How can Neogen's tests make your customers' jobs easier?*

Our customers face a lot of challenges, so they want testing methods that are simple to use, but they do not want to risk compromising the results. I have found they want to quickly ensure that the food they produce or import is safe so they can confidently send products out to their customers. That's why Neogen's rapid tests for foodborne pathogens and allergens are a perfect choice, since they quickly give you results you can rely on.

## Our Sales Team

Neogen's Meat, Poultry and Seafood sales group is backed by unparalleled teams of experienced technical support and research and development personnel, and we offer the most comprehensive line of food, feed and animal safety and quality testing products.

Please feel free to contact us at any time about anything that you may read in this publication, or about any safety and quality testing issue.

***800/234-5333*** *(USA/Canada)*

*www.neogen.com*

**John Heller**
*Sales Director*
jheller@neogen.com

**Rick Kanaby**
*Territory Manager*
rkanaby@neogen.com

**Jeremiah Kosto**
*Territory Manager*
jkosto@neogen.com

**Mike McMillan**
*Territory Manager*
mmcmillan@neogen.com

**Dave Melton**
*Inside Sales*
dmelton@neogen.com

**Nathan Smathers**
*Inside Sales*
nsmathers@neogen.com

**Lisa Shepard**
*Customer Service Rep*
lshepard@neogen.com

## Neogen reports 30% increase in net income in FY 2011

Neogen's net income for its 2011 fiscal year, which ended May 31, increased 30% from the previous year to $22,839,000. Net income in the fiscal year increased to $0.96 per share, compared to the prior year's $0.76 per share.

The fourth quarter was the 73rd consecutive profitable quarter from operations for the company, and the 77th quarter of the past 82 quarters to show increased revenues as compared with the previous year—including the last 25 quarters.

For the first time, Neogen's percentage of sales from international markets exceeded 42% of total revenues. Neogen's FY 2011 operating income increased 33% compared to the prior year to $35,835,000, or to 20.8% of revenues, compared with $26,879,000, or 19.1% of revenues in FY 2010.

Neogen Corporation: a Leader in Food Safety Solutions
620 Lesher Place • Lansing, MI 48912 USA

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