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50 YEARS 1962 - 2012

Poultry International

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In this month's magazine Jansen Poultry E

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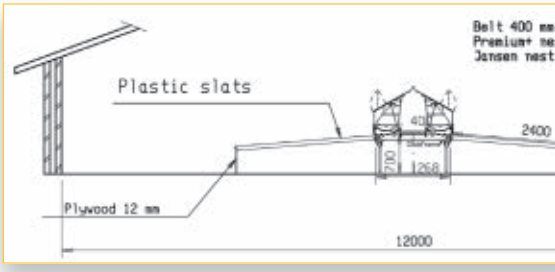

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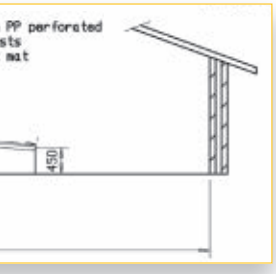

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23 – 25 September 2012
Beijing , China

Eurotier
13 – 16 November 2012
Hannover, Germany

These pages are just a brief summary of our solutions for the poultry industry. If we have not answered your question, please have a look at www.jpe.org, www.bromaxx.com or send an email to info@jpe.org and your question will be answered as soon as possible.

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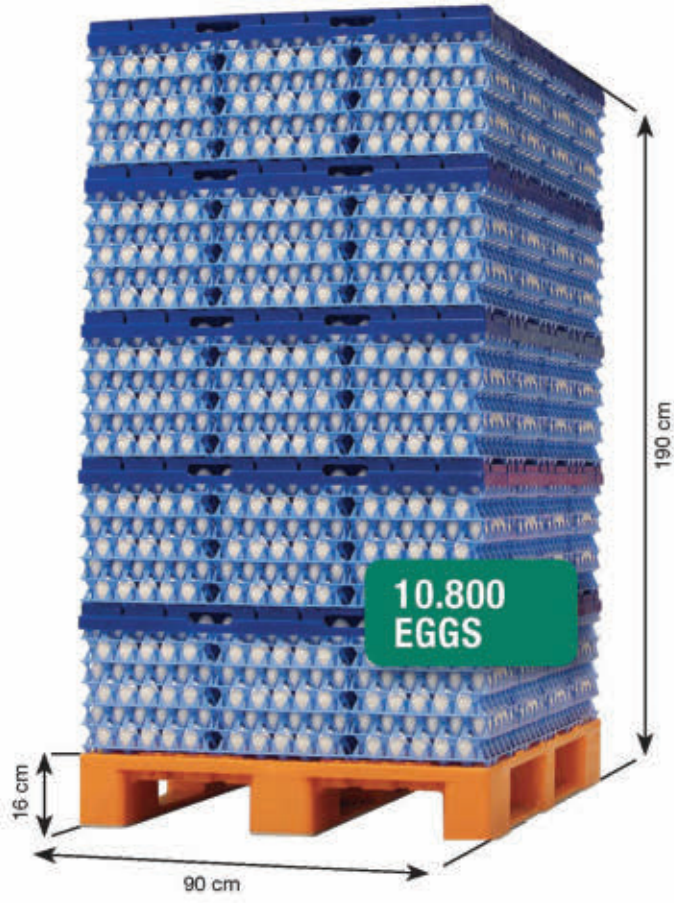
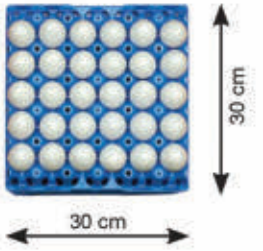
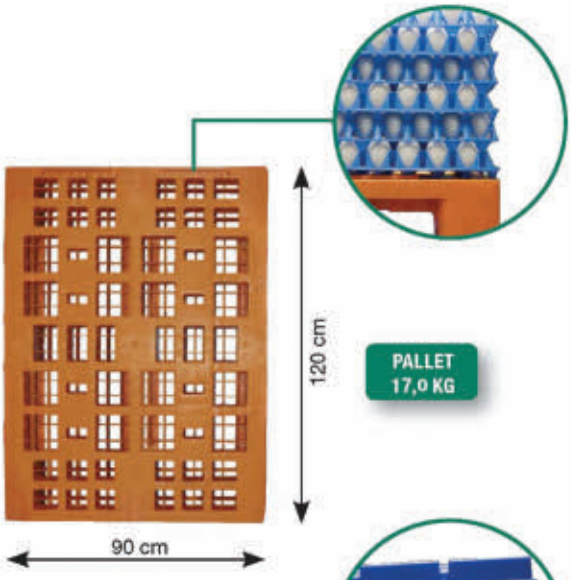




TRAY
145 GRAM



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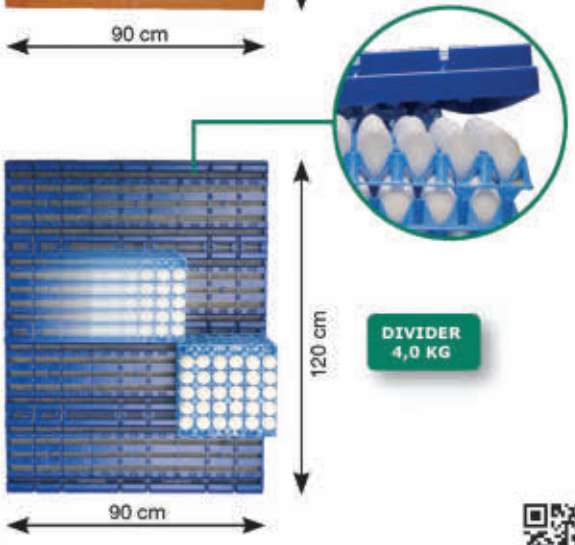

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Features

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WATTAgNet Exclusives

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Video: How agriculture can influence public opinion

Tom Dorr, CEO of the US Grains Council, explains what is needed for agriculture to get its message out to the public. A second opinion is offered by Sean Rickard, Cranfield University, UK. These remarks were made during the Alltech Summit.
www.WATTAgNet.com/151181.html

Video: A prediction about the future of agriculture

Sean Rickard, senior lecturer in business economics at Cranfield University, UK, offers some predictions about the future of agriculture at the close of the Smart Debate at the Alltech Summit.
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Editor's Comment

Mark Clements

Celebrating the poultry industry

There are many reasons for celebration this year. Of course, the Olympics will be held in London; for those Commonwealth countries 2012, it is a Jubilee year; *Poultry International* celebrates its 50th anniversary; and the World's Poultry Science Association celebrates its centenary.

We are fortunate enough to help share in that centenary, and in the July issue you will find an editorial from current World's Poultry Science Association president, Dr. Bob Pym. While the association may not have been around for as long as the domesticated chicken, it has certainly accompanied what we would call the modern poultry industry, helping to shape its development and disseminate best practice. Put simply, helping us all to have enough to eat.

Along with Dr. Pym's excellent article, past presidents have also shared their views on the importance of the World's Poultry Science Association and how it will adapt to future needs. I am delighted to extend my thanks to all who have contributed to this piece and allowed us to share in the celebrations.

Follow Mark Clements
as he gives the inside track on the global poultry industry in his weekly blog at
www.WATTAgNet.com/MarkClements.html

And talking of enough to eat, this issue of *Poultry International* carries the results of our annual Nutrition and Feed Survey. There is cause for celebration here too!

The survey has revealed increased optimism in the industry, with 46 percent of respondents saying that profitability this year will be higher than last year. While, of course, there are regional variations, and high input costs remain a challenge, the industry seems more hopeful in 2012 than it was 12 months ago.

So if things are looking up, that's a good reason to celebrate, and perhaps it is something that we all tend to do far too rarely. Recognizing our own achievements and those of others can act as a virtuous circle, instilling confidence, happiness or pride.

Whether it is recognition of something perhaps abstract and distant, for example that more hungry mouths have been fed this year, or something small and personal, such as making it to work on time in spite of a transport strike, it is good to recognize and celebrate achievement.

On a very personal note, whenever I eat out, if the service is particularly good, I always report it to the management. I sometimes report bad service too, but my thinking is whoever gave me that good service, if subsequently recognized by their manager, is likely to go home feeling good about themselves, and perhaps do an even better job the next day.

We can help to create these feelings in others, and we can help to create them in ourselves too if only we take the time.

Putting in that little bit of effort to recognize our own and the achievements of others is something that we should all do more often. □

EDITOR'S FOCUS - *a regular look at industry key players*

Nepluvi—the Association of Dutch Poultry Processing Industries

Founded in 1977, Nepluvi promotes the interests of the Dutch poultry processing industry in general and its members in particular. Members are specialized in the production, manufacturing and processing of poultry meat, and trade in live and slaughtered poultry.

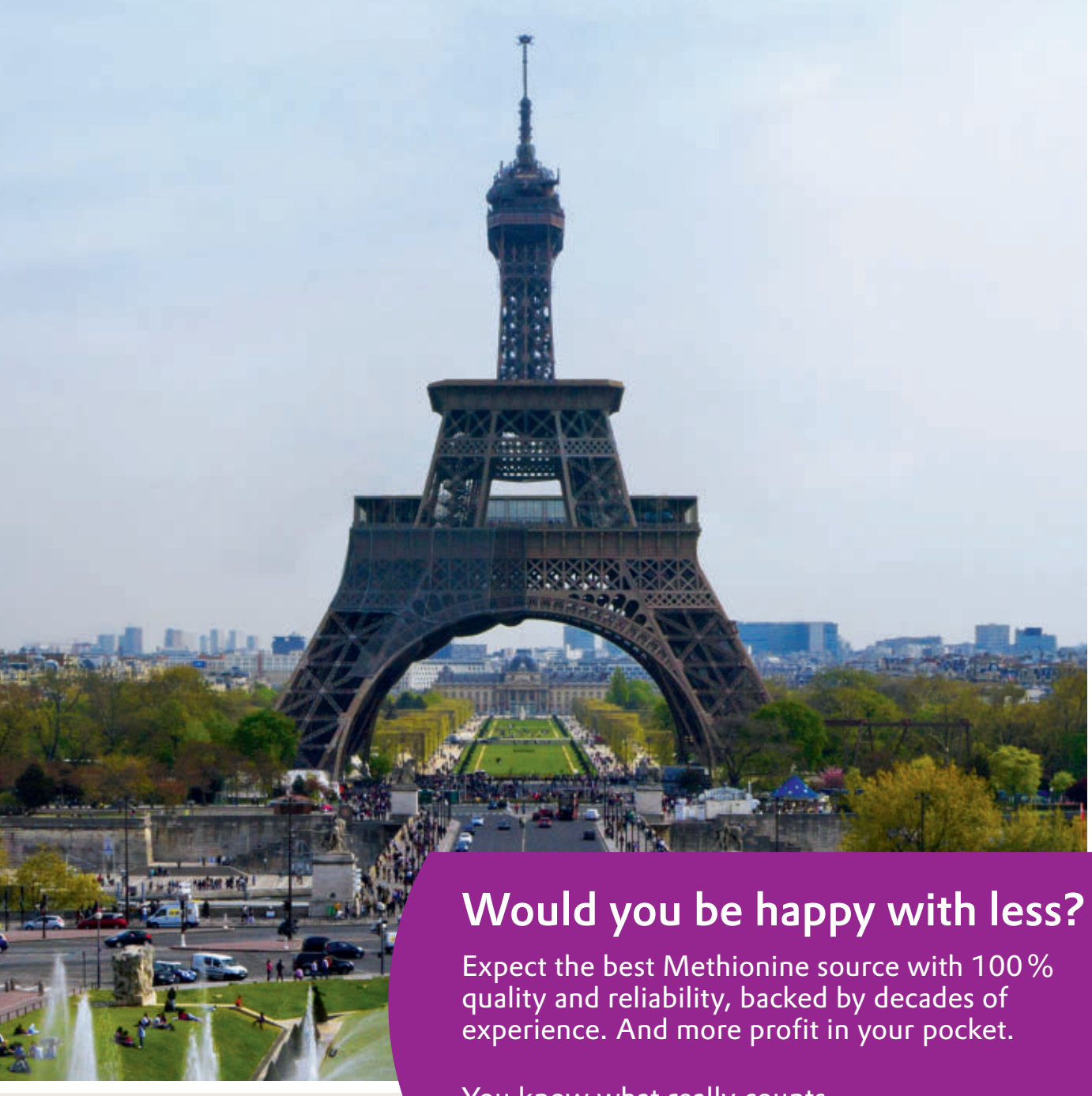
The secretariat of the association is based in Houten, and its general assembly meets once a year and appoints a president and board members. Nepluvi has 55 members active nationally and internationally. Members account for 90 percent of the poultry meat from the Netherlands, amounting to some Euro 2 billion (US$2.55 billion).

Nepluvi is active in veterinary issues, like quality assurance and inspection, health and welfare; legal issues, both legislative and advisory; social issues; corporate social responsibility; and economic issues. It collects and distributes market information, details of pricing policies and reports on the World Trade Organization and General Agreement on Tariffs and Trade.

Contact is maintained with the Dutch government, the European Union and organizations in other European member states.

The association is a member of the Association of Poultry Processors and Poultry Trade in the EU countries, AVEC, and the International Poultry Council.

For more information, visit: www.nepluvi.nl □



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Around the World

Mexico publishes Rule of the Federal Law on Animal Health

The Secretary of Agriculture, Livestock, Rural Development, Fisheries and Food of Mexico, Sagarpa, published the Rule of the Federal Law on Animal Health May 21 in the Diario Oficial de la Federación—Mexico's equivalent to the U.S. Federal Register.

The document outlines the standards expected for animal health, with the following sections specifically applying to the agriculture industry:

Section II, Chapter II explains good livestock practices in primary production units; Chapter III is about good livestock practices and manufacturing in Federal Inspection Type facilities. Section III clarifies the law concerning animal welfare, importation, exportation and international transit. Section VI, Chapter III is about certification, certification maintenance, inspection and verification of the Federal Inspection facilities.

To see the entire document, visit the website of the Diario Oficial de la Federación of Mexico.

Is Dutch poultry production the most environmentally friendly?

An Austrian and Dutch study has developed an enhancement to the commonly used life cycle assessment method for foods, and found that one kilogram of Dutch chicken has the lowest CO2 balance among animal products.

The study, conducted by the University of Vienna and the PBL Netherlands Environmental Assessment Agency, showed that the production of one kilogram of beef in Brazil produces 335 kilograms of CO2, which corresponds roughly to the emissions of driving an average European car for more than 1,600 kilometers. Production of Dutch chicken meat generates 6.2 kilograms of CO2, or 31 car kilometers.

The innovation is the integration into the calculations of the area used for production in addition to the emissions resulting from the production of food. Despite playing a central role for the climate, area use effects have been ignored in climate balances until now. Occupation of huge areas prevents natural vegetation from regrowing. This vegetation would absorb CO2 from the atmosphere in much the same way a sponge would and stabilize the world climate.

IN BRIEF

JBS reports first quarter net income for 2012: JBS SA reported a net income of R$116.1 million (US$58.2 million) for the first quarter of 2012, with net revenue increasing by 9.1 percent compared to the first quarter of 2011, according to the company's latest financial report.

Nova Scotia government investing $1 million in poultry processor: The Nova Scotia government is providing $1 million to Annapolis Valley poultry processor Eden Valley Poultry Inc. to help the company boost its productivity.

MHP reports 143 percent net income increase first quarter 2012: Ukraine-based agro-industrial company MHP S.A.'s net income increased by 143 percent for the first quarter of 2012, reaching US$48 million compared to US$20 million in the first quarter of 2011, according to the company's latest financial report.

Brazilian university opens poultry nutrition facilities: Brazil's Universidade Estadual de Londrina opened a new broiler nutrition house at the end of May.

Ukraine's Ovostar Union posts net profit first quarter 2012: Ukrainian egg and egg product producer Ovostar Union has posted a US$8.9 million net profit for the first quarter of 2012, a 62 percent increase over the same time in 2011, according to the company's latest financial report.

Keep up to date with industry news at www.WATTAgNet.com.

US egg prices, exports expected to rise in 2013

Better overall economic conditions in 2013 are expected to generate greater domestic demand for shell eggs and egg products, especially from the food service sector, according to the U.S. Department of Agriculture's latest report. However, higher production is expected to offset the demand and leave overall wholesale egg prices in 2013 at $1.00–$1.08 per dozen, only slightly higher than in 2012.

During the first quarter of 2012, the wholesale price in the New York market averaged $1.09 per dozen for Grade A large eggs. This is up almost 3 percent from the same time in 2011, in part due to the high prices at the beginning of the year carried over from strong fourth-quarter 2011 prices of $1.31 per dozen. Shell egg prices have fallen seasonally since the Easter holiday and second-quarter prices in the New York market are expected to average $0.91–$0.93 per dozen, down 14 percent from 2011, according to the USDA.

Exports of shell eggs and egg products are expected to expand to the equivalent of 266 million dozen in 2013, slightly higher than the forecast for 2012. Higher shipments in 2013 are expected to be generated primarily by stronger demand from a number of Asian countries, including Hong Kong, Japan and Korea. Egg exports in 2012 are expected to contract, with smaller shipments to Mexico and Canada. One factor that could affect the 2012 forecast is high demands for breaking eggs and egg products from EU countries facing lower production.

In the first quarter of 2012, egg and egg product exports totaled 63 million dozen, down 6 percent from the same time in 2011. Much of the export decrease occurred in March, when shipments were down 13 percent from 2011 numbers. The March decline is chiefly the result of sharp drops in shipments to both Korea and the United Arab Emirates, according to the USDA. Shipments to Korea during the first quarter of 2012 were only 1.1 million dozen, down 88 percent from the same period in 2011.

For more egg information and statistics, see www.wattagnet.com/marketdata.html.

UK Campylobacter breakthrough could benefit poultry industry

The question of why selenium is important for the survival of *Campylobacter* has been answered by researchers at the UK's Institute of Food Research, and the discovery could help in ways to control the bacteria in the poultry industry and improve public health.

Campylobacter uses the organic acids produced by other bacteria in the gut to respire and thrive. It needs selenium to make the formate dehydrogenase enzyme for respiration. Researchers have identified two *Campylobacter* genes required for the formation of the formate dehydrogenase enzyme, but when the bacteria were supplemented with extra selenium, they were able to synthesize the enzyme again, suggesting that the two genes are involved in selenium metabolism. It has already been shown that the lack of formate dehydrogenase affects the ability of *Campylobacter* to colonize the chicken gut, and this latest breakthrough may open up possibilities to target this pathway for antimicrobial purposes.

In addition, as these selenium metabolism genes and the formate dehydrogenase enzyme are also present in other foodborne pathogens, it may be possible to extend such investigations to other areas of food safety. "Selenium metabolism is still poorly understood in bacteria, and its role in important foodborne pathogens such as *Campylobacter* is not yet fully appreciated," said Dr. Arnoud van Vliet, who led the research group. "With the identification of these two genes essential for formate respiration, we now hope to have a tool to generate knowledge that helps us get a better understanding of what makes *Campylobacter* so good at colonizing the chicken gut and causing disease in humans."

Kathmandu chicken consumption down 33 percent due to strikes

Chicken consumption in Kathmandu, Nepal has dropped 33 percent as strikes have forced major consumers like restaurants and hotels to shut down, according to reports.

Daily consumption of chicken is currently at 250,000 kilograms; restaurants and hotels consume roughly 40 percent of the capital city's chicken. "Demand from major markets has slowed due to banda and other forms of strikes called by various groups over the past few days," said Jung Bahadur JC, president of the National Chicken Sellers' Association. "If the situation remained the same for coming few days, farmers will have no option but to dump their chicken ready for market."

Area poultry farmers are also expressing worries about their feed supplies, said JC, as the strikes have disrupted supply lines and some farmers are already experiencing shortages.

Genetic imprinting has potential to improve nutritional efficiency of meat

The revolution in genetics research in the past 10 years — specifically nutrigenomics or the study of the effects of foods and food constituents on gene expression — has the potential to make a tremendous impact on the future of meat production.

"We have discovered that environmental influence turns on and turns off genes in animals. This has been found in animals, humans and multiple tests," explained Dr. Karl Dawson.

Dr. Karl Dawson, Alltech vice president and chief scientific officer of research, said at the opening session of Alltech's 28th Annual International Symposium that while "we have always paid attention to genetics in the meat production industry, we have only used genetics to breed for improved productivity." The relatively new science of nutrigentics will allow meat producers to increase productivity and quality through the proper application of nutrition at specific stages in the animal's development.

In the last five years, researchers have discovered that what the mother is fed during pregnancy impacts the genomic outcome of the animal. "We have discovered that environmental influence turns on and turns off genes in animals. This has been found in animals, humans and multiple tests," explained Dawson. "There is a lifelong alteration in physiology associated with nutrition."

In the poultry industry, trials have been done using early stage nutrition that controls the feeding in the first 96 hours for the conditioning of birds' gene expression. Dawson says the early imprinted birds have totally different gene expression patterns than the control group.

"This makes permanent changes in what a bird is capable of doing," says Dawson. "This is not a genetic change, but an epigenomic change. We have imprinted the animal to improve the nutritional efficiency of the animal, and we are doing it all naturally, without drugs or hormones."

The nutritional revolution

Alltech then looked at what the food industry wants in chicken and beef and has developed feeding programs that will help deliver those characteristics in the finished product.

"We can significantly improve beef quality with improved tenderness and lower fat," said Dawson. "We can produce beef that is comparable to top-notch prime steak, but with the benefits of less fat, less shrinkage and less cooking loss."

Dawson said this all-natural feeding program reduces the pharmacological requirements that the industry has used in the past.

"Animal nutrition has changed in the last five years," said Dawson. "Nutritional programming is the true nutritional revolution."

UK poultry, egg consumers adjusting to economic challenges

The UK market for poultry meat and eggs has not been immune to ongoing economic difficulties in the country, including a decline in national sales of poultry breast meat, according to British Poultry Council chairman John Reed, who spoke at the 2012 British Pig and Poultry Fair.

Shoppers in the UK are switching to more dark meat and whole birds, due at least in part to their need to economize by cooking more meals at home instead of eating out, said Reed. The trend is likely to continue as consumers choose more value or standard products rather than paying extra for standard-plus, organic or free range.

Bird size at slaughter is also altering in response to the weak market. Several years of increasing broiler weights in the UK ended with the first economic crisis in 2007 and, since then, the average weight of bird marketed has declined. The reasons are thought to be due to cutbacks in consumer spending, a national increase in the number of single-person households and the demands coming from fast-food companies to supply them with a highly weight-specified raw material, according to Reed.

Demand for free-range eggs in the UK has collapsed, new data suggest. According to the latest figures on retail sales, for the first time in years the share of free range has dropped to below half the total market. Some 5 percent have been lost in the last year alone, with free range's share of sales standing at 53 percent as recently as May 2011.

The reason is price, says the chief executive of Europe's largest egg business, Peter Thornton, who addressed a discussion on the UK poultry meat and egg outlook at the Pig and Poultry Fair. A massive and growing differential has opened up over the past three months in the retail price for various egg categories, said Thornton. Customers have reacted by buying fewer free-range eggs and choosing instead lower-priced cage type. Sales of cage eggs at major retailers have surged this year by some 20 percent.

"In the current economic situation,

the retail environment is very tough," said Thornton. "Consumers are trading down and buying less. Over 40 percent of their purchases at present are grocery items being sold on promotion. For us, the big thing happening is the trading down from free-range to cage eggs, yet the free-range people are still talking of expansion. Although it is likely that the current demand for cage eggs will moderate, free-range producers should still take at least a two-year view of the market outlook, rather than trying to fill an expected short-term gap in supplies."

EU poultry outlook strong for exports, demand through 2012

The European Union's poultry industry should be able to benefit from relatively strong market fundamentals throughout 2012, according to Rabobank International's Poultry Quarterly report, with high beef prices and strong poultry demand combining with a potential modest downturn in feed costs during the year.

Poultry exports should expand through 2012, according to Rabobank, with increases to Asia, Africa and the Middle East leading the trend. European exporters are benefitting from a more structured approach to open markets and from a more competitive position compared to Brazil due to the Euro/Real exchange rate. In terms of imports, the EU has re-approved Thailand as an exporter to the EU poultry market beginning in the third quarter of 2012. Thailand is expected to use its 92,000-metric-ton quota, but the impact on local players should be negligible, as marketing standards should prohibit products from moving into the EU's fresh chicken market segment, said Rabobank. However, competition with other suppliers in the EU for processed products, especially from Brazil, Argentina and Chile, will intensify.

The biggest concern, according to Rabobank, is the current economic situation in Europe, especially in southern and eastern Europe. A weaker economy may lead consumers to trade down to chicken as the cheapest protein, or it may lead to reduced demand as consumers consume less protein overall.

Dr. Bob Pym

World's Poultry Science Association: 100 years of service to the global poultry industry

The WPSA has played a pivotal role over the past century in the development of the poultry industry.

The World's Poultry Science Association celebrates its 100th anniversary this year. The International Association of Poultry Instructors was founded at a meeting in London in July 1912. The organization later became known as the World's Poultry Science Association in 1928, but it was not until 1946 that national branches in the UK and U.S. were formed. There are now some 80 country branches, with an additional four countries presently in the process of forming a branch and more than 7,500 members of the association.

There are two regional federations of the association—the European Federation and the Asian Pacific Federation. One of the important activities of the federations has been the development of working groups in specific discipline areas.

The European Federation has 11 working groups: Economics and Marketing, Nutrition, Breeding and Genetics, Egg Quality, Poultry Meat Quality, Reproduction, Hygiene and Pathology, Poultry Welfare and Management, Turkeys, Education and Information, and Physiology. The more recently formed Asian Pacific Federation has three working groups on Small-Scale Family Poultry Farming, Water Fowl and Ratites. All of these working groups organize periodic symposia.

"Poultry is more environmentally friendly than other branches of animal husbandry. It is also more convenient for scientific research. The main products of poultry meat and eggs are indispensable, and their necessity for human health has been undeniably recognized,"

Professor Ruvede Akbay, Turkey, WPSA president 2004-2008.

"Our motto is 'Working together to feed the world,' and our main focus is the promotion of poultry science through the dissemination of information under the pillars of research, education and organization,"

Dr. Bob Pym, Australia, WPSA president 2008-2012.

Working together

The motto of the association is "Working together to feed the world," and its main focus is the promotion of poultry science through the dissemination of information under the pillars of research, education and organization.

To this end, country branches organize local, regional and national meetings on a variety of topics and for different groupings according to topic and level of presentation. Federation working groups organize symposia, usually every two or four years, and the federations organize their multi-disciplinary regional poultry conferences every four years.

The flagship meetings of the association are the multidisciplinary World's Poultry Congresses held every four years. In addition to the large and comprehensive technical program, the congresses include a major poultry trade exposition.

The association produces a quarterly journal, World's Poultry Science Journal, which publishes

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"Animal protein is one of the prime demands of emerging middle class consumers in the expanding economies. Eggs and poultry meat are the most efficient way of delivering expanding volumes. Research will concentrate on developing new and improved methods of production, health and quality assurance. Consumers are trying to set the clock back to the 1940s with their demands for 'organic', 'natural', 'farm fresh' and other marketing gimmicks. We have to find ways to assure them that the products of our industry are wholesome and healthy and that large-scale, efficient production is the best way to satisfy demand for food,"

Dr. Peter Hunton, Canada, WPSA president 2000-2004.

review articles covering a variety of disciplines associated with poultry production.

The journal is highly regarded by the industry and research community. Members of the World's Poultry Science Association receive either a hard or electronic copy of the journal every three months.

Programs and awards

The World's Poultry Science Association has developed a number of programs and awards in keeping with its mandate of facilitating poultry research and education globally.

The Travel Grants Scheme provides support for young researchers, students and others to attend association-sponsored meetings in other countries. The awardees must be 40 years old or younger and to have been a member of the association for a specified period. The award is open to applicants from all countries.

The Speakers Bureau Scheme was set up to provide funding to cover travel costs of speakers at meetings organized by association branches in developing countries. The airfares of the approved speakers, up to two speakers per meeting, are covered. At its annual meeting in Cesme, Turkey in November 2011, the World's Poultry Science Association Board voted to extend the scheme to include meetings in developed countries.

There are a number of awards established by the association, which recognize exceptional contribution to the organization, poultry science and/or the worldwide poultry industry. These include:

the MacDougall Medal, induction into the World's Poultry Science Association International Poultry Hall of Fame, and the Research, Education and Organisation awards made by the Foundation for Promoting Poultry Science of the Netherlands branch of the World's Poultry Science Association. The winners of the Netherlands branch awards and the inductees into the International Poultry Hall of Fame are announced at each World's Poultry Congress.

Support for poultry production in developing countries

The majority of the projected increase in global poultry meat and egg production and consumption over the next 20 or more years will take place in developing countries. It is thus appropriate that the association's focus should be on facilitating efficient and sustainable poultry production in these countries.

Over the past decade or so, the World's Poultry Science Association has been actively involved in supporting poultry science and education in developing countries through: the incorporation of the International Network for Family Poultry Development as a global working group of the association; the establishment of the Asian Pacific Federation Working Group on small-scale family poultry farming; the organization at numerous poultry conferences in developing countries of workshops and symposia focused on defining constraints to development of the national poultry industry; the establishment of the Mediterranean Poultry Network; and more recently, the establishment of the (sub-Saharan) African Poultry Network.

"The World's Poultry Science Association has played a phenomenal role in promoting research in various aspects of poultry science, and the process, brought about innumerable benefits to the industry all over the world. If I were to point to just one, I would say it is the dissemination of knowledge and bringing the fruits of research within the reach of developing countries, thereby providing a major boost to the poultry industry worldwide,"
Mrs. Anuradha J. Desai, India, WPSA president 1996-2000.

Socially equitable, sustainable poultry production

Despite the obvious enormous success of the poultry industry in the efficient production of poultry meat and eggs for the burgeoning global population, concerns have emerged on a number of fronts. From society and consumers in developed and developing countries, there have been expressions of concern about health threats from diseases, food safety and quality, animal welfare and the impact of production on the environment.

In recent times concerns have been expressed about the loss of biodiversity and the marginalization and disenfranchisement of small-scale commercial producers in developing countries arising from competition with large-scale commercial operations.

In his keynote address "Emerging boundaries for poultry production: Challenges, opportunities and dangers" at the 23rd World's Poultry Congress in Brisbane in 2008, Dr. John Hodges challenged the poultry industry to examine its practices from sustainability and social equity perspectives. The challenge was taken up and a think-tank meeting to discuss sustainability and social equity issues relating to developments in global poultry production, was organized in Freising, Germany in 2009, with representation from the World's Poultry Science Association, the U.S. Food and Agriculture Organization and from a number of the global breeding companies.

An important driver for industry participation in the think tank was the acknowledged need by the industry to identify genuine areas of societal concern that require being addressed or rectified. There is a generally recognized need by industry for better and more open communication with consumers, ideally through a mechanism that is perceived generally by society as being authoritative and objective, for providing accurate information about industry practices, to publicize positive features and developments within the industry as well as measures taken to overcome problems, and to debunk misinformation.

At the think tank, participants were initially asked to list their own and perceived societal concerns about poultry production. From the

"Over the last 20 years, we have worked hard to increase membership and grow our interest in the developing world. The sophistication of the poultry industry has increased as has the interest in scientific results, yet research has become more complex and expensive. The world poultry congresses, the continental congresses and the working group conferences and workshops are good platforms to discuss scientific results. Contact between the World's Poultry Science Association and the poultry industry has increased, we are now able to carry out more projects for it,"
Piet Simons, the Netherlands, WPSA president 1992-1996.

responses, the main focus would appear to be directed towards large-scale poultry production systems in developed and developing countries, as these are seen as the main contributors to production of poultry meat and eggs globally and as the 'models' adopted by the industry in developing countries. There was good evidence for societal concern about the impact of replacement of existing production systems in developing countries and about practices in all production systems.

It was generally accepted that, irrespective of the objectivity of the reasoning behind such expressions of concern, the industry needed to deal with these issues. It was acknowledged that significant improvements have been made and continue to be made by the poultry industry in many of the areas, e.g. in bird health and welfare, environmental impact and in product safety, but these are all still areas of ongoing societal concern. The challenge here is to address and rectify the areas that require attention, and to counter unwarranted criticism with objective and reasoned argument.

> "Over the past four or more years, there has been ongoing dialogue between the World's Poultry Science Association and the World Veterinary Poultry Association about bringing the associations closer together. A particular benefit would be the opportunity to run multidisciplinary sessions focused on multifactorial problems."

One of the outcomes from the think tank was the recognition of the need for input from a much wider array of stakeholders than present at Freising. The FAO representatives at the meeting undertook the task of arranging this and organized a special one-day session at the European Poultry Conference in Tours, France in 2010. This process is continuing with involvement from the World's Poultry Science Association.

Perceived societal concerns about poultry production

- Diseases and food safety
- Welfare of animals
- Environmental impact
- Loss of biodiversity
- Impact of Intellectual Property Rights and patents
- Impact on small producers
- Concentration of ownership

Relationship with the World Veterinary Poultry Association

Over the past four or more years, there has been ongoing dialogue between the World's Poultry Science Association and the World Veterinary Poultry Association about bringing the associations closer together. It was felt by some that there would be considerable merit in running joint meetings, even joint world congresses. A particular benefit of this would be the opportunity to run multidisciplinary sessions focused on multifactorial problems. One of the particular constraints for combining the world congresses of the two organizations is the inherent structure within each organization associated with the determination of the country and venue of forthcoming meetings.

Issues relating to poultry health are not the exclusive province of the World Veterinary Poultry Association. Most health issues and problems are multifactorial and the World's Poultry Science Association historically has demonstrated a keen interest and involvement in promoting discussion

100 years of service

of these problems. The involvement of poultry health professionals is, of course, fundamental to this. In many developing countries, the issue which stimulates producers and others to seek assistance and advice is frequently related to bird health problems. This collective action often results in the formation of a branch of either of the associations in the country.

In northern Africa, the World Veterinary Poultry Association is relatively well represented in the countries bordering the Mediterranean Sea, whereas apart from Egypt, the World's Poultry Science Association is not. One of the aims of establishing the Mediterranean Poultry Network within the World's Poultry Science Association, was to facilitate the development of its branches in that region through collaboration with the World Veterinary Poultry Association. This has been somewhat interrupted by recent developments there with the Arab Spring uprisings.

There are other ways in which the two organizations can interact and collaborate and I look forward to discussions with my good friend and colleague, Dr. Trevor Bagust, the recently appointed president of Australian Veterinary Poultry Association, to explore opportunities for a closer relationship between the two organizations. □

"Over the next 10-20 years, the World's Poultry Science Association must consolidate its position, emphasizing its role and collaborate with the FAO in order to support actions to eradicate hunger in developing countries,"

Professor Jose Castello Llobet, Spain, WPSA president 1970-1974.

For a preview of the next World's Poultry Congress, read: World's Poultry Congress returns to Brazil
www.WATTAgNet.com/150175.html

Dr. Bob Pym is the current World's Poultry Science Association president and has held this position since 2008. The above article is based on a paper originally presented at the 2012 Australian Poultry Science Symposium.

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Bruce Plantz

World poultry industry forecasts higher profitability, marginal growth

Survey participants

The editors of *WATT PoultryUSA, Industria Avícola, Poultry International* and *Feed International* surveyed 317 people responsible for producing and using poultry feed worldwide about their business outlook and key trends.

Participants included:

- Nutritionists 28.5%
- Administrators 12.6%
- Poultry farm owners/ growers 11.7%
- Consultants/R&D 10.9%
- Veterinarians 9.2%
- Live production managers 8.4%
- Marketing/sales 8.4%
- Feed mill operators 6.7%
- Quality control, processing managers and purchasing agents 3.7%

Participating sectors were:

- Feed manufacturers 20.6%
- Broiler producers 16.8%
- Consultants/veterinarians/ nutritionists 16.4%
- Egg producers 12.6%
- Breeder farmers/hatchery 9.7%
- Manufacturers/producers of feed additives 7.6%
- Feed/pre-mix manufacturers 7.1%
- Poultry processors 4.6%
- Poultry products marketers, turkey/duck producers, egg packers/processors and egg products manufacturers 4.6%

Responses came from:

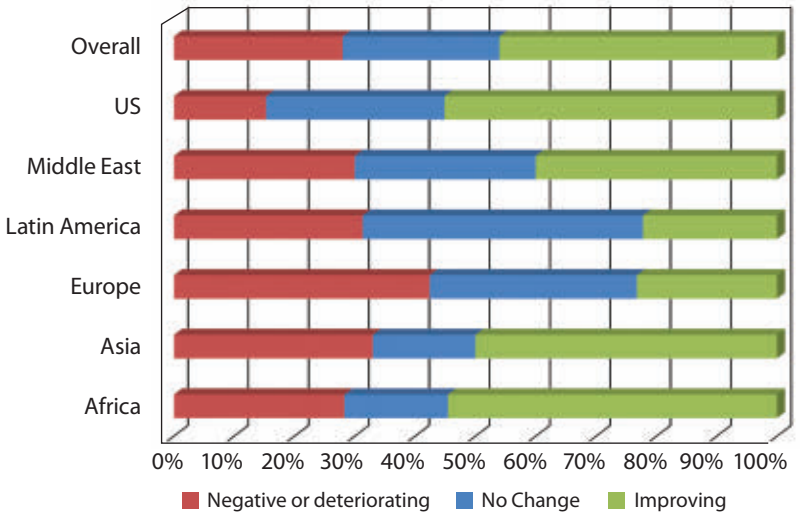
- Asia 26.5%
- North America 23.9%
- Latin America 16%
- Africa 14.7%
- Europe 10.5%
- Middle East 7.1%
- Pacific 1.3%

WATT Publishing's 2012 Poultry Nutrition and Feeding Survey shows a marginal growth in feed and poultry production but with a higher profitability worldwide.

The 2012 WATT Nutrition and Feed Survey shows increased optimism for profitability even while faced with high grain prices and price volatility.

- In terms of business outlook for this year, 46 percent predict an improvement in profitability over 2011 compared to 38.2 percent in last year's survey and 50 percent in the 2010 survey
- The top concern remains cost of grains/volatility in grain prices, with quality of grains moving from the third-highest concern in 2011 to second this year
- Half of respondents expect feed production volume to increase from 2011
- Companies are planning investments in feed equipment and facilities, as well as in improving and expanding production facilities,

Business outlook for 2012

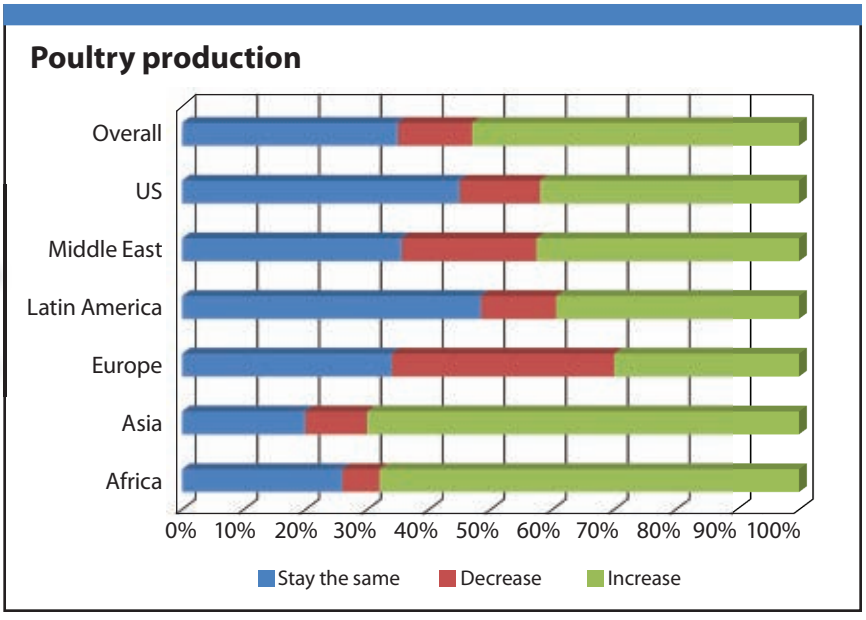


Worldwide, the poultry nutrition sector's business outlook has improved. In the overall survey, the number of respondents predicting improved profitability jumped from 38 percent in 2011 to 46.2 percent while predictions of decreased profitability dropped from 32 percent in 2011 to 28.2 percent this year. Note that respondents from Europe and Latin America had the least optimism for business in 2012.

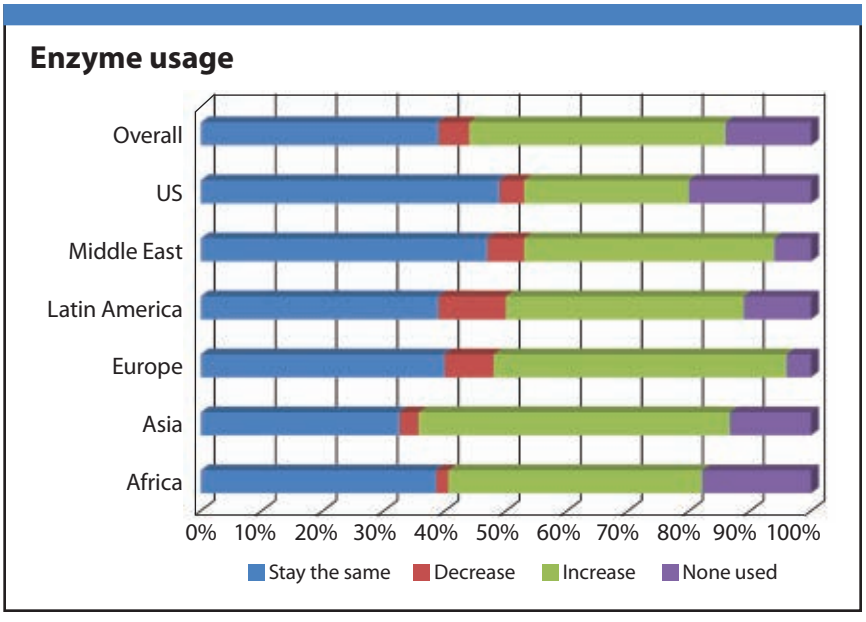
Would you like to participate?

We are continuing our worldwide feed and poultry nutrition survey, and as we collect more data, we will update the results on www.WATTAgNet.com and in this magazine. If you would like to participate, simply fill out the survey online at https://www.surveymonkey.com/s/DM8FYP2

Read more: Compare 2012 survey results with those of 2011: www.WATTAgNet.com/22055.html



Poultry and egg production volume continues to rise with majority of respondents, with Asia and Africa showing the highest forecasted increase and Europe the least.



Roughly 20 percent of U.S. respondents said they were not using enzymes as feed additives, while 96 percent of European respondents said they were, with nearly half of them planning on increased enzyme use.

including new investment in enriched cages for layers

- Despite changes, worldwide usage of therapeutic and subtherapeutic compounds are still being used, but probiotics are on the rise
- Europe and Latin America producers are more pessimistic than the rest of the world for 2012 results

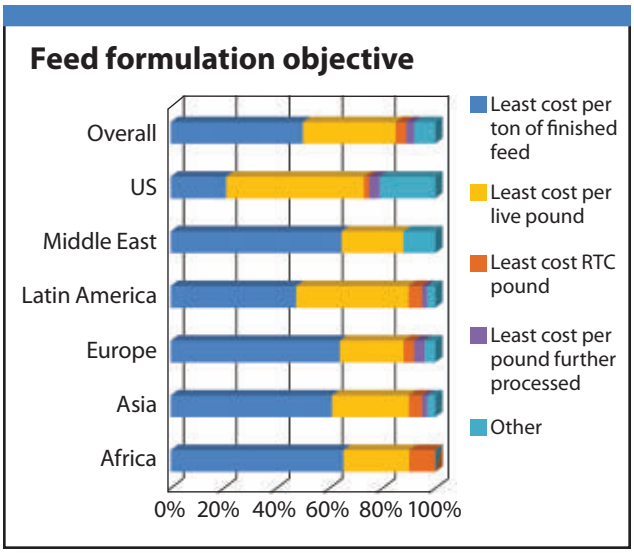
World business outlook positive

The 2012 business outlook seems to be more positive and approaching levels of previous years. Worldwide, the poultry nutrition sector's business outlook is more optimistic than last year, but the outlook is very different among regions. In the United States, 54 percent of respondents thought the outlook was improving, compared with only 23 percent of European respondents, and 22 percent of Latin American respondents. Of European respondents, 34 percent forecast no change and 42 percent had a negative outlook, while those percentages were reversed at 46 percent and 31 percent among Latin American respondents.

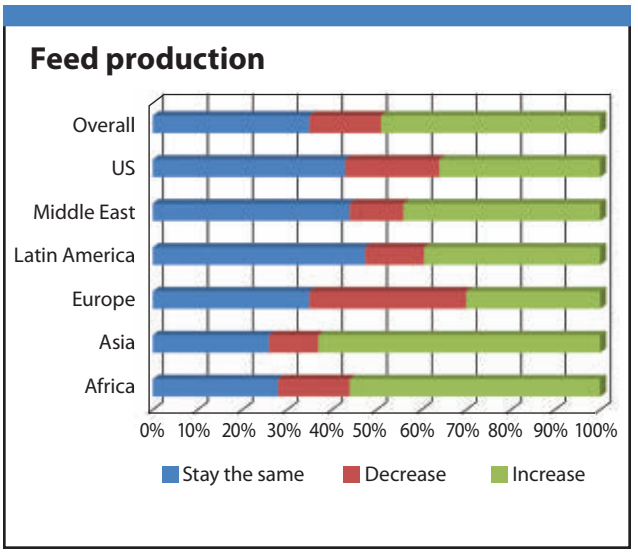
Major challenges in nutrition and feeding

Since the world economy is still adjusting, economics and financial issues were top priorities, such as cost of grains/volatility in grain prices, which was ranked as the most important concern in all world regions. However, this year the quality of grains, including mycotoxins and other anti-nutritional factors, was rated second, compared to third last year. The top five concerns were rounded out by energy costs, cost of micro-ingredients or feed additives, and food and feed safety.

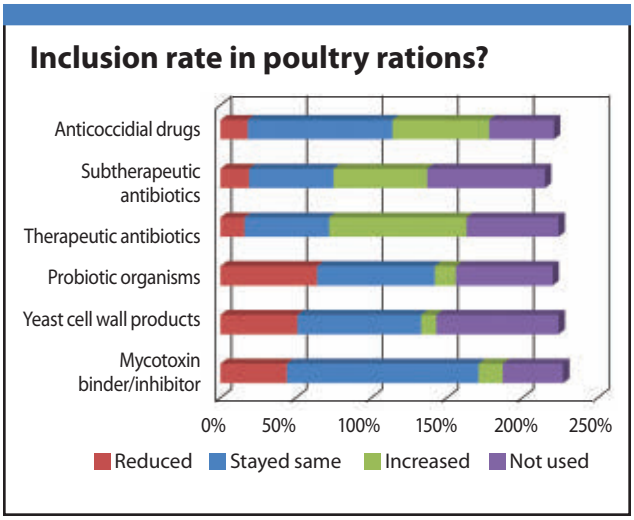
Among other challenges listed by participants, many were related to economic and financial issues, water quality and scarcity as well as lack of trained and educated personnel.



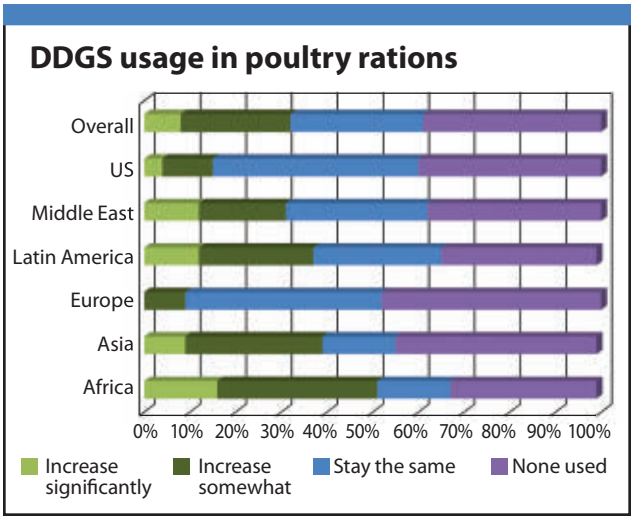
Over 50 percent of this year's respondents formulate for least cost per ton of finished feed. In most of the world more than 60 percent formulate for least cost per ton. The exceptions are Latin America and the U.S., where 42 percent and 52 percent of respondents formulate for least cost per live pound.



Slightly less than half of the respondents predict an increase in feed production volume, with the highest number of positive responses from Asia and Africa.



The survey showed the greatest increases in the use of probiotic organisms, yeast cell wall products and mycotoxin inhibitors.



The majority of respondents are either holding steady with the percentage of DDGS in poultry rations or not using DDGS. Increases in DDGS use are centered in Asia, Africa and Latin America.

Composition of rations

Dried distillers grains solubles continue to be an important feed ingredient. In terms of the use of DDGS in poultry rations, 38.7 percent of respondents said they would not use DDGS in the next 12 months, which could be a reflection of availability. Also 29 percent said DDGS usage will stay the same in the next 12 months, 24 percent thinks it will increase somewhat this year, and finally 8.4 percent said it will increase significantly in the next 12 months.

In terms of enzymes utilization, 41.9 percent of the respondents—compared to last year's 46.8 percent—say it will increase, while 39 percent say it will remain the same as last year. This shows the vast majority still has the same feelings toward the use of enzymes in feed formulation. Only a low 5.1 percent think enzymes will decrease and 14 percent think they will not be used at all.

In terms of phytase use, in particular, as in last year, almost half

of respondents—48.9 percent—expect usage to remain the same as 2011, and 26.2 percent believe that it will be increased.

This year, we asked which other enzymes, aside from phytase, are being used. Responses included, in order of importance: xylanases, proteases, amylases, glucanases and hemicellulases. Nonetheless, a third of respondents said they do not use any enzymes.

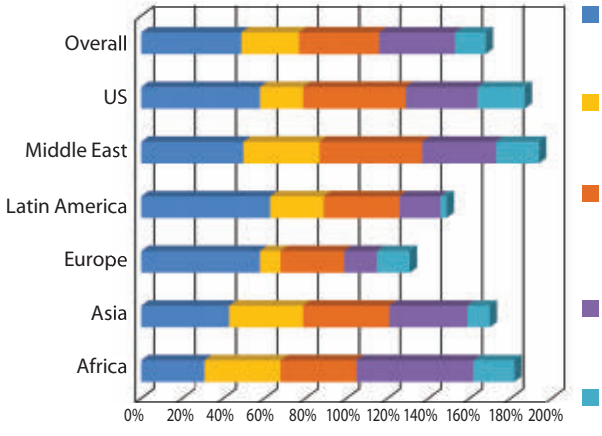
This year's survey contained a question on the inclusion rates of several ingredients such as anticoccidial drugs. The survey showed the greatest increases in the use of probiotic organisms, yeast cell wall products and mycotoxin inhibitors. More respondents were reducing rather than increasing usage of anticoccidial drugs, subtherapeutic antibiotics and therapeutic antibiotics.

Marketing and labeling

Despite the continuous use of subtherapeutic and therapeutic drugs, most of the respondents who answered the question on labeling claim on their labels that products have no antibiotics/drugs. Other claims include no hormones, no animal byproducts, all-vegetable diet or all-natural are the other important claims. □

› Data compilation and statistical analysis by Joyce Neth and Julia Caruso

Planned 2012 investments



Because respondents could answer in multiple categories, totals in this chart are above 100. Notice that Europe and Latin America lag behind other regions in investment plans.

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A special report from
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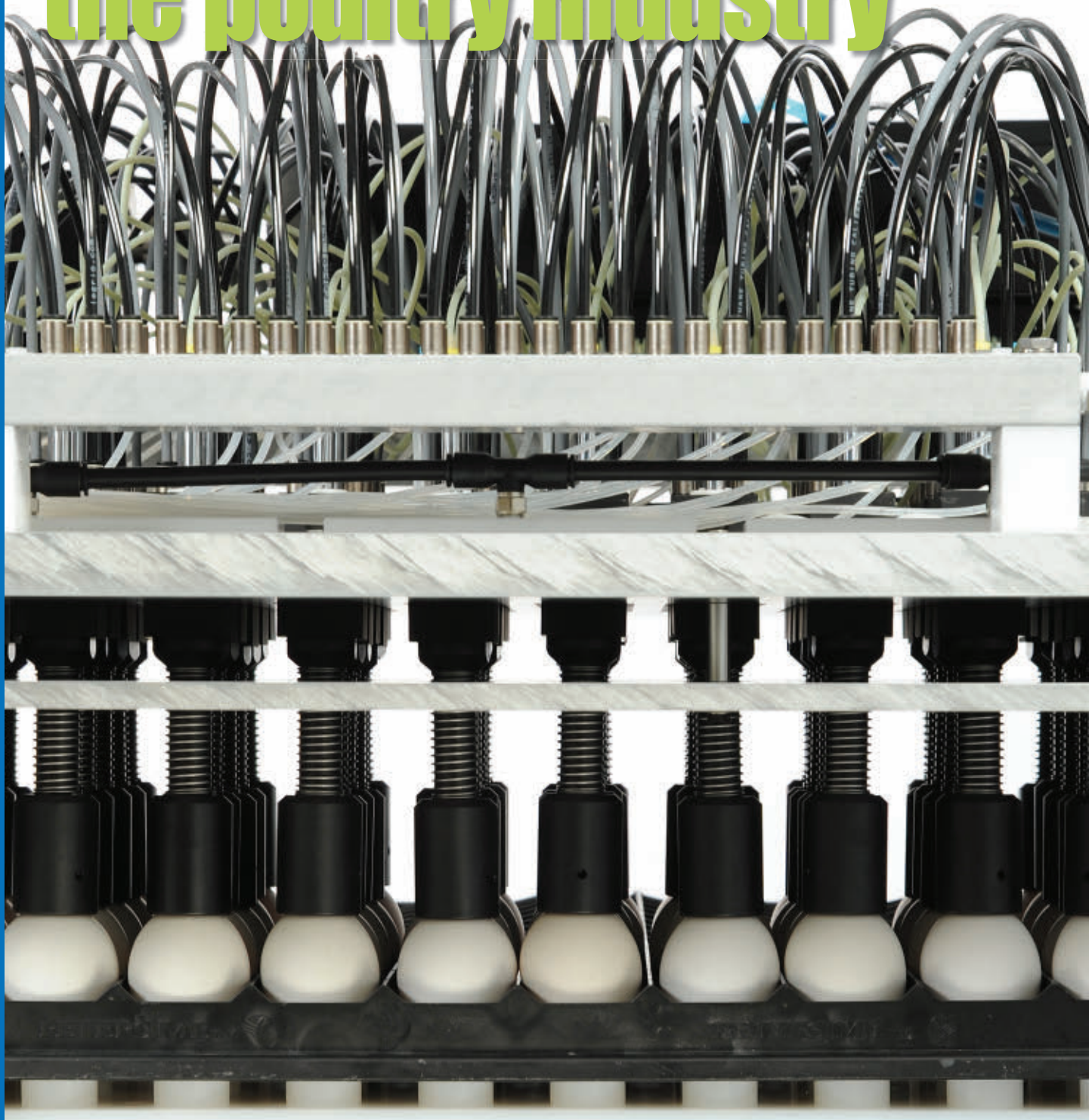
In ovo vaccination in the poultry industry



In ovo vaccination against coccidiosis

Coccidiosis is the most prevalent poultry disease worldwide and estimated to cost the industry the equivalent of $3 billion each year. [1] The disease is caused by coccidia parasites of the Eimeria genus. More than 10 different species of this parasite can infect chickens, but the most common are *E. tenella* (which causes cecal, bloody coccidiosis), *E. necatrix* (which causes bloody intestinal coccidiosis), and *E. acervulina* and *E. maxima*, which cause chronic intestinal coccidiosis. Diseased birds spread parasites in the form of oocysts in their droppings, which are then ingested by other birds. Oocysts may remain viable in the litter for many months.

Under normal conditions chickens may be infected with small numbers of coccidia without any major ill effects. However, the high density of intensive production units provides an environment in which the parasite numbers can easily build up and cause more significant health issues for the flock. Generally, the larger the flock, the greater the threat from coccidiosis; young birds are typically more vulnerable to infection because they do not have maternal antibodies to coccidia; older birds may acquire some level of immunity as a result of exposure to infection.

Vaccination in the hatchery

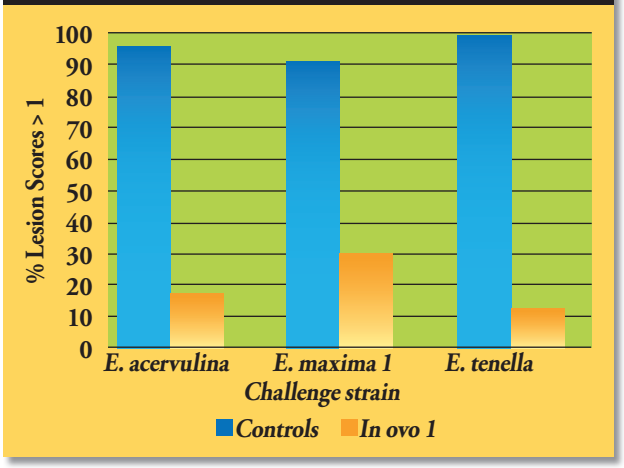
Coccidial vaccines can be administered by edible gel, feed spray, drinking water, eye spray or spray cabinets. These methods are time consuming and labour intensive for the producer and none of them can guarantee an equal exposure of all birds to the vaccine because they do not allow for a uniform distribution of vaccine. In addition, the vaccines are administered to birds after hatch and thus there is a window of susceptibility before immunity develops.

FIGURE 1: MEAN BODY WEIGHT (LBS) AT DAYS 28 AND 42

	D28	D42	D42 Variation from mean (SD)
in ovo vaccination	2.545	5.099*	0.476*
Salinomycin	2.525	4.868*	0.520*

*significant difference between groups ($p \leq 0.05$)

FIGURE 2: VACCINE IN OVO 1 EFFICACY AT E18 ADMINISTRATION AND D21 CHALLENGE



In recent years the advent of *in ovo* vaccines (Inovocox and Inovocox EM1) has meant that hatcheries can supply chicks which have already been vaccinated against coccidia – providing the earliest possible immunity and avoiding the need to administer vaccine in the grow-out unit. It also ensures that every chick has been given the same dose of vaccine. Inovocox contains four different strains of live Eimeria sporulated oocytes – *E. tenella, E. acervulina* and *E. maxima* (2 different strains).

A study which compared *in ovo* vaccination with that of spray vaccination confirmed that the *in ovo* method resulted in a much higher level of infection. [2] The presence of oocytes was determined microscopically. The study compared spray vaccination on day of hatch to chicks that were hatched from eggs vaccinated on day 18 or 19 of incubation. *In ovo* vaccination resulted in 80-90% of birds vaccinated, compared to just 40% for spray vaccination.

Effect on performance

A second study examined the effect of *in ovo* vaccination (day 18 or day 19), commercial spray vaccination and treatment with salinomycin, on weight gain, feed conversion and cumulative mortality. [3] Twenty pens (ten

FIGURE 3: VACCINE FORMULATIONS FOR NE FIELD TRIAL

In ovo formulation 1 (Day 19 *in ovo*)	*In ovo* formulation 2 (Day 19 *in ovo*)	Spray vaccine (Post hatch)
E. acervulina	*E. acervulina*	*E. acervulina*
E. maxima 1	*E. maxima 2*	*E. maxima*
E. tenella	*E. tenella*	*E. tenella*

male/ten female) with 50 chicks per pen were subjected to each of the treatments. The performance indicators were assessed at days 21, 28, 35, 42 and 48. The results showed no significant ($p>0.05$) differences in weight gain between any of the vaccinations and salinomycin at any of the assessment points. FCR (unadjusted for mortality) was significantly ($p\leq0.05$) lower for *in ovo* vaccination than either spray vaccination or salinomycin for day 48.

One of the concerns that has been raised about the use of live coccidia vaccines is the effect that circulation of oocytes from the vaccine could have on the early development of chickens. A field trial was therefore conducted to compare the effect of *in ovo* vaccination and salinomycin on body weight at 28 days and 42 days. [3] Over 28,000 birds in 23 paired houses were divided into two treatment groups and raised under commercial conditions. At day 28 there was no significant difference ($p>0.05$) in body weights between treatment groups, but by day 42 the *in ovo* vaccinated birds were significantly ($p\leq0.05$) heavier than the salinomycin birds (Figure 1). The results also revealed less variability in day 42 weights among the vaccinated group.

Coccidiosis protection

A study was conducted to evaluate the immunogenicity in *in ovo* vaccinated birds. The study was designed to examine the reduction in lesion scores after single Eimeria species challenge as compared to non-vaccinated challenged birds (Figure 2)[4].

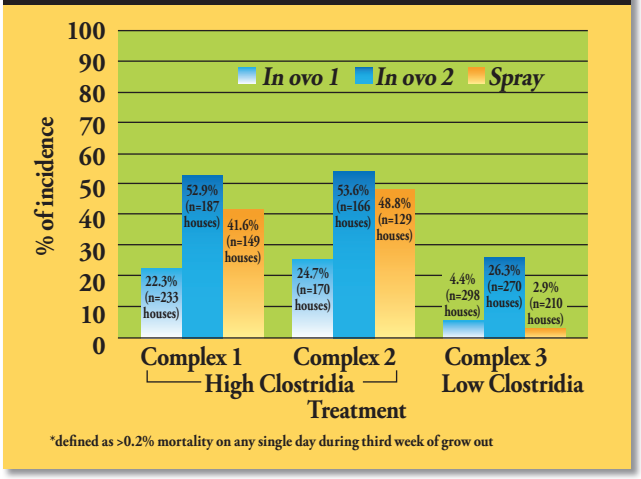
The results showed that the vaccinated birds presented lower frequency of coccidial lesion scores greater than one, compared with the non-vaccinated birds when challenged at day 21 of age.

Knowing there is a relationship between coccidiosis and necrotic enteritis (NE), as well as understanding that vaccine-induced subclinical coccidiosis may help to decrease the incidence of necrotic enteritis [5], a large scale trial was designed to test the vaccine in three commercial broiler complexes: two with high Clostridia challenge and one with low Clostridia challenge. Two vaccine formulations with different *E. maxima* strains were tested against a commercial post-hatch spray vaccine acting as a control (Figure 3).

Each vaccine was administered sequentially for a week of placements across all three complexes. This pattern was repeated three times during the 9-week trial. The adjusted feed conversion at processing and NE incidence (days 14-21) were assessed for each treatment group. In the high Clostridia complexes *in ovo* vaccine formulation 1 resulted in a lower incidence of NE when compared to the other *in ovo* formulation and the spray vaccine (Figure 4). In the low challenge complex formulation 1 resulted in a higher level of NE than the post-hatch spray, but still less than formulation 2. In all complexes, formulation 1 was associated with the most favorable adjusted feed conversion.

Formulation 1 (with only one strain of *E. maxima*) was subsequently licensed and marketed as Inovocox EM1.Together

FIGURE 4: INCIDENCE OF NE WITH DIFFERENT COCCIDIAN VACCINES



the traditional Inovocox, and Inovocox EM1 constitute the only coccidia vaccines which are licensed for administration via the *in ovo* route. The *in ovo* route has a number of benefits for the broiler industry, not just because of the performance benefits of earliest possible immunity against disease, but also in operational terms. Many hatcheries are now using this method as the basis for their coccidiosis control. Subsequent articles in this series will take a look at some other aspects of *in ovo* vaccination. ■

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In ovo technology for smaller hatcheries

The introduction of *in ovo* vaccination has been one of the major advances in hatchery management in recent decades. Not only has this technology improved efficiency and cleanliness in the hatchery, it has provided a means to improve flock health. These benefits have been particularly apparent to large hatcheries and have led to

in ovo devices being adopted by over 90% of US broiler hatcheries. In fact, around 98% of all US broilers are now vaccinated *in ovo,* and globally some 15 billion eggs are produced each year using this technology.

Many smaller hatcheries, particularly those serving markets outside the US, can also see the benefits of *in ovo* vaccination, but do not have the throughput or physical space to make an *in ovo* device a practical option. With this in mind, Pfizer Animal Health Global Poultry decided to develop a new addition to its market-leading Embrex® range of BioDevices – a device which would bring *in ovo* technology within reach for smaller hatcheries.

Embrex Inovoject® m is a semi-automated *in ovo* device capable of processing between 12,000 and 20,000 eggs per hour and can handle a range of different tray formats. Despite this impressive capability, it takes up much less floor space than the full-size Embrex Inovoject and can be easily moved around and stored out of the way when not in use. The device was unveiled earlier this year and Pfizer Global Poultry has already taken orders from hatcheries in Europe and Latin America.

Early trials

One of the first companies to take part in the development trials of the new Embrex Inovoject m was Frango Seva, in Pato Branco, Brazil. The company is a small, vertically Integrated poultry producer dealing with breeders, hatcheries and broilers. Established 36 years ago, the company processes some 55,000 birds each day, five days a week, and brings in around 280,000 chicks from the hatchery.

Frango Seva is typical of many Brazilian poultry companies that are trying to compete with large integrators, but with limited resources, as Agribusiness Director, Marciano Régis Tonus, explained:

"We are trying to be more professional as a company, because by being more professional we believe that we can compete better in the Brazilian market. I believe we must use new technology to keep the company competitive – we have to increase production to 120,000 birds each day in order to support our financial position."

When Pfizer Global Poultry asked if Frango Seva would try Inovoject m in its hatchery, Mr. Tonus saw it as an opportunity to improve performance. Previously, chicks had been vaccinated subcutaneously on day of hatch, but the process was causing increasing problems.

"The most common problem we have with subcutaneous vaccination is due to the people's welfare. They don't work well or develop health problems because of the repetition of the process. For example, problems in their arms because of the position they have to adopt for the process.

"In Brazil the legislation is becoming more complicated in order to put more pressure on companies to have better conditions for employees."

The Pfizer Global Poultry team was at the hatchery in order to receive Embrex Inovoject m, and to support the installation and initial set up. The Frango Seva operators were trained by the Pfizer team who remained in the hatchery throughout the trial. The trial ran for almost a month, during which time some 833,000 eggs were vaccinated.

After some minor initial operational challenges, the device worked well:

"During the first week, the operators had to get used to the machine, but after that, they were much more comfortable with it and the process became natural to them. It was easy to use.

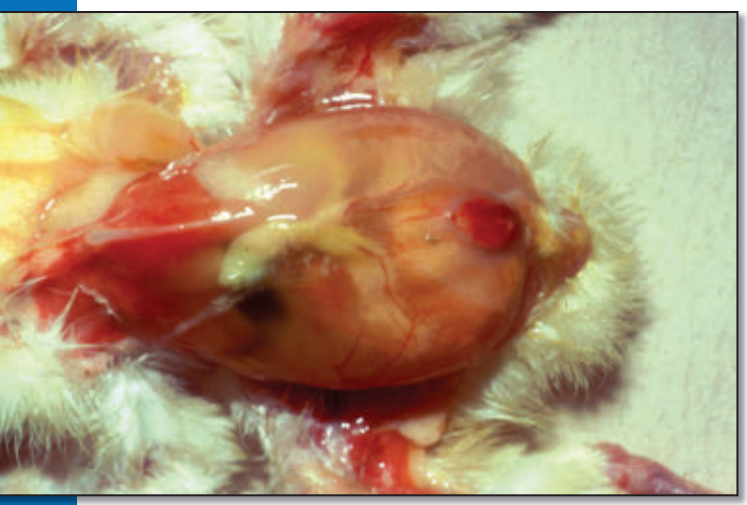
"My perception is that Inovoject m is able to reduce the distance between the small companies and the big companies in Brazil by giving them an opportunity to use new technology.

"I believe that all hatcheries handling about the same number of eggs as this hatchery would be able to use an *in ovo* device like Inovoject m. It's small, it's easy to use and it's simple."

Marciano Régis Tonus believes that all poultry companies in Brazil will have an interest in the new device because day by day the problems with employees are getting worse and it is getting much harder to find people to work in hatcheries. As poultry production continues to increase in both volume and quality in other countries in Latin America and Asia, the availability of a device that can avoid employee issues and bring the benefits of *in ovo* vaccination, is bound to attract a lot of attention. ■

Vaccination against E. coli

Escherichia coli bacteria are a common cause of bacterial infections in poultry, occurring in all species and all ages of birds. These ubiquitous pathogens are found worldwide in virtually every environment, so an *E. coli* free production system is not a practical goal. These bacteria typically cause issues in weak or unhealthy birds, so the aim is to control the level of challenge as much as possible and to maintain healthy birds, with good immune defences.



Yolk sac infection. *Photo courtesy of the American Association of Avian Pathologists (AAAP).*

Even the best run production units can have issues with *E. coli* from time to time. Kreider Farms, for example, has 5 million layers housed in four state-of-the-art facilities, which include integral manure removal belt and tunnel air ventilation. However, the units are located in a high *E. coli* challenge area and this has prompted the adoption of a vigorous vaccination schedule, as Egg Production Manager for Kreider, Ed Hoffman, explained:

"We typically spray all pullets for the four complexes with Poulvac E coli at three days of age initially and again between 12 and 14 weeks.

"Peritonitis typically hits at the peak of egg production at 24 to 30 weeks, so keeping mortality low at that point, and getting a good healthy start, does pay off. You can lose a lot of eggs by having sick chickens in the first couple of months – it's a very key point in the bird's life.

"We're spending about 3 cents per bird on the vaccine, so if we are getting say 10% better liveability on a large flock, that's a pretty big return on investment.

"If using the vaccine helps me avoid running antibiotic in the feed, then that's definitely a benefit, both from a cost point of view and consumer perception."

Turkey vaccination

E. coli can be equally problematic for turkey producers, according to Dr David Pyle, an independent veterinarian who works as a consultant for a number of poultry producers, chiefly in the upper mid-west of the US. His clients are mainly mid-sized turkey companies each producing around 5 million toms (stags) per year.

"*E. coli* infection continues to be a problem that we see routinely in turkey production. It manifests as typical colibacillosis, with increased mortality and performance loss. Sometimes a subtle increase in mortality may be the only way it shows up, but at other times it can be quite devastating. The amount of mortality can be quite variable."

In Dr Pyle's experience the size and pattern of *E. coli* challenge varies between different operations and even farms within companies, but for turkeys most problems are seen either late in the brooder house at 3-5 weeks of age

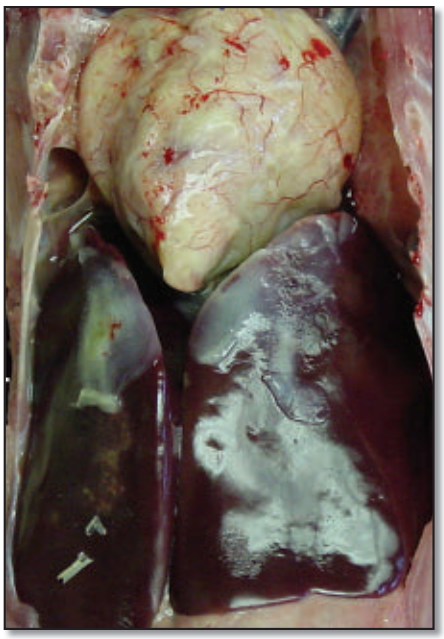
Airsacculitis. Note thickened air sacs covered in fibrinous (yellowish) exudate. *Photo courtesy of the American Association of Avian Pathologists (AAAP).*

or, more commonly, after moving out of the brood house to the grow-finish facility at 6-9 weeks of age. Most farms have a brood house and so birds are simply moved a short distance to the grow-out sheds. After 10-12 weeks of age, birds generally have less problems with *E. coli*.

Dr Pyle had a couple of farms that were having problems with *E coli*: high mortality, routine culture diagnosis of *E. coli* flock after flock. After trying several other solutions, he decided to try vaccinating with Poulvac E coli.

"It didn't cure the problem by any means but there was definitely an improvement in the *E. coli* morbidity and mortality that was very noticeable. It was pretty obvious that this was helping."

According to Dr Pyle, convincing producers of the need for vaccination is not usually an issue during an outbreak of disease because they are aware of the financial implications of increased mortality.



Polyserositis. Note that the heart is covered by fibrinous (yellowish) exudate and there is exudate on the surface of the liver. *Photo courtesy of the American Association of Avian Pathologists (AAAP).*

"Typically for the producers that I work with, if they can vaccinate against a problem rather than treat it, then they are all for it.

"We don't have any numbers behind it, but the benefit is pretty obvious when you use it. More birds stay healthy, they get better performance – better uniformity, weight gain, those sorts of things.

"From my experience it is not a total prevention vaccine, and results can vary, but it is definitely worth trying because I have seen some farms with definite improvements with its use. That's not a scientific, research type study, but just from practical, out-in-the-field type experiences, it does seem to have a good benefit." ■

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Stuart Lumb

Healthy outlook for Vietnam's poultry and egg production

Official forecasts suggest demand will at least double as prosperity rises.

Since the early 1990s, Vietnam has encouraged foreign investment. Charoen Pokphand, for example, has poultry operations in a number of southern regions of the country.

Forecast increase in Vietnamese broiler meat and egg production *(2012-2020)*

	2012	2015	2020
Poultry meat *(000 tons)*	390	625	1,250
Eggs *(billion)*	7.2	8.8	14.0

Source: Vietnamese Ministry of Agriculture.

Vietnam's poultry meat and egg production is expected to double by the end of the decade.

Vietnam's demand for poultry meat is expected triple by 2020, while demand for eggs is set to double. The forecast, released by the Agriculture Ministry's Department of Livestock Production, reflects Vietnam's increasing population and rising living standards.

National and international activity

Among popularly reared birds in Vietnam are Hy-Line stock and the Luong Phuong strains from China. Local breeds are also commonly reared. In the case of the latter, the birds are smaller than many of the bloodlines commonly used around the world. Because of this, feeder pans and troughs for example, often have to be modified.

The government remains a major player in Vietnam's food production, however, a number of international players also operate in the country. For example, Charoen Pokphand, in addition to being a major player in feed, also has integrated poultry operations in the Hanoi region, in the region of Binh Phuoc and in other southern areas of the country. □

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To learn more about Vietnamese broiler production, read: Vietnam broiler breeder farm helps respond to local demand www.WATTAgNet.com/147850.html

Eugene Gerden

Turkey meat moving mainstream in Russia as industry responds to rising demand

No longer a food for those with poor digestion, turkey meat is becoming more popular with consumers and production is growing.

Vadim Vaneev, head of one of Russia's major turkey producers, notes that the company is planning significant investment in 160 new houses, feed mills and processing plants.

Recent years have seen both the demand and supply of turkey meat grow in Russia. During the period of 2006-2011, production of turkey meat increased fourfold, and this growth is continuing in 2012.

Yet the supply of turkey meat in the local market remains very low, and according to Global Research Consulting, Russia remains the world's largest importer of turkey meat. The Moscow region absorbs 40 percent of turkey meat sales in the country.

Turkey a historical niche

In the Soviet era, there was no tradition of either production or consumption of turkey meat, and only two farms specialized in its production. The largest producer was Egorievsk poultry farm, yet even its production was insignificant at less than 3,000 metric tons annually.

According to the head of the Russian National Turkey Association, Yuri Markov, in the USSR turkey was considered as a kind of exotic meat and a dietary product for people with poor health. However, the attitude toward this meat among consumers has now changed.

Per capita consumption of turkey meat in Russia is currently estimated at some 0.9 kg. While this is significantly higher than in the Soviet era, it is still low compared to many other countries. For example, Israel consumption stands at 15 kg per person, while in the U.S. it is 9 kg and in the UK 7 kg.

Local analysts estimate approximately 200,000 tons of turkey meat is consumed in Russia each year, with half coming from overseas. Most imported turkey comes to Russia from Brazil, France, the Netherlands and Germany. Despite demand for imports, supplies have been declining as a result of rising prices for turkey meat in the global market.

Key turkey producers

Two of the main producers of turkey meat in Russia are Eurodon, which produced 33,000 metric tons in 2011, and Krasnobor, which produced 12,000 metric tons.

In the case of Eurodon, the company is planning to significantly increase production. By 2020, its total production is expected to reach 90,000 metric tons per year. The company is planning to build a large industrial complex in the Rostov region in southern Russia, with a capacity of 60,000 metric tons per annum and the facility to triple output in the future.

Investment in the project is estimated at almost Rubles 18 billion (US$600 million), most of which is expected to come from one of Russia's largest banks, Vnesheconombank.

According to Vadim Vaneev, head of Eurodon, the complex will include 160 poultry houses, a new hatchery, a slaughter plant, a feed mill, grain elevator, litter processing plant, and waste treatment facilities.

One of the limiting factors for the successful development of turkey meat production in Russia has been the lack of breeder farms to produce eggs for the modern hybrid crosses.

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This meant that the country's turkey producers had to import hybrid eggs and poults from abroad, primarily from Canada and the U.S. This problem was compounded by Russia's lack of modern technology for rearing, management, slaughter and further processing of turkeys.

Changing times

However, there is a possibility the lack of turkey breeder farms in Russia may soon be partially addressed, according to Vaneev. Eurodon has recently completely halted imports of eggs following its recent construction of Russia's first industrial complex for the production of turkey eggs. The capacity of the complex is estimated at 6.2 million eggs per year, with the possibility of its expansion up to 25 million per year.

"At present, our need for eggs is fully provided for and we even have the opportunity to start their exports abroad," he added.

In addition to Eurodon, an interest in investing in turkey meat production has been recently expressed by Cherkizovo Group, Russia's largest poultry producer. The Cherkizovo Group plans to invest over Rubles 4 billion in the construction of a turkey farm in the Pervomaysky and Staroyurevsky areas of the Tambov region, in central Russia. The project is scheduled for implementation between 2012 and 2014. The site will be able to produce 40,000 metric tons of poultry meat per annum.

The third largest investment project currently in the industry could be that of Rusmolko, a well-known Russian agricultural holding, which comprises building a complex for turkey breeding and processing with the capacity of 15,000 metric tons per annum.

According to Russian media reports, there is talk of foreign companies entering Russian turkey production; however, no names have been mentioned.

Ongoing opportunity

While production in the country is growing and demand may be low in comparison to in other countries, the market still offers plenty of opportunities.

Alisher Adylov, head of the meat processing department at Cherkizovo Group, says:"Turkey meat could be considered as an ideal replacement for expensive beef, the majority of which is currently imported to Russia from abroad. In addition, there is the ever growing demand for sausage products, produced from turkey, among the local meat processors."

Vaneev adds: "According to our estimates, the potential of the Russian turkey market is about 650,000 metric tons per year, which is equivalent to 15 percent of total meat consumption in the country. Currently, turkey is considered not just an element of a healthy diet in Russia, but the type of meat which could significantly push back beef and pork in the food ration of local consumers."

According to Elena Tyurina, general director of the Institute of Agricultural Marketing, Russia's leading analytical agency in the field of agriculture, at present the

By 2020, Eurodon's production of turkey meat should reach 90,000 metric tons annually.

domestic turkey meat market remains one of the most investment-attractive and growing segments of the Russian meat market.

In contrast to the U.S. and other Western countries, about 90 percent of the Russian turkey meat market accounts for cuts, with the remainder being accounted for by whole carcasses, sausage and other products.

Despite this preference, at present, turkey meat and especially breast is only available in 10 percent of Russian retail stores, while other types of meat are available almost everywhere. According to Tyurina, the limited supply of turkey meat in the domestic retail market prevents further growth of consumer demand for such type of meat.

Predicted consolidation

Russian analysts predict that the market for turkey meat will continue to grow to at least until 2015. A trend expected to emerge in the industry, however, will be a gradual reduction of the share of small- and medium-sized manufacturers, in favor of large companies and holdings.

Growing investment activity in the industry has attracted the eye of the Russian government. The development of the domestic turkey meat industry in recent years has become one of its priority goals with various forms of support under consideration.

One goal is the development of small-scale production, through the provision of young turkeys to farmers to fatten and return to the state. Small-scale turkey production is seen as a way to generate demand for turkey meat in those Russian regions where, currently, there is a lack of large facilities for turkey production. It is hoped that this will eventually stimulate the development of large-scale production.

In addition, according to state plans, in the future imports of turkey meat to Russia should significantly decline, and exports to international markets should start. □

To learn more about the Russian market, read: Russian poultry industry ushers in new era with WTO accession

www.WATTAgNet.com/146898.html

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Emma Bellis

2 Sisters' strengths overcome difficult

Customer focus and innovation are winning ways for the UK poultry processor.

Oakham Chicken, produced by 2 Sisters, is the only fresh chicken sold by one of the UK's leading supermarkets.

At a glance

- **Who:** 2 Sisters Food Group
- **Where:** United Kingdom, Ireland, the Netherlands, Poland
- **Headquarters:** West Bromwich, West Midlands
- **Revenue:** US$ 3.4 billion
- **Production:** 6 million birds/week
- **Product:** Chicken, various
- **Employees:** 18,000
- **Website:** www.2Sfg.com

Despite the tough UK economic climate, 2 Sisters Food Group, one of the country's largest poultry processors, stands out as being fit to ride the storm. A report this year by Rabobank highlighting the inefficiency of the UK poultry industry singled out 2 Sisters Food Group for getting things right.

It's not surprising then that since its humble beginnings as a small-scale frozen retail cutting operation in 1993, the company has grown to become the UK's fourth largest food company with total sales topping £2.1 billion (US$3.4 billion). Last year alone it acquired Northern Foods for £342 million and announced a £30 million investment in a new facility in Thetford with the aim of "revolutionizing" the production of coated foods available in the UK.

2 Sisters now employs 18,000 people across 42 sites in the UK, Ireland, the Netherlands and Poland. Eleven of the sites are in the UK, with seven in the Netherlands and one in Poland.

2 Sisters processes over 6 million birds per week with 3.3 million birds coming from the UK—around 20 percent of UK–reared chicken—and 2.7 million birds from its European network. In total, it has over 30 million birds on the ground. The UK birds are sourced mainly via a 50-50 joint venture with PD Hook—the UK's largest broiler chicken supplier.

From primary processing to prepared food

The company operates in three areas with three separate divisions. In the UK, there are four primary processing and slaughter facilities for chicken. A further four secondary processing facilities take meat from these sites for portioning, deboning and filleting. Several more facilities produce processed products such as breaded and roasted chicken, ready meals, savory stocks, sauces, gravies, soups and ready-to-cook BBQ meats.

It is a major supplier of raw and

UK poultry market

prepared chicken products to the big UK supermarkets, including Tesco, Sainsbury's and Marks and Spencer as well as quick-service restaurants. In addition, it produces several of its own branded products, including Buxted and Devonshire Red, which represent five percent of the business.

The expansion of the prepared food part of the business has helped to cement what 2 Sisters refers to as its "virtuous circle," which has been fundamental in helping the company respond to an increasingly challenging and competitive market. "By working to our virtuous circle, i.e. driving volumes to increase efficiency in our factories, we are differentiating ourselves from our peers," says a company spokesperson.

All Oakham birds have access to the range.

Northwestern European network

The northwestern European network is also proving invaluable in driving efficiency in a saturated UK market with high feed costs. "It's about achieving maximum efficiency and flexibility for sourcing fresh meat," according to Rabobank.

The European business currently exports large volumes back into the UK, representing about 50 percent of its turnover. "But we are also working to develop more of a footprint to supply into the retail market on the continent," says 2 Sisters. The company hopes to achieve this by transferring skills from the UK supply retail chains, leveraging its strong UK relationships.

Customer focus

These strong customer relationships set 2 Sisters apart, and "delighting" customers is a core strategy and at the heart of everything the company does. This strategy has been fundamental in helping to anchor the company in the stormy UK waters of fierce competition and oversupply.

2 Sisters says that this means spending more time with customers—about 20 percent of its time—and really understanding and responding to specific requirements. This approach requires "relentlessly innovating to please customers," which counts for a lot in the high value UK market.

For example, last year it worked with Tesco to develop a chicken product with two days' additional shelf life. This year it is working with one customer to develop a range of themed chicken products ahead of the Queen's Jubilee, which will be a key event in the UK calendar.

One of the best examples of this desire to innovate occurred around 10 years ago when 2 Sisters became the first company to develop a system that not only addressed welfare concerns, but was also affordable, bridging the gap between indoor reared chickens and the outdoor systems. It had listened to a key supermarket, Marks and Spencer, and the result was Oakham chicken—the only fresh chicken sold by Marks and Spencer and exclusive to the retailer.

Birds are reared in controlled environment barns and housed on straw or wood shavings with constant access to food and water. The temperature and lighting levels in the house are controlled by the farmers, but birds do receive natural daylight. The chickens are housed

at a maximum stocking density of 30kg/m^2. Oakham free-range birds are reared in similar houses to standard chickens, but have constant access to the range. The internal stocking density is 27kg/m^2 and the area of the range is determined on the basis of 1m^2.

Ethical model factory

Marks and Spencer's commitment to sustainable retailing—known as Plan A—is driving a more systematic change across the 2 Sisters' business and again exemplifies the company's responsiveness to its customers' requirements. Oakham chicken is produced at 2 Sisters' primary processing factory in Flixton. In 2007, Marks and Spencer, like its rival supermarkets, came under fire for labor conditions at its poultry processing plant. Its own ethical audits had revealed some worrying problems. Its response was to pilot the idea of "ethical model factories," as part of its Plan A program. This has required 2 Sisters to cut energy and water use and waste and to confront the working culture. The numbers of agency staff, which had reached 55 percent at times, have been cut, with many migrants offered permanent jobs and training and more promoted to supervisory roles. Bullying managers have been disciplined or asked to leave. The result has been a significant fall in staff turnover and increased productivity.

We are looking at a couple of broader eco initiatives, one around reducing our waste at each site

At the moment Flixton is the only "ethical model," but 2 Sisters has a broader commitment to reducing energy costs, which is part of a multimillion pound investment.

"We are looking at a couple of other broader eco initiatives, one around reducing our waste at each site and the other where we're investing in renewable projects to become more energy efficient, for example our joint venture with PD Hook with wind turbines," explains a 2 Sisters' spokesperson.

Efficiency gains

Not only is this good for relationships with all customers, who are all increasingly focusing on the environmental and ethical credentials of their supply chain, but it is paying

Upton Farm in Great Yarmouth. 2 Sisters has now installed solar panels on 28 farms and at three factories.

dividends in driving efficiencies in a more challenging market. It is one of the ways in which the company is able to offer "highest quality for lowest cost"—one of the key trademarks of the business.

"By focusing hard on our operations, our waste and our costs, we can still maintain the highest quality products but at the lowest possible cost," says the company. And now, as a much broader food company following the acquisition of Northern Foods, what about the future of the poultry business?

"The poultry business remains significantly important to 2 Sisters," says the spokesperson. "It is 50 percent of group turnover and serves a core category for consumers—the poultry business can share its strengths, and also learn from other parts of the group.

The company is confident that it is well placed to meet the challenges of the highly competitive market place head on. "We are now in more meal occasions, we are now serving a wider range of customers and we have real scale and talented people to help us grow towards our goal of £3 billion sales by 2015. ☐

› Emma Bellis is a freelance writer specializing in agriculture, food and health.

Radka Borutnova

Poultry feed and the control of fumonisins

Failure to deactivate fumonisins can lead to not only reduced production, but also higher mortality rates.

Table 1: Effects of fumonisins in poultry

Effect	Clinical signs	Reference
Decreased performance	Reduced average daily weight gain Reduced body weight Impaired FCR	Brown *et al.*, 1992; Ledoux *et al.*, 1992; Ledoux *et al.*, 1996
Gastrointestinal effects	Diarrhea	Satheesh *et al.*, 2004; Asrani *et al.*, 2006
Hematopoietic effects	Hematological disorders Increased levels of serum calcium Cholesterol and activity of AST Increased serum sphinganine and serum Sphinganine:Sphingosine ratio Reduced white blood cell (WBC) counts and depressed antibody response Increased activity of drug metabolizing enzymes activities Increased activity of the liver enzymes AST and ALT	Jand *et al.*, 1995; Leeson *et al.*, 1995; Weibking *et al.*, 1993; Henry *et al.*, 2000; Javed *et al.*, 1995, Tran *et al.*, 2005; Raynal *et al.*, 2001; Asrani *et al.*, 2006
Pathological changes	Increased weight of liver, kidney, proventriculus, heart, pancreas and gizzard Depressed thymus Liver necrosis	Ledoux *et al.*, 1992; Leeson *et al.*, 1995; Satheesh *et al.*, 1994; Weibking *et al.*, 1993; Bermudez *et al.*, 1995; Marijanovic *et al.*, 1991
Reproductive disorders	Decreased egg production, weight, and eggshell weight Decreased pigmentation, fertility and hatchability of eggs	Butkeraitis *et al.*, 2004

Poultry may be less sensitive to fumonisins than some other species; however, fumonisins can still be detrimental to bird health and consequently production of meat and eggs.

Poultry is known to be less sensitive to fumonisin exposure than pigs and horses, but this does not mean that birds are immune to the effects of this mycotoxin, or that its presence in feed does not impact on meat and egg production.

The effects of fumonisin exposure were dramatically witnessed back in 1995, when two layer farms were seriously affected. The outbreak was characterized by black, sticky diarrhea; a severe reduction in the birds' food intake, egg production and body weight; and followed by lameness and death. The mortality rate reached 10 percent, while egg production declined by 20 percent.

Analysis of the birds' diets revealed contamination with fumonisin B_1, up to 8.5 mg/kg in combination with aflatoxin B_1 up to 0.1 mg/kg. At the time of the outbreak, the risks of fumonisin contaminated feed were not fully understood, and there continues to be less than a full appreciation of its impact on production.

Growing fumonisin regulation

In the mid-1990s, fumonisins were only subject to regulation in one country. The number of countries now regulating fumonisins has increased to six, with limits for maize ranging from 1,000-3,000 µg/kg.

Attitudes toward fumonisin control vary. In Europe, fumonisins are currently regulated in Bulgaria (FB_1 and FB_2 in maize and maize products), France (FB_1 in cereals and cereal products), and Switzerland (FB_1 and FB_2 in maize). At the EU level, harmonized limits for fumonisins in food and feed are yet to be established, while in the U.S., limits

for FB_1, FB_2 and FB_3 in animal feeds currently only exist in the form of guidelines.

Lowest observed adverse effect

Available data suggest that the lowest possible adverse effect level in broilers is approximately 2 mg/kg body weight/day. This contrasts with European Commission recommendation 2006/576/EC (Table 2), which states that concentrations of fumonisin B_1 and B_2 below 20 mg/kg in complementary and complete feeding stuffs are considered "safe" for poultry.

So why should there be such a wide disparity between the lowest observed adverse effect level for broiler chickens at 2 mg/kg body weight/day and the European Commission's recommendation of 20 mg/kg feed?

The key to this difference is that the EU Commission has simply published recommendations and not set regulations. Yet, farmers, feed millers and the large integrators tend to think that by respecting these recommendations, and keeping fumonisin levels under 20 mg/kg for complementary and complete feeds, they are erring on the side of caution and that their flocks will not be at risk.

There is extensive literature on the clinical and sub-clinical effects of individual mycotoxins in various livestock species, yet the effects of mycotoxin combinations have received less attention. Fumonisins act synergistically with fusaric acid and ochratoxin A, and have additional integrations with moniliformin and T-2 toxin.

Deactivation of mycotoxins

The most widely applied method for protecting animals against

Table 2: Guidance values on fumonisins in products intended for animal feeding. *(Commission recommendation 2006)*

Mycotoxin	Products intended for animal feed	Guidance value in mg/kg (ppm) relative to feeding stuff with a moisture content of 12 %
Fumonisin B1 + B2	Feed materials Maize and maize products	60
	Complementary and complete feeding stuffs for: pigs, horses (Equidae), rabbits and pet animals	5
	Fish	10
	Poultry, calves (<4 months), lambs and kids	20
	Adult ruminants (>4 months) and mink	50

Adapted from EC/576/2006

The European Commission has published guidance on fumonisins in animal feed; however, it should be remembered that the figures are merely recommendations.

Table 3: Experimental design for fumoninisin degrading enzyme (FDE)

Treatment group	Fumonisin (ppm)	FDE (%)
Control	—	—
0.5% FDE	—	0.5
Fumonisin	100	—
Fumonisin+FDE	100	0.5

The trial involved 600 one-day-old broilers over 21 days.

Table 4: Effect of fumonisin degrading enzyme, FDE, on the average feed intake, body weight at day 21 and feed rate conversion, FCR, of broilers fed diets contaminated with fumonisin.

Treatment group	Average feed intake [g/bird]	Average body weight [g]	FCR
Control	1078bc	754ab	1.45ab
0.5% FDE	1105ab	773a	1.45ab
FUM	1034e	693c	1.52a
FUM+FDE	1043cd	739ab	1.43b

a,b,c,d,e Means within the same column with different superscripts are significantly different

The addition of fumonisin degrading enzyme to feed resulted in improved performance compared to that of birds fed contaminated feed.

fumonisins is to mix clay minerals with feed to bind mycotoxins in the gastrointestinal tract.

An alternative way of removing non-absorbable mycotoxins is through enzymatic detoxification or biotransformation. This method is defined as degradation or transformation that reduces or removes the toxicity of mycotoxins. Specific mycotoxin-degrading enzymes offer a natural way of encouraging biotransformation in the digestive tract of animals.

It is known that the 12,13-epoxide ring of trichothecenes, for example DON, T-2 Toxin, is mainly responsible for their toxicity, and its removal leads to a significant reduction in toxicity. As for zearalenone, its metabolization by esterases produces a compound that is no longer estrogenic. In the case of fumonisins, fumonisin-degrading enzyme preparation is capable of fumonisin B_1 biotransformation into non-toxic metabolite hydrolyzed FB_1.

Could enzymes be the way forward?

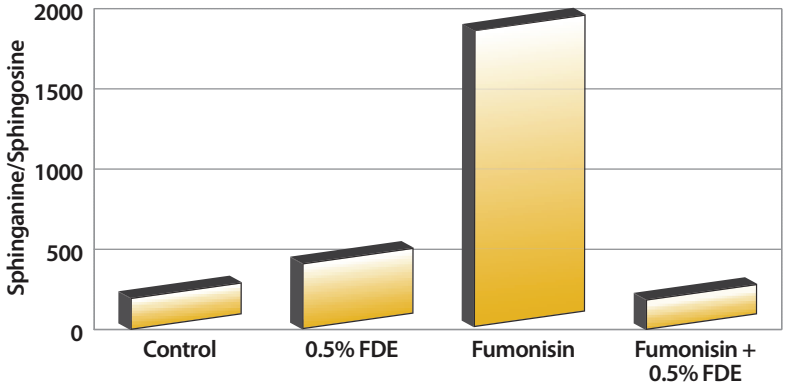
Biological methods could become the technology of choice for mycotoxin deactivation, as enzymatic reactions offer a specific, irreversible, efficient and environmentally friendly way of detoxification that leaves neither toxic residues nor undesired by-products.

A 21-day study has looked at the efficacy of fumonisin degrading enzyme preparation Fumzyme in diminishing the toxic effects of fumonisin added to broiler rations. 600 day-old male broilers were randomly divided into four treatments, with 12 replicates and 10 birds in each replicate. On a weekly basis, the individual weight of the birds and feed intake per replicate were evaluated and, at the end of the trial, feed conversion rate and sphinganine:shingosine ratio were evaluated.

The negative effects of fumonisin were evident from the first week of the experiment, with the feed intake of the affected animals inferior to that of the control group. The addition of the fumonisin-degrading enzyme improved feed intake and the final body weight of the birds in a statistically significant way compared with birds given the fumonisin. This resulted in a better feed conversion rate for the supplemented birds. The accumulation of sphinganine and shpingosine in the serum and urine is a useful biomarker for exposure to fumonisins. These free shingoid bases are toxic to most cells as they affect cell proliferation, induce apoptosis or necrotic cell death, and are associated with hepato and nephrotoxic effects. Animals that consumed feed contaminated with fumonisin showed an increase in the sphiganine:sphingosine ration when compared with the control group (Fig. 1). The addition of the fumonisin-degrading enzyme decreased these values in a statistically significant manner.

Any feed is likely to contain grains from a variety of sources, so the risk exists that a variety of mycotoxins may be present. Considering and managing the entire potential risk along with correct farm management will improve birds' health status, performance and profitability. □

Figure 1: Sphinganine:sphingosine ratio in blood of broiler fed diets contaminated with fumonisin



Birds that consumed feed contaminated with FUM showed an increase in the sphiganine:sphingosine ration when compared with the control group.

› *Radka Borutnova is product manager for Biomin's Mycofix product line.*

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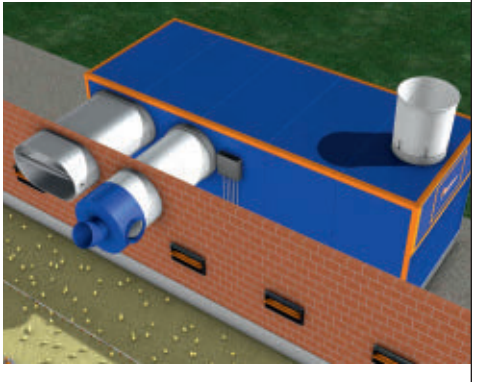

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Eduardo Cervantes Lopez

Poultry Processing Worldwide

Poultry processing and the importance of staff performance

When companies have access to the same processing equipment and facilities, it is a motivated workforce that can really make the difference.

If a company wants to ensure success, it needs to achieve high levels of productivity. This productivity needs to extend across all area, including personnel.

To better understand this, let's imagine the roof of a great house, supported by three pillars: knowledge, experience and technology. To ensure that these three pillars remain in the same place, there needs to be a solid foundation; that foundation is staff attitude.

This is the determining factor in maintaining productivity. Today, companies increasingly succeed because of the comprehensive nature of their human capital. Consequently, the daily challenge of companies operating in today's market is to grow and strengthen this capital.

If we look at poultry processing, all companies more or less have the same resources: buildings, equipment and personnel. What facilitates the achievement of Grade A quality and a good yield is developing a comprehensive quality of performance in the staff.

Processing and nanomanagement

With this in mind, it is worth considering the concept of "nanomanagement," which helps to ensure that this high level of quality is achieved. When considering the processing line, the workforce will need to possess particular characteristics in order to perform well. In selecting the best workers for the job, the following should be taken into consideration:

- They will spend most of the working day standing
- They should not be sensitive to noise
- They should not suffer from claustrophobia
- They should not be sensitive to artificial light
- They should not be averse to the sight of blood, or to having to deal with feathers, fat, bile or feces
- Walking on wet floors, that may also have fat and blood, should not bother them
- They must have manual dexterity with scissors, knives and sharpeners

The ability to cope with these requirements will need to be matched with a good working attitude. Factors to consider will be:

- Good interpersonal relationships and the ability to work in teams
- Attention to detail
- Desire to feel productive
- Punctuality

In demanding these qualities from staff, companies need to offer something in return. There should be good facilities, including a cafeteria and lavatories. There also needs to be a clear route for career progression, so workers can become supervisors or plant managers. Career progression must be accompanied by strong, comprehensive training; the basics of processing from start to finish must be fully understood along with the relationship between the various activities preslaughter and during processing.

Processing workers must be suitable for the tasks they perform. One example is being able to spend most of the day standing and being able to cope with tasks some may find unpleasant.

Shackles should be within easy reach, not only to make hanging faster but also to reduce the onset of tiredness.

Ergonomics and productivity

Companies must ensure that each workstation is ergonomically designed. Every worker should feel comfortable throughout the workday. The following should be taken into account:

- The height of the shackle on the overhead conveyor— platforms should be easily adjustable to the height of each worker

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Staff performance

- Shackles should be within easy reach for workers
- Light levels should be adjusted to each section of the plant. For example, there should be darkness in the area where live birds are hung, yet there are special blue lights that do not disturb birds, but that allow them to be seen without tiring the eyes of workers
- Adequate ventilation and the replacement of ambient air
- All necessary health and safety equipment maintained in a good state, for example, protective glasses, masks, caps and aprons
- In some sections of the plant, music can be played to help maintain a cheerful atmosphere

Addressing the above can result in improved performance. To further illustrate this approach, we can look at the work station: hanging live chickens on the overhead slaughter conveyor.

Considered placement of equipment can cut down on the physical stress experienced by staff, which allows them to work efficiently for longer.

Ergonomic requirements will vary from country to country. In many cases, platforms that adjust to the height of the operator can be used in order to minimize the worker's effort and consequently tiredness, especially in the arms and the back. The height from the floor to the top of a cage should be 90 cm.

Shackles should be positioned over the upper edge of the area where the chickens are removed from the cages. This way, when they are attached to the conveyor, workers' arms do not have to stretch to the maximum, but rather form a slight angle. Cages should be slightly tilted so that chickens move down the slope of the cage floor and towards the worker, saving time reaching for birds inside the cage.

Taking these factors into account, a worker can comfortably hang an average of 1,800 birds per hour.

To learn more, read: Attention to detail and cost control in poultry processing
www.WATTAgNet.com/150152.html

Satisfaction and performance

In many plants that have either reached or surpassed such high

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production levels, managers take the time to ensure that workers operate in an atmosphere that encourages them to be enthusiastic throughout the workday. To this end, they consider every aspect of the day in advance—nanomagement—that may influence the self-esteem of workers.

Some examples of this might be treating everyone with respect, and as viewing relationships as being with coworkers, not superiors and subordinates. Strengthening the bonds of friendship enables managers to understand the wants and needs of workers, with the aim of helping to achieve them.

The result of adopting this attitude is that there is greater acknowledgement and gratitude among staff, and so they perform not due to obligation, but through reciprocity, improving their own welfare and collaborating for the welfare of the group as a whole.

In those companies that achieve high performance levels, work is implemented with the philosophy that, "If the company wins, the staff wins." Salary is not everything. Feeling good in your job is highly important. □

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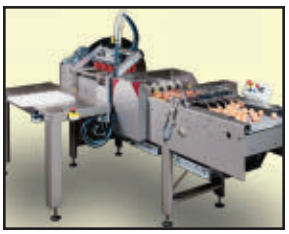

and positioned points down. The setter trays are manually positioned by the operator, where the OVOSET will automatically and gently place the eggs onto the tray. The OVOSET can be integrated for egg collection on-farm, as well for incoming egg handling in moderate capacity hatcheries.

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www.tuffigorapidex.com

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