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APRIL 2017

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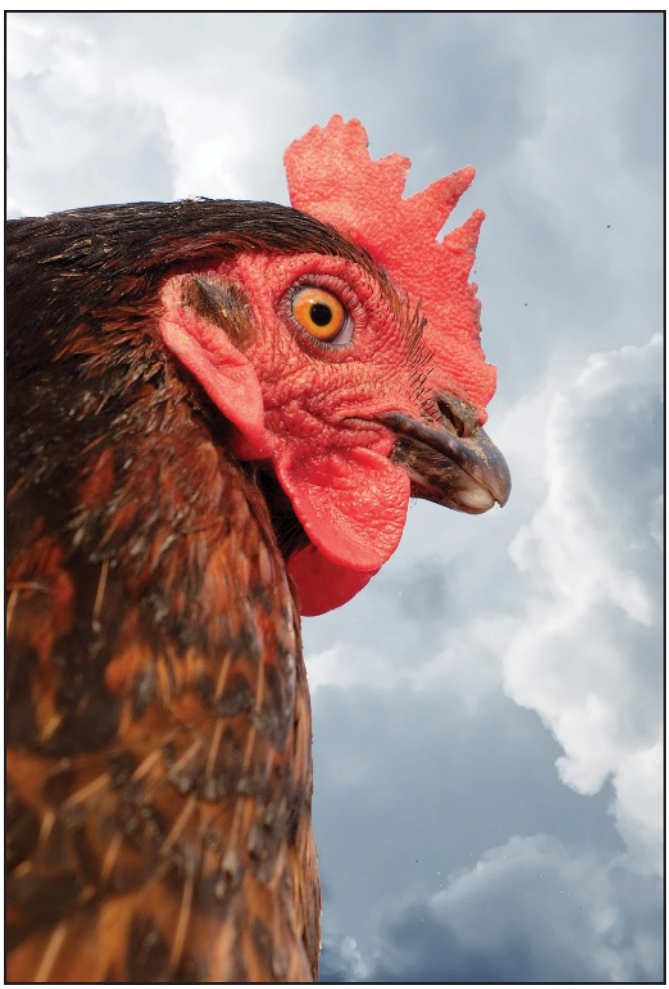
Cover Story

Features



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Departments

Editor's Comment

by Mark Clements

Efficiency key to successful production

This issue leads with a look at prospects for the Russian broiler industry during the year ahead.

Growth will be lower for the Russian industry after years of rapid expansion in consumption and production. The industry has succeeded in largely meeting domestic demand; now it must introduce further efficiencies and look to increasingly sell overseas.

As the Russian broiler market has approached maturity, the sector has experienced volatility, with smaller, less-efficient producers disappearing. This rationalization is expected to increase, and companies face an uncertain future if they are unable to benefit from economies of scale or produce good product at low prices while still maintaining margins.

Russia is importing less poultry meat, but hop across the border and there is a country that is importing more chicken. As our guest writer Todd Southerland explores in his examination of who will meet China's growing demand for poultry meat, China wants more chicken and it will not all be home-produced.

Healthy approach

There is a strong focus in this issue on nutrition and health. Our WATT 100 series article looks at gut health, which is often referred to as the key to efficiency. It is a topic of increasing interest as producers need to rely less on antibiotics to control pathogens and boost performance.

@ Follow Mark Clements in his blog
www.WATTAgNet.com/MarkClements.html

It is important to understand the benefits of what is fed to flocks and the potential risks of any feed. This issue brings you key findings from 10 years of mycotoxin survey data.

Our regular visit to the world of poultry processing examines how, from harvest to packing, there are numerous activities and practices that can frequently lead to waste, and how making often quick and simple adjustments can lead to an increase in yields. ■

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Corporate Headquarters
303 North Main Street, Suite 500,
Rockford, Illinois 61101-1018 USA
Tel: +1 815 966 5400

Publisher, International: Greg Watt
gwatt@wattglobal.com

Publisher, N. America: Steve Akins
sakins@wattglobal.com

VP/Director of Innovation and Data Development: Bruce Plantz
bplantz@wattglobal.com

Director of Content: Terrence O'Keefe
tokeefe@wattglobal.com

Director of Global Digital & North American Agribusiness Sales
Jeff Miller; jmiller@wattglobal.com

Editorial Team

Editor: Mark Clements
mclements@wattglobal.com
Tel: +44 7866 475 388

Digital Content Director: Tara Loszach
Nutrition Editor: Ioannis Mavromichalis
imavromichalis@wattglobal.com
Senior Editor: Lisa Kirschner
Associate Editor: Ann Reus
Staff Reporter: Roy Graber
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Social Media & SEO Editor: Kathleen McLaughlin

Art/Production Team

Creative Director: Joe Cabusao
Senior Art Director: Tess Stukenberg
Production Manager: Jim Riedl
jriedl@wattglobal.com
Advertising Production Coordinator: Connie Miller

Sales Team

Northern Europe, Asia, Africa
Frans Willem van Beemen
fvanbeemen@wattglobal.com
Tel: +31 344 653 442; Fax:+31 344 653 261

Southern Europe, Latin America
Tineke van Spanje
tvanspanje@wattglobal.com
Tel: +31 495 526 155; Fax: +31 495 525 126

Southeast Asia
Dingding Li, dingdingli@vip.163.com;
Tel: +86 137 640 39062

USA/Canada
Pam Ballard, pballard@wattglobal.com
Tel: +1 815 966 5576; Fax: +1 815 968 0941
Mary Harris, mharris@wattglobal.com
Tel: +1 815 980 5938; Fax: +1 847 908 7551

Classified
Craig Greuel, cgreuel@wattglobal.com
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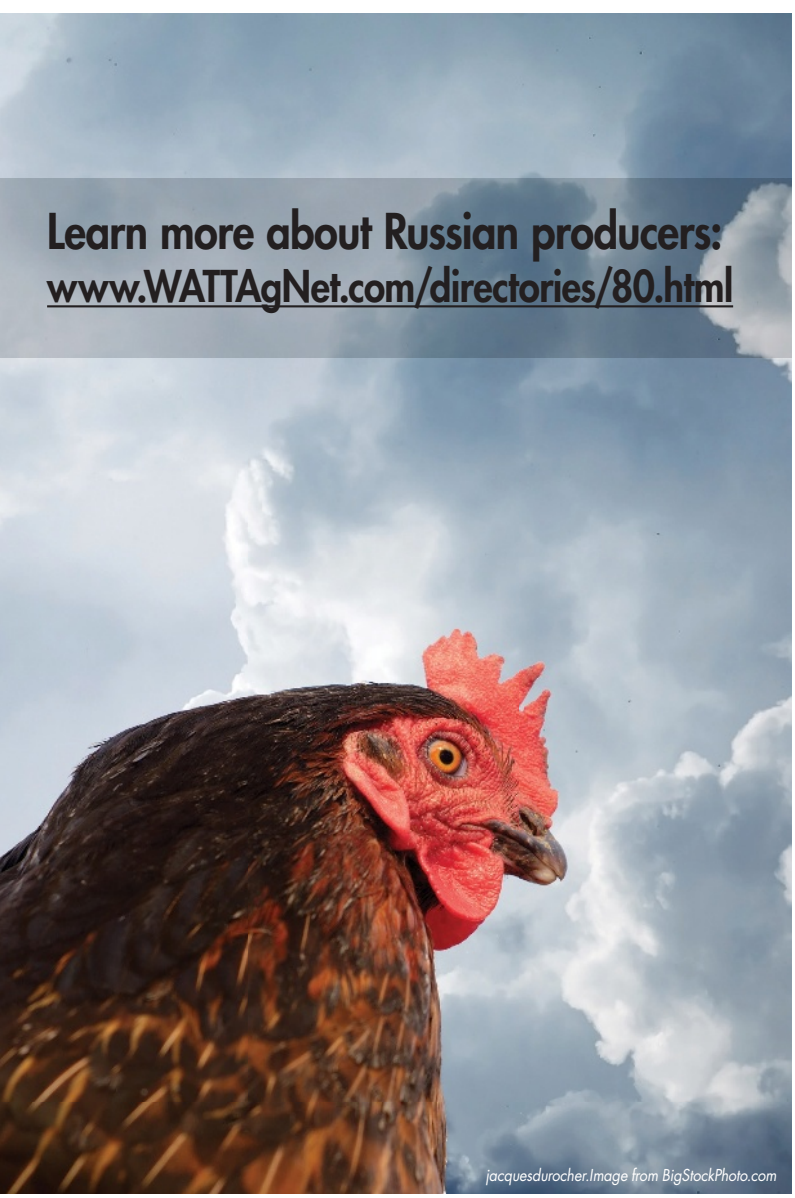
Russian broiler producers facing flat growth in 2017

The long expansion enjoyed by Russia's broiler producers has ended, and producers must now prioritize efficiency over volume.

MARK CLEMENTS



jacquesdurocher.Image from BigStockPhoto.com

Russia's broiler producers can expect a difficult year ahead. The country is now largely self-sufficient in chicken meat, consumption levels on the domestic market are expected to remain flat, and the export market is hampered by the strengthening ruble and outbreaks of avian influenza. Alongside these difficulties, changes to government support schemes are causing uncertainty, particularly for smaller companies.

Slowing poultry meat output

Russia's poultry producers are now, in some ways, having to face up to their own success, as 20 years of strong growth comes to an end.

After increasing by 2.4 percent last year, Russian broiler production is forecast to grow by only 0.8 percent this year, reaching 3.75 million metric tons (MMT), reports the U.S. Department of Agriculture's Foreign Agricultural Service. While still positive, the figures are in marked contrast to the growth rate achieved over the previous two decades, which averaged 14 percent per year.

Russia has become largely self-sufficient in poultry meat, and imports are falling. While exports may present a new opportunity for Russia's producers, selling overseas is not without its difficulties. The strengthening ruble, along with disease outbreaks, have seen Russia lose some of the export markets it has already won, leading

to a glut of chicken meat on the home market, and downward pressure on prices.

Imports are expected to continue falling and exports to rise, particularly as the government is now offering help to companies wanting to sell beyond Russian borders, yet the sector still needs to undergo further change.

Home market key focus

While exports will become increasingly attractive for Russia's chicken producers, in the immediate term their key focus remains on the domestic market, and the industry will need to focus on efficiency, not volumes, to flourish.

Despite the 2.4 percent rise in production last year, several of the country's major broiler-producing regions reported falling output, and smaller companies have found it increasingly difficult to compete.

Producers have been hit not only by restrictions on exports causing oversupply at home but, from early 2015, consumer prices failed to keep pace with the rate of inflation. This, combined with higher compound feed prices in the first half of last year, resulted in a particularly hard squeeze on margins.

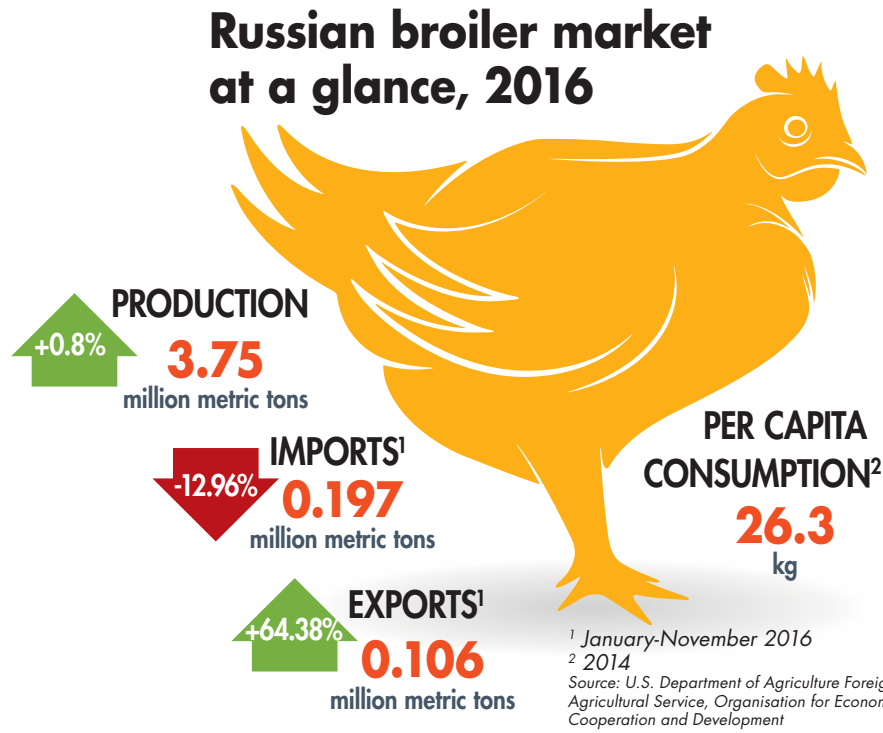
The decrease in profitability and weak demand not only led to producers scaling back production plans last year and for the first quarter of this year, but in some cases shutting down capacity, particularly after mergers or changes in ownership.

While increased volume sales remain to be seen at home, 2017 has seen margins improve for Russian producers. Feed prices are now more favorable, after a record grain harvest, while the wholesale price for whole chicken rose by 32.1 percent between January 2016 and January 2017, offering some solace for the year ahead.

Another bright spot for producers is that, after two years of recession, the closing months of 2016 suggested that an improvement in the Russian economy is starting to take place. The contraction in the retail trade is slowing and inflation is moderating. While real incomes have been falling, the number of poor in the country is no longer increasing, and the Russian economy is expected to expand by 1.5 percent this year.

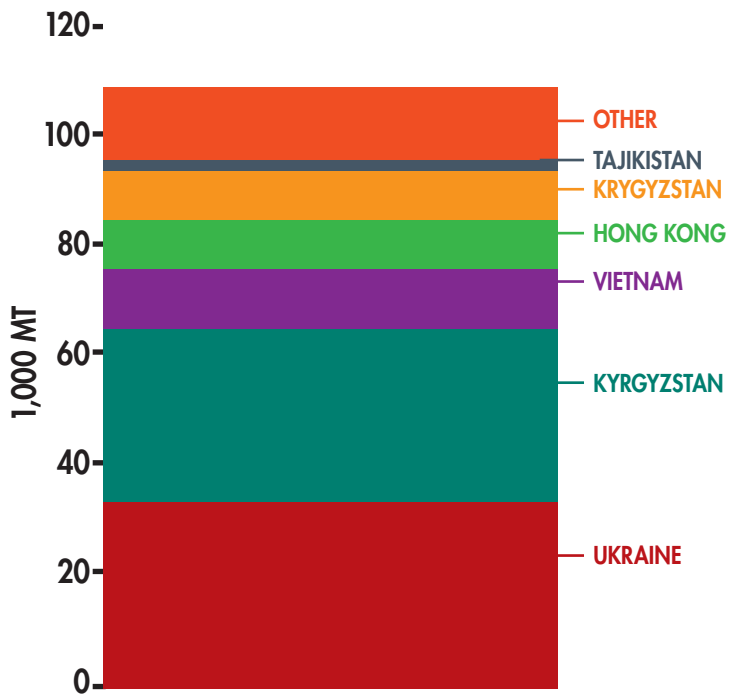
Despite this turnaround, production remains constrained by price-sensitive consumer demand, competition from other meats, and limited access to funding.

While the Russian economy may be returning to health, a new uncertainty has emerged for Russian producers. Russia has focused on import substitution and self-sufficiency and, where poultry meat production is concerned, this has been largely successful.



The high growth rates enjoyed by the Russian poultry industry have come to an end as the country has reached self-sufficiency for poultry products.

Russia's broiler meat export markets, 2016 (Jan-Nov)



U.S. Department of Agriculture/Federal Customs Service of Russia

Russian poultry producers are increasingly looking overseas to make up for sluggish demand at home.

However, the government has redesigned its agricultural support program for 2017, moving away from production growth and instead focusing on operational efficiency. For those companies able to access funding and investment, produce more efficiently, and benefit from economies of scale, the outlook may be bright. For smaller companies, however, the outlook is not so clear.

Moving to a new distribution system for subsidies has increased uncertainty, and many broiler producers, particularly those of a small or medium scale, are excluded from preferential credits for operational needs and development. Those companies located in regions where broiler production is not classified as a priority industry will be hardest hit by the change, suggesting a further consolidation of the industry is about to take place.

Imports and exports

The countersanctions on food imports imposed against several countries are expected to continue until at least the end of this year.

Forecasts suggest imports will fall by 15,000 metric tons in 2017 to 200,000 metric tons, and that this downward trend will continue beyond the year-end. The rate of decline, however, will be influenced by the strength of the ruble. If the ruble continues to rise, local producers will have to continue to look to efficiencies or risk losing out to cheaper imports.

The rising ruble is already thought to be hampering exports, forecast to reach 115,000 metric tons this year, lower than some had predicted when the currency was weaker.

However, the ruble had not been the only difficulty confronting Russia's broiler meat exporters. Outbreaks of highly pathogenic avian influenza have also seen Russian broiler meat shut out of several markets.

Even in the absence of disease, export markets have not proved easy for Russian producers and there are reports that producers have not always been able to adjust their product offering adequately to align with the demands of foreign markets. Yet, demonstrating how the industry has matured and how government priorities for agricultural production is changing, the Russian government is supporting trade missions to help the poultry industry penetrate overseas markets. Strategic markets are thought to be the countries of the former Soviet Union, the Middle East and Asia. ■

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VIV Russia will be held in Krasnogorsk, Russia.
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VIV Russia to showcase industry's developments

Feed to Food concept will once again be on display.

WHEN AND WHERE

Crocus Expo International Exhibition Center
Krasnogorsk, Russia
May 23*-25, 2017
10 a.m. 6 p.m.
*May 23 is by invitation only.
www.vivrussia.nl

In its role as the nation's platform on animal production and meat processing, VIV Russia will showcase the industry's developments by the Feed to Food concept.

Feed to Food brings together supply and demand within the complete animal protein chain. The driver behind the chain concept is that animal feed and animal health are vital for meat quality and safety. VIV Russia will represent every step in the meat production process.

Consumer attitudes and behaviors toward food are rapidly changing on a global scale. Demands for healthy, convenient, fresh and safe products are increasing. Packaging is becoming more important with the selling process as fresh foods are expected to be conveniently packaged and easy to store.

Animal production and processing is facing a difficult time. After mad cow, classical swine and avian influenza, consumers are skeptical and want guarantees about the meats they eat. Meat safety can only be guaranteed if every step in the meat production chain is monitored and controlled.

Today's meat business is about improving yield, quality, hygiene, traceability, portioning, performance, profitability, efficiency and transparency.

VIV Russia attendees will be given the opportunity to stay current with many of these topics. ■

By gracious powers so wonderfully sheltered,
and confidently waiting come what may,
we know that God is with us night and morning,
and never fails to greet us each new day.
(Dietrich Bonhoeffer)

Heartbroken, we say goodbye to my dear husband, to our beloved father, father-in-law and grandfather

Josef Meerpohl

* 23 January 1932 † 6 March 2017

We are thankful for the time we had together. You will be missed dearly.

With love and gratitude

Hety Meerpohl
Eva and Chrise Bitter with Moritz and Nicole, Leo, Paul, Marlene
Bernd and Silja Meerpohl
Dirk and Dr. Jutta Meerpohl with Helena, Conrad, Emma and Dirk Moritz
Anne and Matthias Koos with Rasmus and Greta

Big Dutchman

The employees of the Big Dutchman group mourn the loss of their senior CEO

Josef Meerpohl

With deep affection and much respect, we say goodbye to an extraordinary person and a courageous and visionary businessman. Josef Meerpohl turned a small sales agency into a world market leader – and never tired of expressing the appreciation he felt for his employees.

Humorous and motivating, always focused on his cause, he was a great role model for all of us. Approachable at all times, he was happy to provide his invaluable advice until the end, but also gave warning whenever he saw the need.

He will be remembered with gratitude and admiration.
We extend our special condolences to his family.

Management and staff of the Big Dutchman group

Who will supply **China's growing appetite for poultry?**

Significant opportunities await whomever may be able to satisfy China's growing appetite for safe poultry meat.

BY TODD SOUTHERLAND,

Todd Southerland

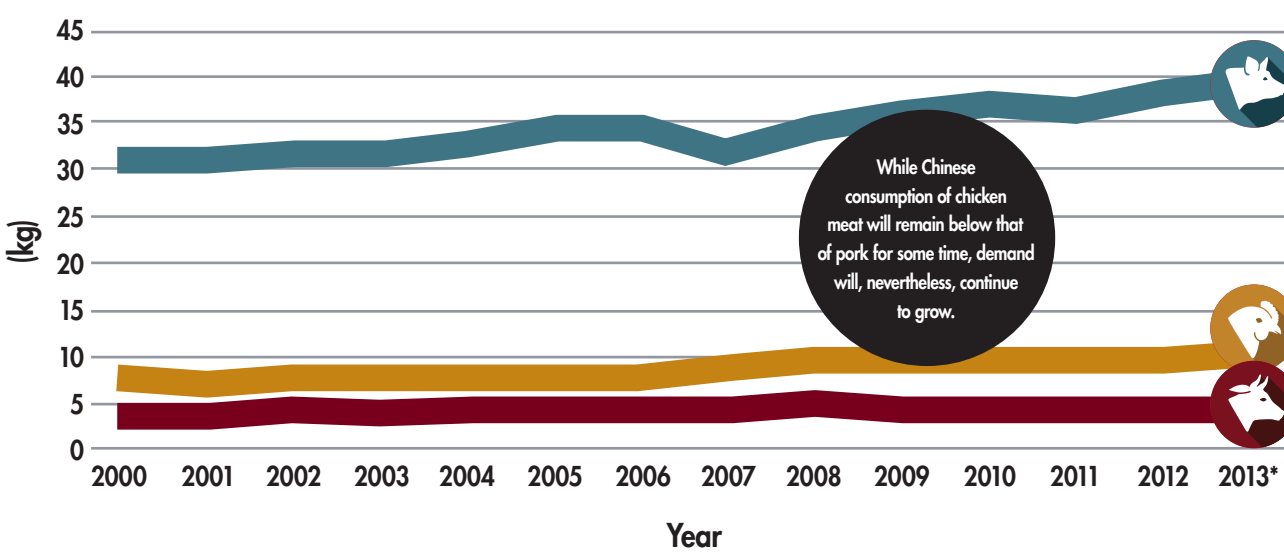
During the past 30 years, Chinese meat and poultry consumption has more than quadrupled, as economic conditions in the country have improved and the population has become increasingly urbanized.

While chicken will not soon overtake pork consumption in China, it is being eaten much more regularly, particularly as urban Chinese citizens become accustomed to availability through fast food restaurants.

For example, since opening its first Kentucky Fried Chicken (KFC) in China in 1987, YUM! Brands has built more than 5,000 KFC restaurants in 850 Chinese cities. This success has been replicated by other domestic and international fast food chicken brands and, from any perspective, this rise in availability has boosted consumption over the past several decades, as shown in the chart below.

Despite this strong growth trajectory, Chinese per capita meat consumption remains low – for

China's per capita meat consumption 2000-13 (kg)



Source: Based on Earth Policy Institute analysis of U.S. Department of Agriculture and U.N. data.
** estimated*

example, it has only reached half that of the average American. As such, it seems likely that demand has plenty of room for future growth if consumer desires are met, but which poultry meat exporting country will be the main beneficiary if this becomes reality?

Trusted sources

Chinese trust in its food supply has been waning for several years, and the 2013 Chinese purchase of U.S. pork conglomerate Smithfield Foods was the clearest signal yet of the country's reliance on foreign meat processors to safely supply rising demand. After all, China consumes nearly half of global pork production, and this acquisition solved many obvious challenges facing its ability to meet consumer demand.

Similar obstacles likely remain with respect to chicken, and there has been a notable falling off of trust in poultry meat over recent years. Yet demand for chicken is still expected to grow as total meat consumption in China is forecast to increase by 50 percent over the next decade. The manner in which China addresses a potential shortfall in chicken may not, however, involve the U.S. processing industry, as was the case with the pork sector.

Asia to drive 40% of world poultry consumption growth:
www.WATTAgNET.com/articles/22173

There are several factors involved in this potential exclusion.

First, the U.S. poultry industry has ample opportunity for growth domestically, as chicken has far outpaced the consumption of other proteins for several years. U.S. processors are not lacking for distribution markets, in particular for higher margin cuts of white meat that are preferred by most Americans.

Additionally, politically motivated headwinds between the two countries pose yet more challenges. Moreover, the new U.S. administration may lessen any incentive for the country's processors to press for the development of a Chinese trade channel.

What remains is a Chinese market poised for long-term consumption growth in which U.S. processors may not stand to directly benefit.

Brazil to the forefront?

Brazilian chicken processors appear to be the obvious beneficiaries of China's growing demand for poultry meat, as a weakening real — particularly when combined with a strengthening U.S. dollar — has made Brazilian products more affordable, while U.S.-China trade restrictions have made availability sporadic.

BRAZILIAN CHICKEN PROCESSORS appear to be the obvious beneficiaries of China's growing demand for poultry meat…

While Saudi Arabia and other countries in the Middle East remain primary export markets for Brazil, China is expected to be Brazil's leading growth poultry market for 2017. And the Brazilian chicken industry is far more dependent on trade, as more than 30 percent of Brazilian chicken is typically destined for export markets, compared with the U.S., which exports 18 percent of its chicken.

As Chinese demand for chicken continues, U.S. processors are capable of filling that need, but it is likely that Brazil will be the beneficiary of this demand growth. Time will tell if the barriers that exist to U.S.-China poultry trade will diminish, allowing it to compete for a part in this growth opportunity. ■

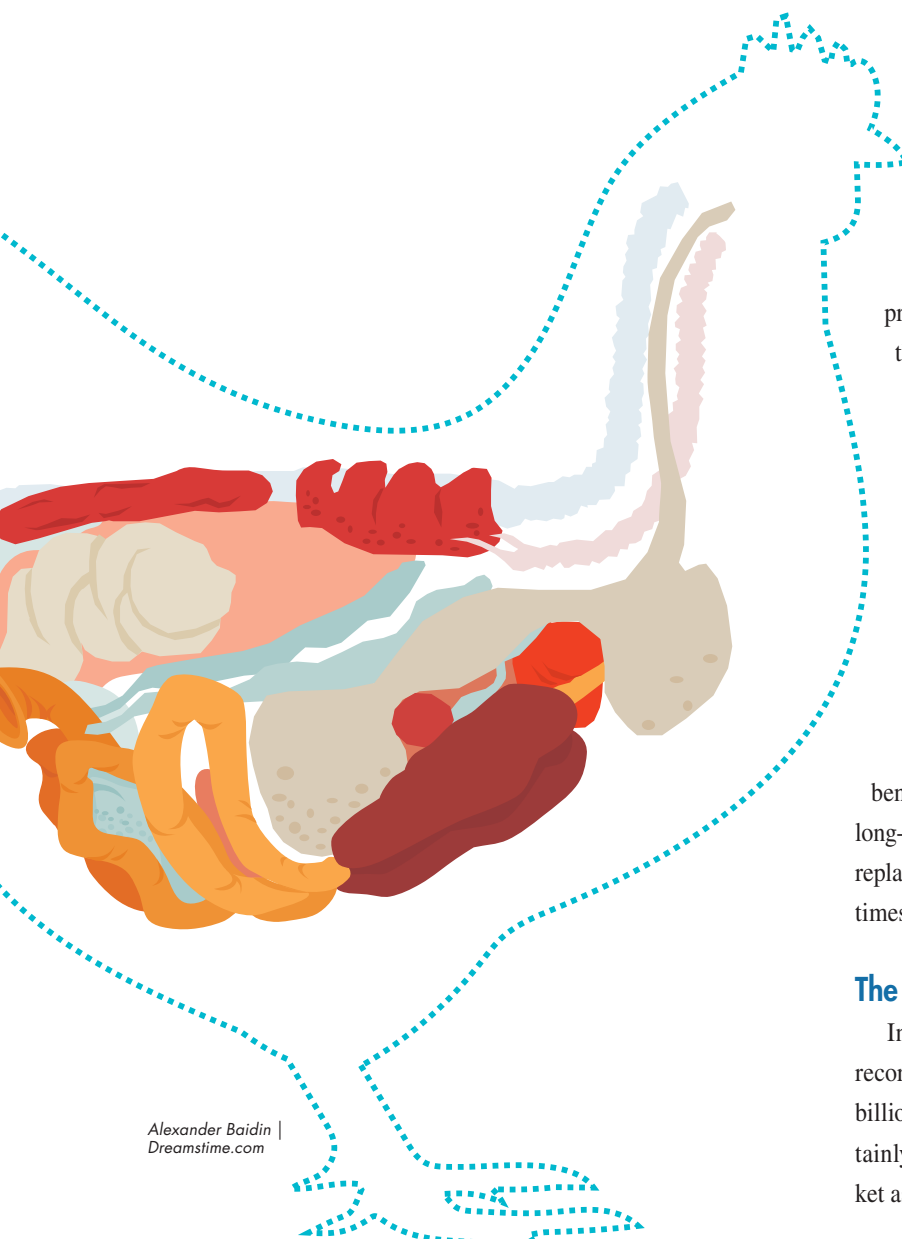
Todd Southerland, senior vice president and food and agribusiness industry manager at SunTrust Bank: www.suntrust.com

This is the fourth article in WATT Global Media's 100-year anniversary series.

Gut health additives: four possible future scenarios

What does the future hold for the business of gut health additives during the next decade?

BY IOANNIS MAVROMICHALIS



Alexander Baidin | Dreamstime.com

"Antibiotics are dead. Long live gut health additives!" Indeed, this could very well summarize the prognosis by any health or nutrition professional when pressed for a quick answer about the future of gut health additives in the years to come. And, without giving it a second thought, they could be right, no? After all, antibiotics are being removed from an increasing number of feeds throughout the world, and we can all agree that at least these old compounds will not make a comeback — ever.

So gut health additives must continue taking their place, and what a great selection of additives we have. Even additives with no direct claims on antimicrobial activity try to benefit from this unexpected turn of events that saw long-established and inexpensive antibiotics being replaced by previously unheard of additives, at many times the cost and considerably less efficacy.

The global additives business

In fact, the global additives business is growing at record speed, and it is estimated to exceed USD$20 billion within a few years. Gut health additives certainly make up an increasing proportion of this market as other products, such as amino acids and flavors,

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appear to have reached maturity. Looking at this bigger picture, it is no wonder that new additives are introduced each year and old ones continue to enhance their claims. New companies also continue to emerge, trying to market new and old products to a shrinking clientele that is looking for immediate solutions now more than ever. After all, we still do not know how to replace antibiotics effectively, inexpensively and constantly; in other words, we have considerable room for improvement and growth.

If we were to consider the business of gut health additives for the next decade, we would have to ponder over all possibilities, even the most extreme. It is logical to assume that each scenario has its own proponents, especially when jobs and businesses are affected by the success or failure of all other possible scenarios. This remains a fluid market where all outcomes are possible. Here is what I believe could happen, in no particular order.

1 Nothing will change

Antibiotics will continue to be banned in even more countries, reaching a level where they will be considered virtually withdrawn from the global market. In contrast, the current trend to use the existing gut health additives will continue and even increase. New additives will find it harder to be registered and share a piece of this market. According to most professionals, this is the most likely scenario, at least for the foreseeable future. Based on this assumption, many new players are considering entering the market and others are expanding their portfolio, whereas only a few continue to investigate new additives.

The real danger in such an outcome comes from the consolidation in buyers and suppliers. A shrinking number of buyers (those who feed animals) will look to buy an increasing number of additives from a very small number of suppliers (manufacturers) — hence the "supermarket" effect in which all suppliers will sell all additives up to the point that these additives will become commodities with low margins and standardized specifications. This will definitely benefit the buyers, but it will ensure the same fate to smaller additives suppliers as that experienced by most premix manufacturers: extinction.

2 A super additive will emerge

This is the dream of every researcher and additive supplier. It has happened before, and it can certainly happen again. Lamentably, this will also probably mean this new additive will enjoy a narrow window of success before being copied, regulated or replaced by other products. Being first is important, and additive suppliers acknowledge this fact by spending vast sums of money on research. Some will ask what is left to discover, especially after the sprint of research activity in the past 20 years, and perhaps they are right. Others point to the undisputable fact that new additives, even the best ones, will have to face a battle uphill, not only against fierce competition from other additives, but also from an increasingly difficult regulation framework.

Despite all of these difficulties, and if I were to make a bold prediction here, I would say any new super additive would no longer be feed-borne; I believe it will be something administered through the water, the next frontier in nutrition and health management.

Read more online: Good poultry gut health needs a broad approach, www.WATTAgNet.com/articles/24181

3 Microbes will produce their own additives

It is surprising how many drugs and additives are produced today by microorganisms, such as bacteria and yeasts. What if these same additives and drugs were to be produced in the gut by specifically designed microorganisms? Does the world of direct-fed microbials (probiotics) hold the key to our future?

This is at least something to discuss with probiotic suppliers. In fact, there are already products that claim antimicrobial action against *Salmonella*. They are based on yeasts and bacteria. Here the keyword is antimicrobial peptides, also known as "bacterial or yeast biological warfare." There is still much work to be done, but the beginning is interesting and very promising. Questions remain, and the most important one is whether these antimicrobial peptides are similar to the very same antibiotics being banned. If yes, then I foresee a quick death to this technology, as we will be coming back to the original problem of enhancing bacterial resistance to human antibiotics. I do not believe this will be the case, but it is worth investigating before misinformation causes misregulation.

MOST EXPERTS BELIEVE BUSINESS will continue as usual, but I disagree.

4 New drugs will emerge

If we were a pharmaceutical company sitting on millions of research dollars and employing the best minds available, we would definitely not want to sit idle watching our antibiotic business being overtaken by gut health additives, especially now that they are still not 100 percent effective in replacing our banned antibiotics, right? But what could we do? Should we use our ample resources to find new molecules, new drugs that could be used in animals without causing resistance to human-level antibiotics? And while we do that, would it not pay to launch a massive campaign to inform everyone about how harmless our new products will be and how inexpensive and effective they will be when used properly?

A dream, you say? Indeed, it is a dream that cannot be easily transformed into reality, and this is why most antibiotic suppliers are buying into gut health additives, trying to maintain their clientele and recover part of their business — but they will fail as this is not their core expertise. For a few visionaries, this is not a dream but rather a challenge. Indeed, some are already working hard to find these "nonantibiotic" drugs. Some preliminary signs indicate that the dream will materialize, but there is still no estimated time of "arrival." Could this be the long-term solution to gut health management?

What to do in case of a disaster?

As mentioned, most experts believe business will continue as usual, but I disagree. I believe we will see a new upheaval in the gut health business, most likely caused by probiotics or new drugs. In this scenario, most current gut health additives will become obsolete, and the change will be a rapid one.

To guard against such an unpleasant scenario, some additive suppliers are looking into what benefits their products have beyond the boundaries of gut health. Others try to create a niche for their class of additives by tying them up with a feed formulation matrix variable — an almost impossible task. Others work hard to make their additives so effective or multitasking that they become indispensable. All of them, however, are aware of the impending danger, and in their minds there is a pressing question: how to make their additive(s) as successful as phytase — something the computer picks up automatically. But even the successful enzyme phytase faces an uncertain future; what if phosphates become cheap again? Impossible, you say? Perhaps, as impossible as antibiotics coming back? We shall soon see. ■

This is the fourth article in WATT Global Media's 100-year anniversary series, which looks at key drivers that will shape the future of the worldwide poultry industry.

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11 mycotoxin survey lessons to reduce poultry feed risks

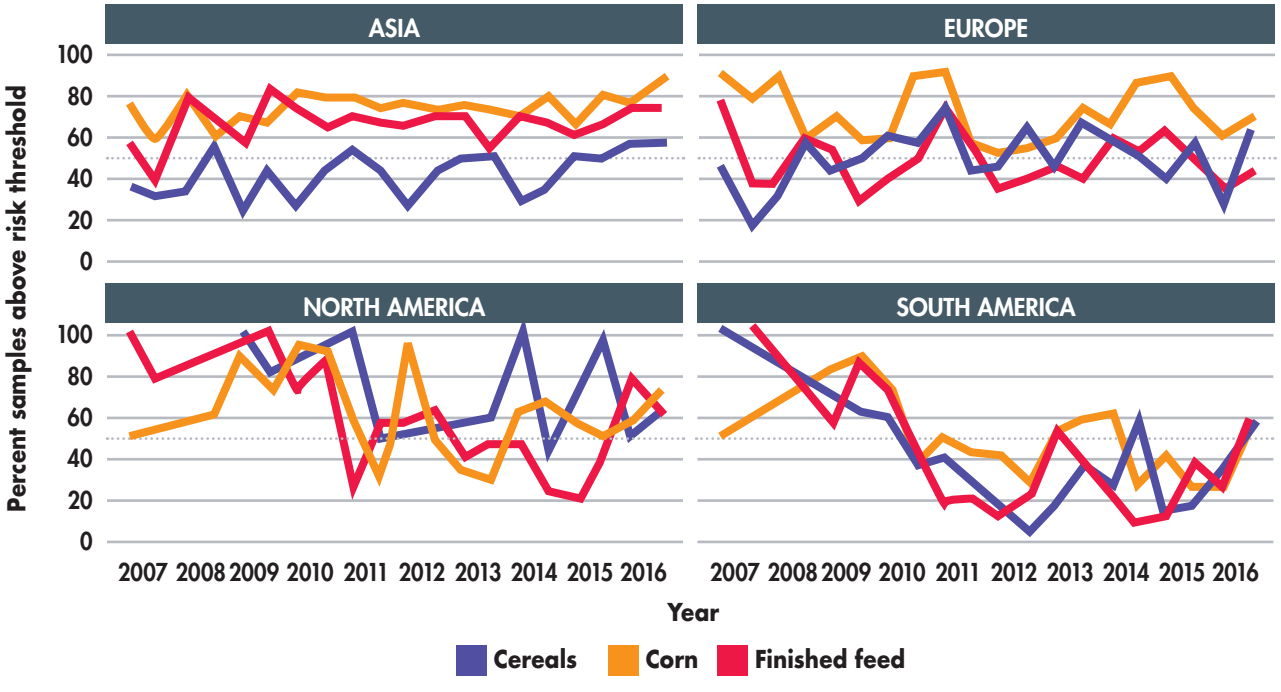
A decade-long mycotoxin survey has revealed which fungal species present the major potential risks in poultry feed, and how contamination can vary according to geography and climatic conditions.

BY DR. TIMOTHY JENKINS

The presence of toxic fungal metabolites has long been associated with impaired health and performance in poultry flocks. However, several specific lessons for the poultry industry have emerged after analysis of a decade of worldwide mycotoxin occurrence data.

Much of the risk to broilers and laying hens comes from mycotoxin-producing Fusarium species infecting crops in the field. One major example is head blight of cereals, caused by *F. graminearum* and *F. culmorum*, both able to produce deoxynivalenol

Figure 1. Changes in mycotoxin risk for poultry around the world for the decade from 2007 to 2016.



For most years in most regions, the probability of encountering mycotoxins is greater than 50 percent.

(DON) and other trichothecene toxins as well as zearalenone (ZEN). The same fungi can cause ear rot in corn, as can the fumonisin (FUM)-producing *F. verticillioides*. These three mycotoxins have presented the greatest risk to poultry during the past 10 years.

2 Sometimes, mycotoxin levels can increase in corn and cereals in one season but quite often the trends are different (Figure 1). A risk assessment based on the proportion of raw commodity and finished feed samples for which at least one mycotoxin was above the risk threshold (Table 1) reveals an obvious fluctuation from year to year.

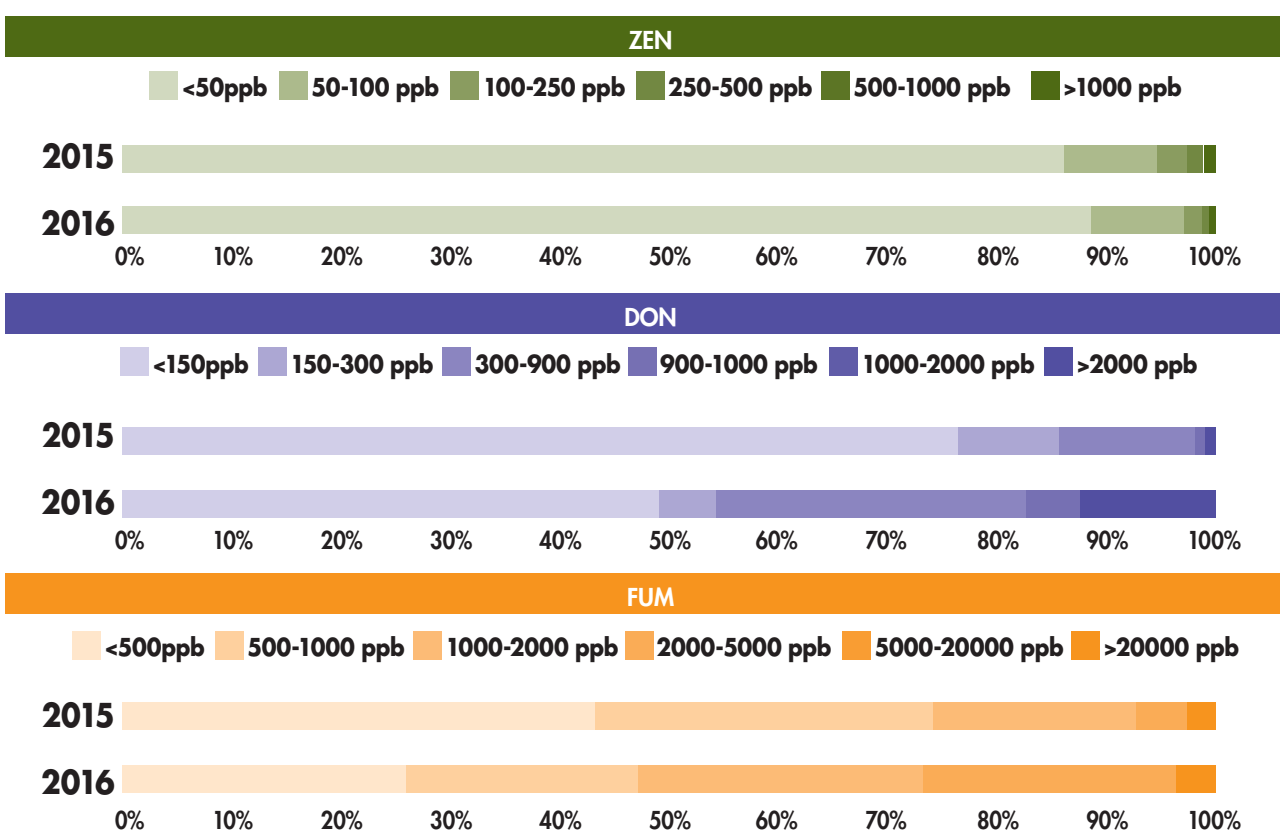
3 The risk for finished feed often tracks the pattern of corn for six monthly fluctuations in each of the four continents represented in Figure 1. This is to be expected, given corn's prominence in poultry

Table 1. Recommended mycotoxin risk thresholds for poultry

	Parts per billion (ppb)
Aflatoxins (Afla)	20
Zearalenone (ZEN)	50
Type B trichothecenes e.g. deoxynivalenol (DON)	200
Type A trichothecenes e.g. T-2 toxin	50
Fumonisins (FUM)	1,500
Ochratoxin A (OTA)	10

Mycotoxins may impair poultry health and performance at levels lower than regulatory or guideline maximum levels.

Figure 2. The changing risk of finished feed in South America, 2015-16.



The occurrence and concentrations of fumonisins and deoxynivalenol rose considerably from 2015 to 2016.

11 MYCOTOXIN SURVEY LESSONS TO REDUCE POULTRY FEED RISKS

diets. Depending on the subregional feed materials, the levels in feed will also be affected by cereal mycotoxin levels as well as other feed sources.

4 Binders may not be sufficient to fully guard against common mycotoxins. Although a proven product can safely and effectively bind aflatoxins, an adsorption strategy is less effective against deoxynivalenol, zearalenone and fumonisins. Given the occurrence of these major mycotoxins, an effective biotransformation strategy may be preferred.

5 Weather conditions largely determine the field-grown mycotoxin risk. Rainfall has a particular influence as it is conducive to fungal infection, but timing is important.

The 2016 cereal harvest in much of Europe registered high levels of DON due to rainfall at the crucial flowering time of crops. The risk in southern Germany was, for instance, generally greater than in northern Germany, due to the difference in weather patterns. The risk in 2016 European corn did not see the same dramatic increase because the rainfall did not coincide so much with the silking period of corn, although it still remained at a slightly higher risk for mycotoxins compared with cereals in the latter half of the year. Regional variance in weather – a key driver of mycotoxin patterns – means vigilance is warranted in the face of common and unexpected threats.

6 Given the changes in levels and types of mycotoxins that occur over time and between even localized parts of regions, monitoring is important and strategies to address mycotoxin threats present should be proven for the broad range present.

7 A combination of deoxynivalenol and fumonisins can worsen the incidence and severity of coccidiosis in poultry.

8 Low risk does not mean no risk. Even within a relatively small country such as Austria, there are large differences in DON levels in corn that have been statistically linked with rainfall occurrence around the silking period. This means that, even in a year of low average occurrence, we still need to be mindful of the presence of mycotoxins in individual feed batches.

9 Certain ingredients can surprise. Soya materials are generally considered a low risk for the major mycotoxins, but high levels were registered in some regions of South America in 2016. This was largely related to very wet harvest conditons. Occasional high levels of mycotoxins can be found in soya in other regions also, so caution is also warranted with this feed type.

10 Regional surprises also occur. The detailed examination of the increased mycotoxin risk in 2016 South American finished feed (Figure 2) reveals that fumonisins and deoxynivalenol posed the greatest risk. The rise in their prevalence included sharp increases in samples with very high contamination.

11 Distillers dried grains with solubles (DDGS) merits monitoring. DDGS are a high-value, but reasonably low-cost, feed source. The mycotoxin content in DDGS, however, increases by a factor of three compared with the original corn or cereal. For this reason, manufacturers are often selective about grain quality, but the survey results reveal that 90 percent of DDGS samples had at least one mycotoxin above the risk threshold. If DDGS are used as a significant portion of the diet, then there is added cause for careful monitoring. ■

@ **Mycotoxin study reveals biggest risks to birds globally**
www.WATTAgNet.com/articles/25985

When to use **natural betaine in poultry diets**

Betaine remains an interesting additive with advanced applications in modern poultry feed formulations.

IOANNIS MAVROMICHALIS

The major metabolic function of betaine is well-known, but it suffices to reiterate that betaine is a direct donor of methyl groups, a function similar to that of vitamin choline and amino acid methionine. In this respect, betaine can replace (or spare) methionine and choline. In addition, betaine is an osmotic regulator, one of the most important in physiology, acting in a way that keeps cells well-hydrated — a function that comes in handy during heat stress. Limited work has highlighted betaine as a lipotropic; it turns fat towards lean tissue synthesis, assuming there is sufficient protein in the feed.

Today, when poultry diets are fortified with betaine, a synthetic form and most often of China industrial origin, is used. There are a number of betaine chemical forms available, with anhydrous, monohydrate and hydrochloride betaine being the most widely available. Likewise, price and quality varies, as one would expect from any additive that has become an industrial commodity.

Depending on the price of chemical betaine and those of choline and methionine (both similar commodities), the use of betaine increases or decreases, assuming the correct factors are assigned to betaine as a methyl donor.

Seasonal fluctuations in use are also observed, with summer months demanding heavier use as betaine is included in summer heat-stress nutritional supplements.

Liquid betaine is a concentrated form of molasses produced naturally from sugar beets.

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WHEN TO USE NATURAL BETAINE IN POULTRY DIETS

What is natural betaine?

Apart from chemically-derived betaine, a natural form is also available, albeit in limited quantities. It comes from sugar beets in the form of a liquid concentrate of molasses. Molasses is a useful co-product of sucrose extraction from sugar beets, which contain so much betaine that this molecule was first discovered in beets, hence its name — betaine! Most of the betaine in beets is in the molasses fraction, and its concentration creates a betaine-rich liquid product that can be used as an additive.

Read more about betaine: Betaine can spare dietary methionine, choline www.WATTAgNet.com/articles/20301

There is no universal additive, just like there is no magic additive.

Natural betaine contains about 400 ppm betaine, compared to about 800 ppm in synthetic betaine products. As such, inclusion rates can be easily assumed to be roughly twice for the natural versus the synthetic product. Most poultry diets contain from 200 to 1,000 ppm pure betaine (regardless of source).

When is natural betaine preferred?

Despite any price differences, which always depend on volume, distance, etc., the use of a natural source of betaine can be deemed preferable in the following cases — not all of which might apply together.

In organic poultry nutrition, synthetic methionine is not allowed (at least in some schemes throughout the world). The same is true for all similar additives, making the use of synthetic choline and chemical betaine impossible. Methionine is the first limiting amino acid in poultry diets, and without methionine supplementation, modern hybrids cannot reach their genetic potential. Thus, organic farming has been characterized by slow growth rates (broilers) and reduced layer performance (low egg numbers and low egg weight). Using a natural source of methyl, donors can bypass the issue of methionine/choline deficiency, allowing for greater performance.

Some nutritionists, including myself, often opt for a wholesome ingredient that contains a major additive/compound instead of its purified form. This is the case, for example, when it comes to functional fibers, where I expect to find a greater use from a complex source of fibers versus a purified one. Perhaps the same holds true to natural betaine that includes many more biomolecules than just betaine due to its concentrated and not purified form. Perhaps this is not correct, but this thinking is not uncommon among nutritionists.

Feed mills with advanced liquid application capabilities opt for liquid additives to depreciate the cost of the machinery. In such cases, any possible liquid additive offers logistics-related savings to them. Here it merits to note that such liquid application systems are very accurate, albeit expensive, thus minimizing errors and waste.

Certain feed mills that place a premium on quality over cost often prefer to buy "locally" from a known supplier rather than a faceless "supermarket." This has nothing to do with the source of materials, per se, but rather with the lack of adequate in-house quality control mechanisms. A single, local, direct source can be more reliable compared to an unknown trader sourcing from a number of manufacturers. Again, it is a matter of logistics and quality control.

The term natural carries a specific weight in certain markets and products — a prestige different from that enjoyed by formal certification systems. As such, when one tries to design a "natural" diet, any ingredient used with such origin can enhance the image of the final product. Of course, this is not an easy exercise, but it does come into play on certain occasions.

When is natural betaine not suitable?

Like any additive with which I have worked, there is a well-balanced list of pluses and negatives. There is no universal additive, just like there is no magic additive. Thus, natural betaine cannot or should not be used in the following cases.

If cost per kg or lb of feed is the most important criterion, then any ingredient that carries a price premium is automatically rejected, and it takes little imagination to understand that natural ingredients can carry a price premium when bought in small quantities.

Not all feed mills want to invest in a liquid application system, although less-expensive systems do exist today. In this case, using any liquid additive is simply not possible. But, more and more additives are being converted into liquid forms that can be added in feeds with greater precision. So, it merits keeping this in mind.

Where dry betaine is not used already, it would be difficult to introduce a liquid source of betaine. Betaine remains one of those additives that require considerable marketing/training to become a mainstream additive.

Natural liquid betaine is another interesting additive that has unique advantages over synthetic, dry betaine sources. At the same time, it can be more expensive to use as quantities remain limited, hence demand dictates a better price in smaller volumes. The balance, of course, lies with each nutritionist's final decisions and marketing goals. Natural or synthetic, betaine remains an undervalued and rather poorly understood methyl donor that should be considered alongside choline and methionine. ■

Ioannis Mavromichalis, Ph.D., is a nutrition editor for WATTAgNet.com and editor-in-chief of Pig International. Contact Mavromichalis at imavromichalis@wattglobal.com.

Reducing poultry processing waste maximizes yield, profits

Improving key activities during preslaughter and slaughter can maximize yield and profits.

EDUARDO CERVANTES LÓPEZ

Following waste reduction strategies during poultry processing not only helps to maximize the volume of processed poultry produced and better respond to growing demand, but can increase profitability while lessening the impact on the earth's finite resources.

From preslaughter to packing, there are several activities where waste is likely to occur. Paying particular attention to these key areas, ranging from minimizing harm to broilers during harvesting to the proper training of plant staff, can help to ensure that poultry processing is carried out in the most profitable and sustainable way possible.

@ **Successful poultry processors identify challenges, benefits**
www.WATTAgNet.com/articles/29047

Preslaughter

A failure to properly manage the feed withdrawal period can lead to downgraded and rejected product at the processing plant. Common problems resulting from a badly managed feed withdrawal include weight loss and carcass contamination.

To minimize rejects and waste, birds must have sufficient access to water preslaughter, for example, and harvesting must take place within four hours of suspending feed supply. Typical issues that may be apparent due to badly managed feed withdrawal include a full crop, dehydrated intestines, a dilated gallbladder, shrunken liver, a hardened gizzard cuticle and weight loss.

Harvesting and cages

Poor handling and any resultant harm to broilers during capture and caging can lead to poor-quality carcasses, raising the number of rejects. However, there are several best practices that can be followed to mini-

Insufficient ventilation during transport to the processing plant will increase the number of dead-on-arrival birds.

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Poorly agitated water during scalding will make plucking harder, and this can result in carcass damage.

Eduardo Cervantes López

mize quality issues.

Any birds separated from the rest of the flock during harvesting must be allowed sufficient space. If crowded together, birds will start to fight for space, scratching and pecking each other, and damaged skin can lead to rejected carcasses.

Birds should always be captured by the body, holding the wings close to it, but without putting too much pressure on the abdominal air sacs. Studies have shown that, in flocks where broilers are caught by the body, the number of rejected birds is 50 percent lower compared with birds caught by the legs.

Cages and containers must be in good condition and of an appropriate size, ensuring that not only are broilers not harmed, but are also comfortable during transport and while waiting at the processing plant.

Filled cages should be kept inside the poultry house until all are ready to be loaded. In this way, maximum advantage will be taken of circulating air, minimizing possible suffocations.

Transportation to the processing plant

To avoid mortalities during transport, measures must be taken to dissipate evaporative heat.

Depending on environmental conditions, fans can be placed at the end opposite to where birds are loaded, to help to keep them cool and supply them with air. Additionally, a mobile awning can be erected where birds are loaded. If made from mesh, this can reduce light penetration but still allow air flow.

The microclimate within the truck needs to be carefully monitored if dead on arrivals are to be prevented.

It should not be assumed that birds that reach the lairage alive will also reach the overhead hangers alive. In many plants, it can take up to four hours from arrival to complete processing, so the lairage must be properly ventilated to prevent suffocation

while birds wait to be slaughtered.

A failure to address the above points will increase the number of dead-on-arrival birds and reduce the volume of Grade A meat produced.

Hanging

The area where live birds are handled at the processing plant should be darkened and illuminated with red, green or blue light to keep them calm and prevent stress.

Workers must handle birds carefully as, for example, excess pressure on the legs can result in bruises or reddening appearing further along the processing line, and these roughly handled birds may be rejected by quality control inspectors.

Entrance to the stunner

A poorly adjusted breast stunner will lead to birds flapping their wings intensely, resulting in bruises and trauma of the breast and wings. Additionally, blood will accumulate in the pectoral muscles due to the heart sending more blood to keep them oxygenated, possibly leading to downgrades.

Too much time in transit between being hung and slaughtered will also result in more blood flowing to the wings due to the forces of gravity.

Excess blood may also be present in the wings if bleed time is not properly adjusted to reflect hanging time, and again the number of rejects will rise.

Stunning, slaughter and bleed out

A failure to properly place birds in shackles can also lead to poor stunning, and birds may reach the automatic killing system still conscious. This will increase the workload of those responsible for guaranteeing that

The impact of poor feed withdrawal can become apparent during evisceration.

Eduardo Cervantes López

all birds entering the bleed-out tunnel are dead. If the automatic killer is only partially successful, then there may still be an accumulation of blood in the neck, another cause of rejects. Any birds that enter the scalder still alive will take on a reddish color.

Scalding and plucking

If birds are observed floating in the scalder, or the movement of the water is uneven, problems and losses will occur at plucking. The same will occur if the heat gained by the carcass is lost on the way to the plucker.

If birds pass through the plucker at low temperatures, the damage to carcasses can range from minor to major, including skin loss and bone dislocation, due to the greater pressure needed to remove the feathers. Birds damaged in this way will be rejected by quality control.

Evisceration

It is at evisceration that the consequences of a poorly managed feed withdrawal can often lead to waste. Carcasses may become contaminated with feed or fecal matter or the carcass may be contaminated with bile.

Carcasses contaminated in this way will have to go to reprocessing and examined to see if they can be reintegrated into meat fit for human consumption.

Energy

Processing plants tend to start all machines at the same time at the start of the shift, despite the fact that 15 minutes may elapse between the first birds being hung on the line and reaching the final part of the process. Any machines that are working, but are yet to receive carcasses, will be wasting electricity, and machine start times should be reviewed in developing any waste reduction program.

Water and ice

Water is too often used without care in the plant's various processes and when losses from hoses and valves are considered, then waste can be significant.

In plants that use ice to cool carcasses, it may again be used to liberally, resulting in waste. If the pipes or channels that supply ice are poorly maintained, ice may be lost onto the floor, and if ice is poorly stored it may melt before it can be used.

Packaging

Packaging needs to be managed properly to avoid waste. It is also worth using good quality packaging to avoid breakages and need for replacement.

Processing plant staff

If plants are not ergonomically designed, additional staff will be needed to complete tasks. This will also be the case if equipment and working practices are not suitable for the task at hand. Additional staff costs will increase the cost per kilo of processed meat, and can be an expensive waste of resources. ■

Eduardo Cervantes López is an international consultant based in Colombia. He can be contacted at icproave@hotmail.com or via www.icproave.com.

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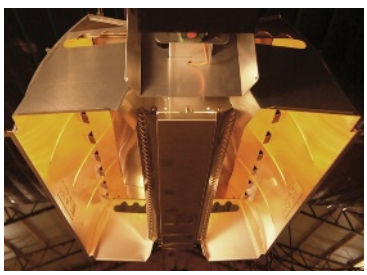

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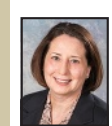

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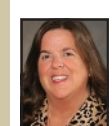

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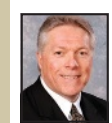

Craig Greuel
Tel: +1 815 966 5591
cgreuel@wattglobal.com

Jeff Miller
Tel: +1 815 966 5582
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