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merial Selections

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VALUE BEYOND THE LABEL

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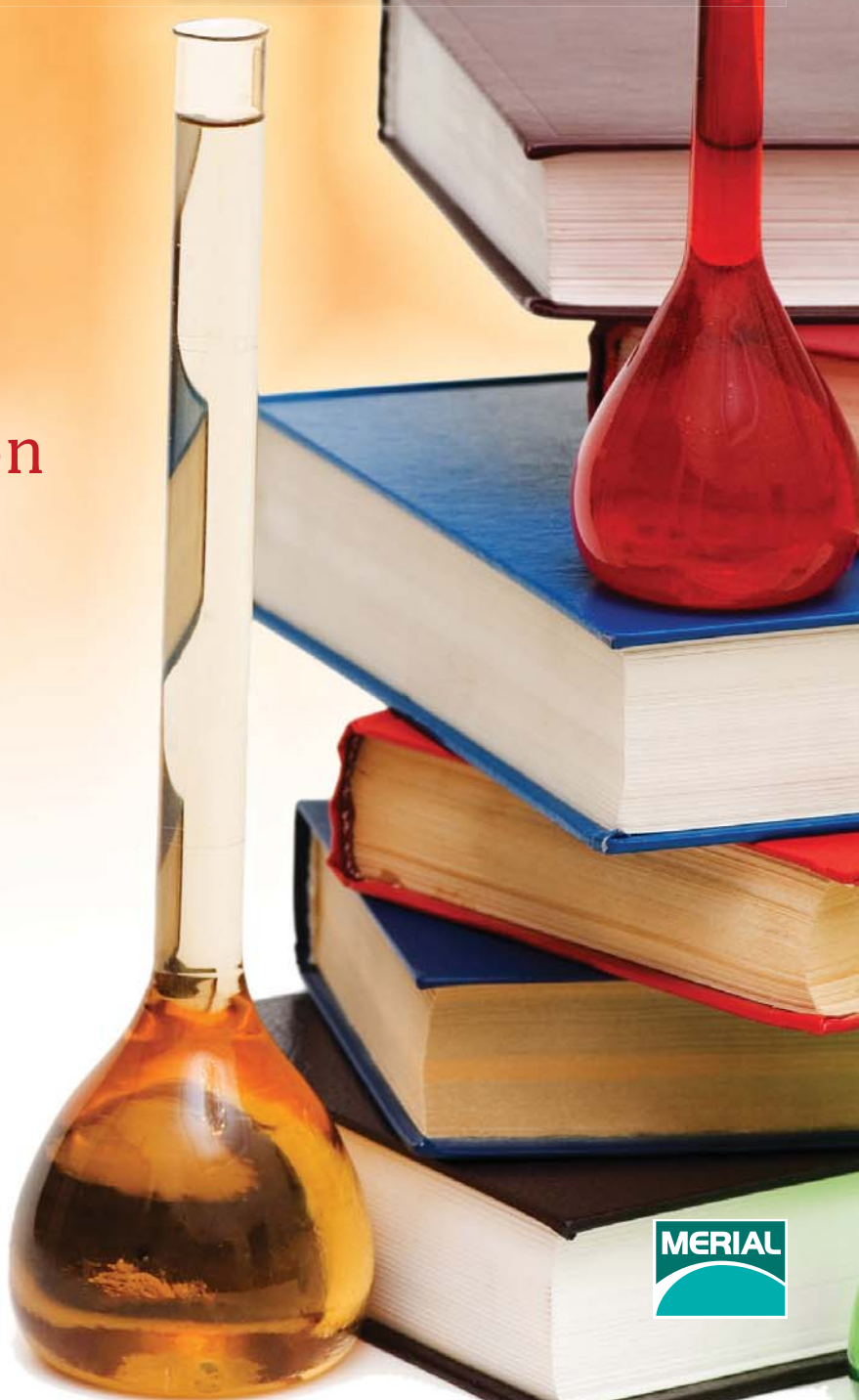

Also in this issue:

Guest columnist:
Dr. John Glisson

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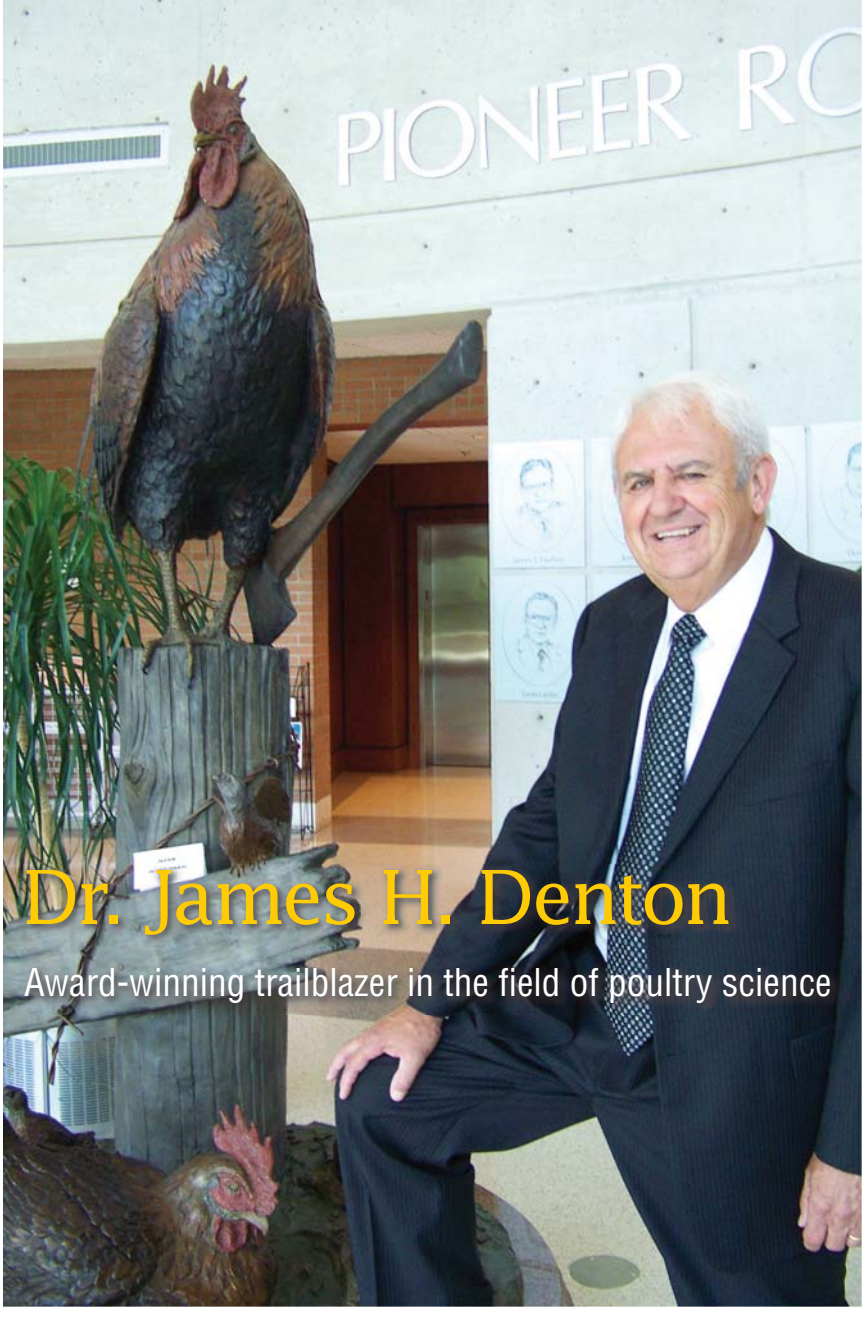

Dr. James H. Denton

Award-winning trailblazer in the field of poultry science

During his 30-plus year career, Dr. James H. Denton has participated in some of the most innovative, exciting and groundbreaking programs in the history of poultry science.

Dr. James H. Denton is Professor Emeritus of the Poultry Science Department, Center of Excellence for Poultry Science, University of Arkansas (UA). He not only taught and served as director of the UA Center of Excellence for Poultry Science – he was one of its founding fathers. Denton served as head of the Department of Poultry Science and director of the Center of Excellence for Poultry Science from 1992 to 2002.

During his time as director and department head, he provided oversight for the research, teaching and extension education programs of 26 center/department faculty members and six USDA scientists as well as 180 support staff.

Denton's *curriculum vitae* is one filled with excellence and accomplishment. In a career that spans more than three decades, Denton has participated in some of the most innovative, exciting and groundbreaking programs in the history of poultry science. His most recent honor, the Merial Distinguished Poultry Industry Career Award from the Poultry Science Association, underscores the value of his contributions to the science of poultry.

His recent Merial Award caps an extensive list of honors ranging from the American Egg Board Research Award in 1979 to induction into the American Poultry Historical Society Hall of Fame in 2007. He has served on the USDA National Advisory Committee for Meat and Poultry Inspection for four terms (1992-1994, 1999-2000, 2002-2004 and 2005-2007).

Denton has been Poultry Science Association representative on the board of directors for the International HACCP Alliance (1995-present).

His work in the area of poultry science has given him the opportunity to travel to China, India, Australia, New Zealand, Russia and various countries in Europe and South America. Future plans may include additional trips to South America.

However, Denton's global journey began with small first steps in a town in Texas, at a time when the poultry industry and the study of poultry was, as Denton says, "small and fragmented." He would be in the thick of things over the next few decades as the study of poultry health, genetics, processing and microbiology related to food

safety and nutrition developed at an unprecedented rate.

Upbringing on the farm

In 1946 Harry Truman was in the White House and there were no personal computers, no color TVs in living rooms, no microwave dinners and no gadgets requiring adapters or chargers.

It was the year when the James Stewart classic "It's a Wonderful Life" hit silver screens across the nation. By Denton's telling, the movie title speaks volumes about his own life.

Denton was born in Stephenville, Texas on Sept. 4, 1946. James and his brother, Johnny, were raised by their single mother and grew up on their grandparents' farm. While his mother worked for the gas company, Denton spent much of his time helping his grandparents. Denton says that he liked doing chores on the farm. "I liked going to milk the Jersey cows, feeding the horses and saddling the horses and working cattle," he says.

An upbringing on a farm allowed him to be outdoors a great deal of the time with animals. Denton reflects fondly on his youth. "I never thought of it as hard," he says. "We grew up surrounded by love. We never went hungry. We had everything we needed … everything was nice."

Denton got his first job at 11, delivering 119 newspapers a week from the back of his bicycle. He earned 10 cents per customer, per week. Denton used his weekly pay for school lunches and then gave the rest to his mom to help support the family. He did this for four years before landing a job at Safeway, where he says he began to appreciate the way goods were packaged, preserved and presented to families.

His work at Safeway had a deep impact on his life. As a teenager, Denton cared about families and about how they purchased and prepared food. He cared about how poultry was safely marketed for these families seeking a good, healthy meal at home. These concerns would lead to an exciting future.

College career

Denton spent two years at Tarleton State University, from 1965 to 1967, and then cast an eye ahead to Texas A&M University. While he excelled in math, he felt a calling to agriculture. Denton made an appointment in the Dean's office to discuss career opportunities. The Dean, Dr. R.C. Potts, recommended four fields for him to consider: agricultural engineering, veterinary medicine, the department of poultry science and agricultural journalism.

After careful thought and deliberation, Denton chose poultry science. This would give him opportunities to work with "living biological systems."

"(I made) fortunate decisions," Denton notes.

His family, at the time, wasn't so sure. "My grandparents, aunts and uncles wondered, 'Why do you have to major in poultry science?' " Denton said that they could not completely understand why he would want to study chickens in school.

Denton earned a Bachelor of Science degree in Poultry Science in 1970. He continued his studies at Texas A&M and earned a Master of Science degree in poultry products technology in 1972. It was evident rather quickly that Denton had picked the right field. While working on his master's degree Denton helped conduct a study comparing four different packaging systems. The study led to an innovative "freezer tunnel."

Dr. Charles Dill of dairy science said to Denton, "If ever I had a student that should go forward to

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Dr. Denton's recent Merial Award caps an extensive list of honors ranging from the American Egg Board Research Award in 1979 to induction into the American Poultry Historical Society Hall of Fame in 2007.

pursue a PhD, you are the one."

At the urging of his advisors, Denton went on to the PhD program at Texas A&M. "It was a great experience," Denton recalls. "(It was) more of a family than a department."

His mentors included Dr. C.B. Ryan, aka "Rooster." "He had a knack for making us feel we were the most important person in the classroom," Denton says. He earned his PhD in 1978 in poultry products technology.

Denton then came to a crossroads in his career. He could head into the commercial world or remain in academia; as it turns out, he discovered he could do both.

'Golden Age'

In 1977, Denton interviewed for a position with the Cooperative Extension Program at Texas A&M. He was hired in October, allowing him to work while finishing his dissertation. The mission of AgriLife Extension is "improving the lives of people, businesses and communities across Texas and beyond through high-quality, relevant education."

Denton says that the program offered him the opportunity to conduct research and put that research into practical application. He began to develop close contact with the people in the poultry industry, while addressing problems and issues of interest to the companies.

Denton had the best of both worlds. In the academic world, he could be involved with the latest research programs; in the commercial world, he could link scientific discoveries and development with practical application. "It was as rewarding as anything I'd done," he says. One of the greatest advantages was the "instant feedback."

By this time, Denton was serving as Acting Head of the Poultry Science Department and as the Associate Department Head - Extension Program Leader in the Department of Poultry Science at Texas A&M. In 1979, Denton received the American Egg Board Research Award. It would be among the first of many accolades throughout his career.

The course of Denton's remarkable career was replete with what he terms "Eureka moments" with his teams, flashes of insight culminating months, or sometimes years, of study and research. About five years into his career, Denton worked with the U.S. Department of Agriculture (USDA) and a project team from Texas A&M to investigate a food borne pathogen. *Incidence and Level of Campylobacter Jejuni in Broiler Processing* (1988), which he co-authored, evaluated the distribution and level of *Campylobacter jejuni* throughout broiler

In 1992, Dr. Denton became Department Head and Director of the newly created Center of Excellence for Poultry Science (CEPS).

processing. The study, Denton said, eventually led to helping the industry save hundreds of thousands of dollars a week.

Denton refers to this period of time as a "Golden Age," when breakthroughs and discoveries led to greater insight and application in the areas of nutrition, disease control and food safety. During this time, his reputation within the industry continued to grow.

By the beginning of the 1990s, he would be invited to the University of Arkansas on several occasions. Interested parties wanted him to start a poultry science school from the ground up. With characteristic civility, Denton paid a few visits to the Fayetteville campus "out of courtesy. I was honor-bound to look at Arkansas."

Building for the future

While the Arkansas opportunity remained a possibility, Denton continued his work at Texas A&M. During this period, he was also the coordinator for the Texas SafeFood Program, a comprehensive food safety education system based on HAACP principles. This program was one of the first comprehensive interdisciplinary programs in the U.S. Denton also served as the Chairman of the Southern Region Extension Service Food Safety and Quality Committee and was a participant in the National Cooperative Extension Food Safety Inspection Service Working Group.

Still, Arkansas beckoned. During his visits to the University, Denton liked what he saw: a vision of the future. The prospect of helping to start a school was intriguing. This was a chance to develop a first-class poultry center. He consulted with his wife and constant advisor, Shirley, and they were ready to go.

In 1992, Denton became Department Head and Director of the Center of Excellence for Poultry Science (CEPS).

"The Arkansas legislature and the Arkansas poultry industry worked hard to get Congress to approve a grant for the poultry center," Denton recalls.

Denton provided oversight for more than $30 million in new facility construction, primarily the 112,000-square-foot Tyson Building. Other facilities included a pilot processing plant, a poultry health lab, a poultry feed mill, an applied broiler research unit and a broiler breeder research unit.

A culture of kindness

Today, the center has 30 faculty members in various fields of study. These include five scientists from USDA-ARS and several associated faculty from different departments at the Fayetteville campus and from other campuses within the state of Arkansas.

In looking at today's students, Denton says, "They are much more sophisticated with electronic sources of education. They are also well traveled." One thing that remains true through time is simple, direct and quite human; "They are responsive to people who care about them."

While at the University, Denton worked to cultivate this sense of caring with barbecues and student get-togethers. He treated his students with the same kindness and respect he had received on his childhood farm, at Texas A&M, at UA and throughout his life.

Denton remains a busy man whose time is in high demand. "I still want to be involved where I can contribute," he says. **ms**

From Pasteur to Genomics

Past, Present and Future Control of Poultry Diseases

The use of modern science to control diseases in poultry was first applied by Louis Jean Pasteur (1822-1895), often called the "Father of Bacteriology" and the "Father of the Germ Theory." Pasteur made great contributions to the understanding of the role of bacteria, yeasts and fungi in causing food spoilage and producing disease. His research led to the first understanding of microbial fermentation and the role of microbes in the production of wine, beer, cheese and other fermented products. He demonstrated that liquids such as milk and wine could be preserved utilizing heat to kill all contaminating organisms. This process, later named pasteurization, became a standard method for prevention of food spoilage.

Dr. John R. Glisson

Perhaps Pasteur is most famous for his contributions to immunology and his development of some of the first vaccines for human diseases. His vaccines for rabies and anthrax brought him great acclaim during his lifetime and initiated global interest in disease control through the use of vaccination. Pasteur's work on immunization against rabies and anthrax was inspired by his earlier work on immunization against a chicken disease, fowl cholera. Pasteur had an interest in poultry and had isolated a bacterium from chickens which had died from fowl cholera. He found that if the bacteria were left for a few weeks in a laboratory culture that it lost its ability to kill chickens when the chickens were inoculated with the aged bacteria. He also found that the chickens that survived injection with the attenuated bacteria were protected against subsequent challenge by the virulent organism. These experiments represent the development and use of the first live bacterial vaccine for any disease in any animal. The bacteria that causes fowl cholera was later named Pasteurella in honor of this important discovery.

So what has changed since these early experiments in poultry disease control? Pasteur had only a microscope and crude bacteriology culture media to work with but today we have all of the biotechnology related to genomics and proteomics and highly advanced forms of microscopy. But immunization of poultry is still primarily based on the use of live attenuated organisms, naturally occurring organisms of low virulence, and inactivated pathogens in an adjuvant solution or emulsion. These products were developed using the classical bacteriology, virology, and immunology techniques. There have been some recent advances using live chemically-induced mutants, gene deletion mutants, and recombinant vaccines; however these products are few in number and limited in use. Why have products produced by modern biotechnology had limited use commercially? What factors have slowed the commercial success of the application of biotechnology in poultry vaccine production? What are the opportunities for vaccines produced using biotechnology? There are some important barriers to innovation but also some important opportunities for innovation.

One of the important barriers to innovation is the relatively low price of most poultry vaccines. Large poultry companies have used their immense purchasing power to drive down the price of many poultry vaccines through competitive purchasing. Many current vaccines are sold as generic commodities at a very low price. In general, poultry vaccines have become only marginally profitable compared to vaccines for other animal species. This practice has established a low price range for poultry vaccines and poultry companies resist buying new technology vaccines at an enhanced price.

Because poultry vaccines are not always highly profitable, large biologics manufacturers have had a tendency to shift product research funding toward development of more profitable novel products for companion animals, horses and livestock. This has occurred during a period of time during which government funding for poultry disease research has also declined. University research programs, which have been responsible for the development of many poultry vaccines, have declined because of the loss of government-sponsored research funds.

Many of the developed nations have large sophisticated poultry industries. The cost of labor in the developed nations has risen over the past two decades to the point that it is no longer financially feasible to manually inject vaccines into broiler chickens in the field. Vaccines which cannot be applied in the hatchery or by mass application in the field have limited use and consequently a limited market. This financial impediment has limited interest in development of new vaccines which must be injected in broilers.

As new molecular technology has been developed and applications of that technology have been adapted for vaccine production, the intellectual property rights to the use of the technology and its application have been widely patented. For example, the use of various vector systems for the development of recombinant vaccines is tightly controlled by patents.

Potential commercial products have been developed which may never reach the market because of potential patent infringement issues. Biologics manufacturers and university research programs are forced to avoid research areas which are already controlled by patents. This has significantly limited the investment in vaccine development.

Today much of the poultry vaccine market is controlled by large multinational biologics firms. These companies market products globally and seek to develop new products which can be marketed worldwide. This marketing trend has affected vaccine development priorities. New products which can potentially be marketed globally are typically given a much higher priority for research funding than products which have only a potential regional market. Therefore, new products designed to provide protection against relatively minor diseases or diseases with a restricted geographic distribution are not of the highest priority for development.

Although there are significant barriers to innovation there are also great opportunities for innovation. There is a significant need for novel products specifically designed to induce mucosal or local immunity in the respiratory tract and intestinal tract. Many of the most important disease problems facing the poultry industry involve pathogens which invade through or damage the respiratory mucosa. Examples are avian mycoplasmosis and infectious bronchitis virus. Likewise, viral and bacterial infections of the intestinal tract are becoming much more important in poultry health. Food safety concerns, such as salmonella and campylobacter, also involve colonization of the intestinal tract. Basic research is needed that will provide a better understanding of mucosal and local immunity in birds so that products can be developed to improve our ability to induce specific immunity to protect the respiratory and intestinal tracts.

The poultry industry relies on traditional modified live vaccines to induce protection against many diseases, such as Newcastle disease, infectious bronchitis and infectious laryngotracheitis. These types of vaccines can induce significant vaccine reactions and initiate complicated chronic respiratory disease in vaccinated birds. Antibiotics have been less available for use in many countries and therefore chronic respiratory disease has become more difficult to treat effectively. Recombinant vaccines show the potential for successful immunization without damaging the respiratory tract. Wider use and development of recombinant vaccines may significantly diminish the need for antibiotics.

In-ovo vaccination is becoming more common globally. This unique vaccine delivery system provides great potential for early induction of active immunity against several diseases. Several barriers have limited its use for vaccination against some diseases. Many live virus vaccines, such as Newcastle disease virus and infectious bronchitis virus, are lethal to the embryo and cannot be safely used in-ovo. Maternal antibody interference is a serious limitation to the effectiveness of some vaccines when used in-ovo. Also, little is known about the compatibility of mixtures of different vaccines when applied in-ovo. But in-ovo delivery of vaccines provides an important opportunity for new vaccine development and application. The herpesvirus recombinant vaccines are a good example of novel products that are well adapted to in-ovo delivery.

Many diseases have been traditionally controlled by antimicrobial usage. Examples are clostridial enteritis, colibacillosis, and coccidiosis. Mandated and voluntary reduction of antimicrobial usage in many countries has created a need for immunization approaches for controlling these diseases. There is a significant opportunity to develop and successfully market additional vaccines for these markets.

One of the major hurdles to successful immunization of young chicks is interference by maternal immunity. For example, aggressive immunization programs against Newcastle disease in broiler breeders interferes significantly with the early immunization of the broiler progeny. New products developed with modern biotechnology have not been able to completely overcome this important limitation, although the herpesvirus recombinants show some improvement over conventional products. Future products which can more effectively immunize chicks in the presence of maternal antibodies will find wide acceptance.

Basic research on the chicken genome is providing opportunities to enhance genetic resistance to particular diseases through genome based selection or direct genetic manipulation. Although this approach holds promise for improving the overall health of commercial poultry, it will not replace the need for effective products to immunize flocks.

There are many exciting opportunities for innovation in immunization approaches. The demise of antimicrobial usage has heightened the need for advancements in immunization technology. Biotechnology has had a limited impact so far, but holds great promise for the future. The barriers to innovation are significant but the opportunities are also tremendous. As it has done so many times in the past, the poultry industry and the vaccine industry will successfully position its efforts and investments to take advantage of the future opportunities. **ms**

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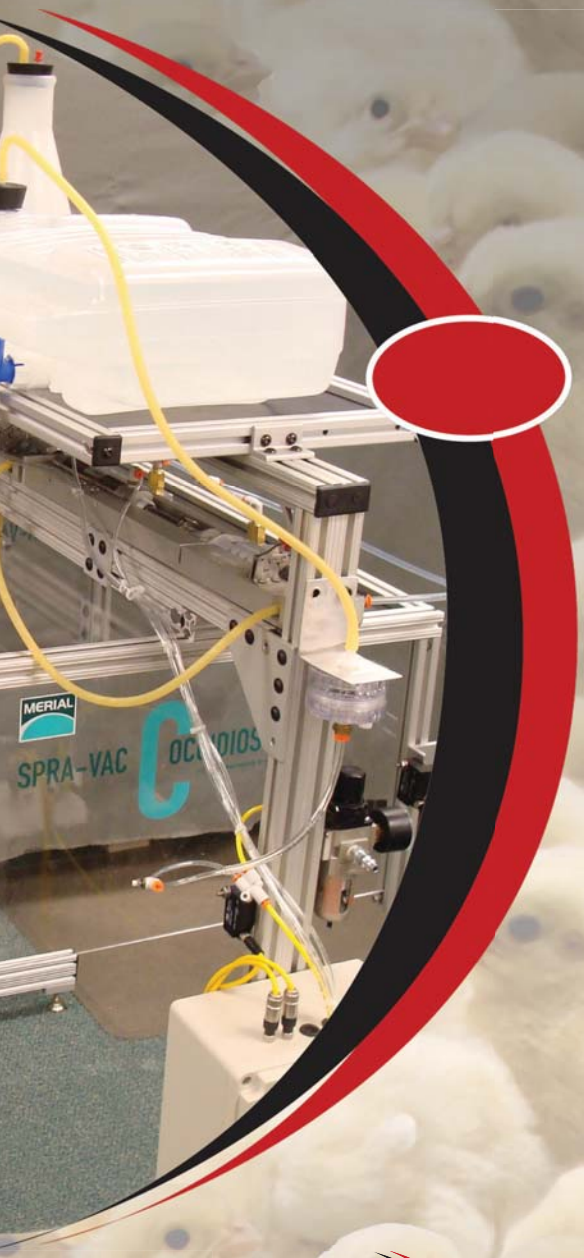

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