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Feed manufacturers face challenges, opportunities for transport in 2012

- Optimizing your hay resources
- Increasing protein in grain-based fish meal
- Getting more value from your poultry feed ingredients

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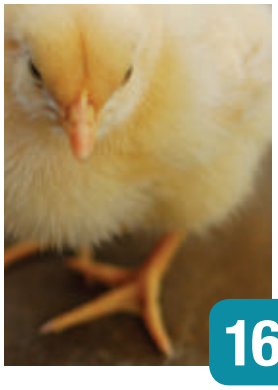

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FM ON SITE *by Ken Jennison, Editor*

When new feed technology is both awe-inspiring and overwhelming

I recently had the opportunity to read a copy of *China Daily*, a weekly Asian newspaper printed in English. Reading about world events and markets from a Chinese viewpoint was interesting, but actually it was a small item in the publication's "news briefs" section that caught my attention. The headline: "Buddhist temple offers e-blessing."

The article explained that a famous Buddhist temple was encouraging people to send text messages rather than burn incense for prayers. For a small fee, worshipers could text a message to the temple, which would be displayed on an LED board. The monks would then chant prayers for the senders or receivers. A spokesperson for the temple said it was a "go green" initiative, and noted that it reduced the size of crowds during peak seasons and lowered the risk of fires.

I don't know much about Buddhism, but I couldn't get the thought out of my head that something in the world truly has changed if Buddhist monks are embracing technology in this way (maybe they've been doing similar things all along, but it was news to me).

With that in mind, I often marvel at the rapid pace of technology these days. At IPE/IFE and at Victam Asia, new technology for feed milling and processing was on display nearly everywhere. These technologies are quite exciting, allowing for faster processing, higher levels of efficiency and extraordinary capacity for data collection.

Yet, at times, I must admit that at both events I occasionally experienced a bit of information overload.

Columnist and neuropsychologist Vaughan Bell makes an interesting observation on the topic of information overload. A respected Swiss scientist, Conrad Gessner, might have been the first to raise the alarm about the effects of information overload. In a landmark book, he described how the modern world overwhelmed people with data and that this overabundance was both "confusing and harmful" to the mind … It's worth noting that Gessner, for his part, never once used email and was completely ignorant about computers. That's not because he was a technophobe but because he died in 1565.

NEW TECHNOLOGIES ARE IMPORTANT, EVEN IF THEY DO CREATE A TEMPORARY SENSE OF INFORMATION OVERLOAD.

Ultimately, I guess a temporary sense of information overload is not a new sensation at all. In my more lucid moments, I realize that the ability to do anything more quickly and efficiently is something to be celebrated, and that should be our approach to new feed technologies.

However, when it comes to prayers and blessings, I think I'll continue doing those in person in a house of worship. I'm not quite ready to make that leap.

Ken

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FEED NEWS

South Dakota corn crop grows by $1 billion in 2011

South Dakota's corn crop grew in worth by $1 billion in 2011, reaching $3.953 billion (an average of $6.05 per bushel) and outstripping both 2010's $2.899 billion ($5.09 per bushel) and 2009's $2.282 billion ($3.23 per bushel), according to the National Agricultural Statistics Service.

Overall, the state is on par with a national trend: The value of the nation's corn crop rose from $46.734 billion in 2009 to $76.464 billion in 2011, and the average per-bushel price increased from $3.55 to $6.20. South Dakota farmers say they are using their profits to pay down debt and increase their working capital. In addition, current projected numbers point to corn being more profitable than soybeans in 2012, leading some farmers to plant successive corn crops, rather than rotating to soybeans — if the weather allows for it.

An early, dry spring would let farmers plant sooner, but if planting is delayed, corn's yield potential declines more rapidly than that of soybeans, according to Keith Alverson, secretary-treasurer of the South Dakota Corn Growers Association and board member of the National Corn Growers Association. If, however, spring allows a typical planting schedule, "guys will lean toward corn," said Alverson.

American Soybean Association expresses concerns over export market

The American Soybean Association submitted formal comments to U.S. Trade Representative Ron Kirk expressing concerns over the state of both soybean export quantity and value to the EU, saying that the EU's policies on biotech soybeans, as well as "inaccurate characterization of biodiesel by the Renewable Energy Directive," have contributed to a 70 percent drop in total soybean export quantity and a 44 percent decrease in soybean export value to the EU over the last 14 years.

"America's soybean producers have lost a significant portion of what was a viable and thriving export market," said association president, Steve Wellman. "Now, with a Renewable Energy Directive that omits biodiesel based on inaccurate information and arbitrary standards, the remainder of that export market is threatened." In its comments, the American Soybean Association points out that multiple EU policies hinder the importation and use of biotech crops from the U.S., including delays in approvals of new biotech traits, despite positive assessments by the European Food Safety Authority; commercially infeasible requirements on biotech content in food products under EU Traceability and Labeling Regulations; state-by-state restrictions on biotech imports; and application of National Seed Catalog and Coexistence requirements to planting of biotech crops by certain EU member states.

With regard to biodiesel, the association contends that the Renewable Energy Directive will impose inaccurate greenhouse gas emissions reduction requirements for biodiesel produced from American soybean oil and other feedstocks; and will require compliance with arbitrary, unwarranted and commercially infeasible sustainability certification requirements.

"Soybeans and soy-based products are the country's leading agricultural export, topping $26 billion in total value last year," said Wellman. "We are certainly encouraged by efforts to expand trading relationships and grow new trading partners, but not at the expense of our industry's global competitiveness. Any discussions on a potential trade agreement with the EU must first address and resolve these barriers."

Foreign pigeon pea crop may have US applications

The pigeon pea, a subtropical, drought-resistant legume grown worldwide as a food staple, may have multiple U.S. applications, according to researchers at Texas A&M University, who received a $200,000 Southern Sustainable Agriculture Research and Education grant to study the crop. Possible uses include as a forage for livestock, a garden crop or edible landscape ornamental. "For the purposes of the grant, we wanted to look at pigeon pea as a forage for livestock producers," said John Sloan, a soil scientist and associate professor with Texas AgriLife Research and Extension Center at Dallas. "One of the main purposes of the study was to determine if cattle would graze pigeon pea or ignore it in favor of grasses. We found that pigeon pea does well drilled no-till into Bermuda grass pastures. It grows slowly so it won't outcompete the grass, and cattle will graze on it just fine. They don't discriminate," said Sloan.

However, the study's results suggested that this was not the best way for farmers to utilize pigeon pea as a forage crop. "Without some sort of soil preparation, the uneven surface of most pastures will prevent proper functioning of the no-till planter and result in loss of seed and an inadequate population stand," said Sloan. "Next, the area where the pigeon pea is planted will have to be protected from grazing cattle until the plants have reached an adequate size. If allowed to graze the area immediately after planting, the pigeon pea plants will probably not survive beyond the first trifoliate leaf stage."

Sloan said that a better way to use pigeon pea as a forage is to plant it after wheat harvest in July and then graze cattle on it when it matures to its flowering stage in September or October.

France calls for suspension of Monsanto genetically modified corn

France has asked the European Commission to suspend authorization to plant Monsanto's genetically modified MON810 corn, the only genetically modified corn approved for planting in the European Union, according to reports.

France banned the growing of MON810 corn in 2008, citing environmental risks, but the ban was overturned by France's Council of State in November 2011. According to the French government, the authorization should be suspended due to "significant risks for the environment" shown in recent scientific studies.

COVERSTORY By Cindy Snyder

Feed manufacturers face challenges, opportunities for transport in 2012

New federal regulations may create hurdles, but many should see other aspects of transport easing up in the months ahead.

While truck transportation may see some challenges in 2012, rail traffic seems to have improved – at least for some in the feed industry.

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Feed mill manufacturers have grown used to worrying about whether rail cars will be available to bring feed ingredients to the mill and if trucks leaving the mill are legally loaded. Those headaches aren't likely to disappear in 2012, but mill managers may find themselves trying to sort out a new logistics problem resulting from a new federal law that – at first glance – doesn't seem to have much to do with feed.

However, there are some bright spots on the horizon. A number of states are considering increases in truck load limits, and growth in rail capabilities in parts of the U.S. should make feed transport easier for at least a portion of the industry.

Food Safety Modernization Act

President Barack Obama signed the Food Safety Modernization Act into law on January 4, 2011. One requirement of the law is that the U.S. Food and Drug Administration must publish final rules that will govern how both food and feed is transported by July 2012. This marks the first time that the FDA will be writing regulations that apply to transporters. This fact has the National Grain and Feed Association worried; not so much about the precedence as the timing.

Randy Gordon, the association's vice president for communications and government relations, said the language governing transportation is fairly simple. "Vehicles should not transport anything that could be harmful for human or animal health," he summarized.

The push behind that language dates back to 1990, when Congress passed a sanitary food transportation act to prevent vehicles carrying fruits and vegetables from backhauling garbage. The feed industry itself has expressed concern over whether conveyances – trucks or rail cars – have

Cindy Snyder is a freelance agribusiness writer based in Idaho.

been adequately cleaned before being loaded with feed or feed ingredients. Complying with the clean-out regulations isn't expected to be onerous, but the timing could be.

Timing issues

The problem with the timing of the regulations is that the Food Safety Modernization Act will also require feed mills to adopt Hazard Identification and Preventive Controls (see sidebar). If the FDA releases the preventive controls rules first and a mill has identified transport conveyances as a potential hazard, the mill will require a clean-out procedure be followed. However, if the rules for transporters don't come out until much later, transporters may feel they are outside of the FDA's regulatory oversight and decide they have no obligation to clean their equipment just so a mill can meet their preventive control rules.

The FDA's initial work plan for implementing the Food Safety Modernization Act delayed transportation-related regulations until later in 2012 or 2013. National Grain and Feed Association and others are encouraging the FDA to make sure the regulations regarding conveyances are compatible for both manufacturers and transporters, and that the regulations come out close to the same time.

"We have a very tight rail and truck supply," Gordon said, "and a lot of de-

Preventive control rules on the way

While rules regarding the sanitary transportation of food and feed may not be released until later in 2012, the requirement that feed mills develop written feed safety plans must be in place by July 3. However, many believe meeting that deadline will be difficult.

The proposed rules were expected to be released January 4, but were still under review on that date by the Office of Management and Budget. The proposed rules pertaining to human food manufacturers is reported to consist of a 400-page preamble, 200 pages of economic analysis and then the proposed regulations. The rules for animal feed, feed ingredient and pet food manufacturers is said to have a 200-page preamble, 100-page economic analysis and the proposed regulations. Once the proposed rules are released, the U.S. Food and Drug Administration will provide a 60-day comment period.

Facilities will likely be required to implement current good manufacturing practices that already apply to medicated feed manufacturers including training personnel, sanitation of facilities and grounds, good housekeeping practices and maintenance of equipment.

Most facilities will also likely be required to be registered with the FDA under the Bioterrorism Act of 2002. That's where the hazard analysis and preventive control aspects of the proposed regulations will come in.

The rules will apply to commercial feed mills, feed ingredient manufacturers, pet food companies, grain elevators, grain processors, flour and corn millers/refiners, exporters and biofuel companies that manufacture co-products, such as distillers grains, used as feed ingredients.

Facilities must identify any hazards that could lead to the physical, chemical or biological adulteration of the product and then implement controls to prevent that from occurring. Hazards that could lead to the misbranding of products must also be identified. The entire safety plan must be written and on file, and records kept to verify the effectiveness of the preventive controls.

FDA officials have estimated that the economic impact of the proposed feed regulations of the Food Safety Modernization Act at $100 million. In contrast, the economic impact for human food manufacturers ranges from $1 to $2 billion.

The American Feed Industry Association has said the rules will bring the largest change in the regulation of feed, pet food and ingredients in history. Still, manufacturers that are already following current good manufacturing practices or utilizing programs like the Safe Feed/Safe Food Certification Program should have no problem meeting the preventive controls rule.

[Transportation]

According to Randy Gordon, National Grain and Feed Association vice president for communications and government relations, the language governing transportation is fairly simple. "Vehicles should not transport anything that could be harmful for human or animal health."

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mand coming from agriculture, coal and the consumer section with intermodal containers. We don't want the regulations to make us undesirable compared to non-ag customers."

This scenario could happen if the FDA issues rules that ban the use of specific conveyances that have dual use in hauling other products. Rather than banning certain conveyances, the feed industry would prefer that carriers comply with existing statutory obligations to provide equipment that is clean, appropriate and suitable for the commodity to be shipped. The carrier is in the best position to monitor the use of the fleet, know the contents of the immediate load hauled and to use appropriate clean-out procedures to foster product safety.

Gordon is hopeful that the FDA understands the potential squeeze that issuing one set of rules without the other could cause. He is encouraged that the FDA has reached out to industry groups and consumer groups before the agency even began writing the proposed rules, and is cautiously optimistic that the proposed rules will be science- and risk-based approaches that will truly matter to human and livestock health.

Proposed weight limits

A number of states are again weighing alternatives to increase the amount trucks can legally haul. Idaho is one of those states.

Todd Strayer, manager of the Scoular Company in Jerome, Idaho, calls the current system of different regulations for different roads one of the biggest issues facing Idaho's feed industry.

"A truck can leave Jerome and be legal for the county road, but be breaking the law on a city street, state highway or on the interstate," Strayer said. "Surrounding states of Utah, Nevada and Montana allow much higher gross weights than Idaho, making interstate hauls a challenge."

Many agricultural groups support raising the state's maximum truck limit from 89,000 pounds to 129,000 pounds, but also require more axles. Supporters of the plan say heavier trucks would cause less damage to roads because the additional axles

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would reduce pounds per square inch on roads.

"It's a win-win," said Mark Duffin, executive director for the Idaho Sugarbeet Growers Association. "It would mean fewer trucks on the road, a smaller footprint on the road and less cost to haul beets." He points to the 169,000-pound maximum truck limit in Michigan, where trailers are essentially solid axles.

Higher weight limits are an argument that the National Grain and Feed Association has been making for years. Attempts in the past to set a federal maximum truck weight limit have met with opposition from highway safety groups that fear bigger trucks on the road will result in more accidents. Labor unions in some states have also opposed raising maximum truck weights.

"The stalemate has made it impossible to move forward," Gordon said.

Improved rail traffic

While truck transportation presents challenges, rail traffic seems to have improved — at least for some in the feed industry. The Union Pacific Railroad has added more engines and freight, and that's increased the velocities of shuttles and unit trains into Idaho, Strayer said.

Livestock feed makes up 32 percent of the end products Union Pacific carries. Paul Hammes, vice president and general manager for Union Pacific, said the railroad increased rates during 2003 to 2007, when the booming economy pushed the volume of freight higher and used the revenue to improve capacity.

However, that's not true for competing railroads or other destinations. Commodity brokers in California, for instance, say rail rates continue to control commodity movements. They would like to see negotiated rates come into play more, as those rates seem to have improved interstate truck movements.

Commodity groups and feed associations have tried to get rail competition bills introduced in Congress but Gordon does not anticipate an effort will be made in 2012. With this being an election year, it will be difficult to get action taken on significant bills, such as the farm bill, let alone rail competitiveness. [FM]

COWFEED by Del Williams

Optimizing available hay resources

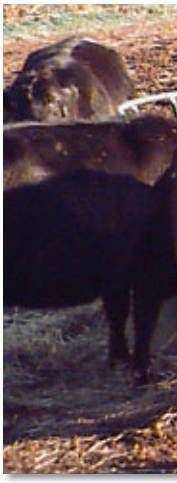
With hay selling for vastly inflated prices this year, ranchers are looking more closely at getting cows to eat more and waste less.

Since cattle are hierarchal creatures, designs that have straight edges, such as the cradle feeder, allow a more dominant cow to push a less dominant cow out of the feeder.

Drought conditions in regions throughout North America have placed a great deal of pressure on cattle ranchers and dairy farmers, particularly in regard to the cost and availability of hay this winter. In many areas, ranchers are faced with a difficult choice: either stretch existing supplies of hay or purchase additional hay at prices significantly higher than a year ago. Dairy quality hay in Idaho, for example, is selling for around $240 per ton, up nearly $100 from a year ago.

The U.S. Department of Agriculture's latest biannual look at U.S. hay stocks shows the lowest December 1 on-farm hay stocks in 23 years. Hay stocks on all U.S. farms totaled 90.7 million tons as of December 1, down 11 percent from a year ago. U.S. growers harvested 19.2 million acres of alfalfa and alfalfa mixes in 2011, the smallest harvested acreage total since 1949.

New and improved hay feeder and bunk designs can help maximize on-hand stocks of hay to last through the winter. However, it appears that the best solution for maximizing hay stocks may be simply good management.



Comparing designs

Michigan State University Extension Beef Specialist Daniel Buskirk has noticed over the years that some producers seem to be able to stretch their hay supplies longer than other producers. He set up a feeding trial to look at four different hay feeder designs to determine which design wasted the least hay.

Buskirk compared a ring feeder, cone feeder, cradle feeder and trailer feeder in the study. In addition to weighing the amount of hay fed and the amount wasted, the feeders were also videotaped, and the resulting footage was analyzed in terms of cow behavior.

Feeder designs with the greatest recorded hay waste were also the ones where cattle displayed the most antago-

A "hybrid" style of feeder features vertical bars that allow for cows to put their heads in to eat; a horizontal top bar prevents them from dragging the hay back out.

Del Williams is a technical writer based in California. He writes about health, business, technology and educational issues.

nistic behavior. These feeders all had one thing in common: they had straight edges. "The longer, more linear the feeder is, the more cattle jockey for position," Buskirk said.

Since cattle are hierarchal creatures, designs that have straight edges, such as the cradle feeder, allow a more dominant cow to push a less dominant cow out of the feeder. The displaced cow in turn pushes the next cow over and so on until the last cow is pushed off the feeder. Each time an animal is displaced, it takes a mouthful of hay with it that usually gets dropped on the ground.

Since cattle graze with their heads down, they don't like to eat with their heads elevated. Although the trailer feeder has obvious advantages for a cattle producer because it can be easily moved from pasture to pasture, trailer feeders

Circular feeders that provide regular entrances for cows can be a way to minimize waste if the hay bale is significantly smaller in diameter than the feeder.

often force cattle to reach up for the hay. Video footage showed that cows often would reach in for a bite of hay and then back out to eat the hay in the preferred, head lowered position, often dropping hay in the process.

Circular feeders that provided regular entrances for the cows wasted the least hay, but Buskirk cautions that part of that success came from putting a 5-foot diameter round bale in a 7-foot 6-inch diameter feeder. Giving cows enough room to put their head into the feeder when they start to feed on a new bale is the key to reducing waste. If the bale is roughly the same size as the feeder, cows can't reach all the way into the feeder and will drop some hay outside where it can be trampled on. Using a hay saver ring on a circular feeder will also reduce hay wastage.

A "hybrid" style created by GoBob Pipe and Steel features vertical bars that allow for cows to reach their heads in to eat, and a horizontal top bar prevents them from dragging the hay back out. The feeder can hold both round and square hay bales, and the manufacturer claims the design reduces waste by one-third.

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Feed bunks

Another option for feeding cattle is feed bunks. Like the hay feeder, there are important factors to consider when selecting a bunk and its construction.

Cattle can easily push plastic feed bunks around the yard and can punch a hole through the plastic if they step into the trough. Concrete bunks require regular maintenance. Since concrete is porous, it must be sealed on a periodic basis or it will spall or chip. Concrete bunks are also heavy and cumbersome to move.

Another feed bunk option is one constructed of metal. These offer enough weight to prevent animals from moving them around, but they are light enough to be moved by producers. Another "hybrid" approach – concrete reinforced with steel – is another option.

Management still key

Although design of a hay feeder or feed bunk is important, Buskirk says management is still the most important tool for reducing waste. Cattle that are fed only what they will eat within a day, waste less hay than those given enough hay for three or four days.

"My recommendation is a well made ring feeder that's a got a real high hay saver ring with an adequate diameter so the cows have to put their head inside the feeder when you first put a new bale in," Buskirk said. "That will give producers a pretty good balance between dollars invested and hay wasted." [FM]

AQUACULTURE *by Cindy Snyder*

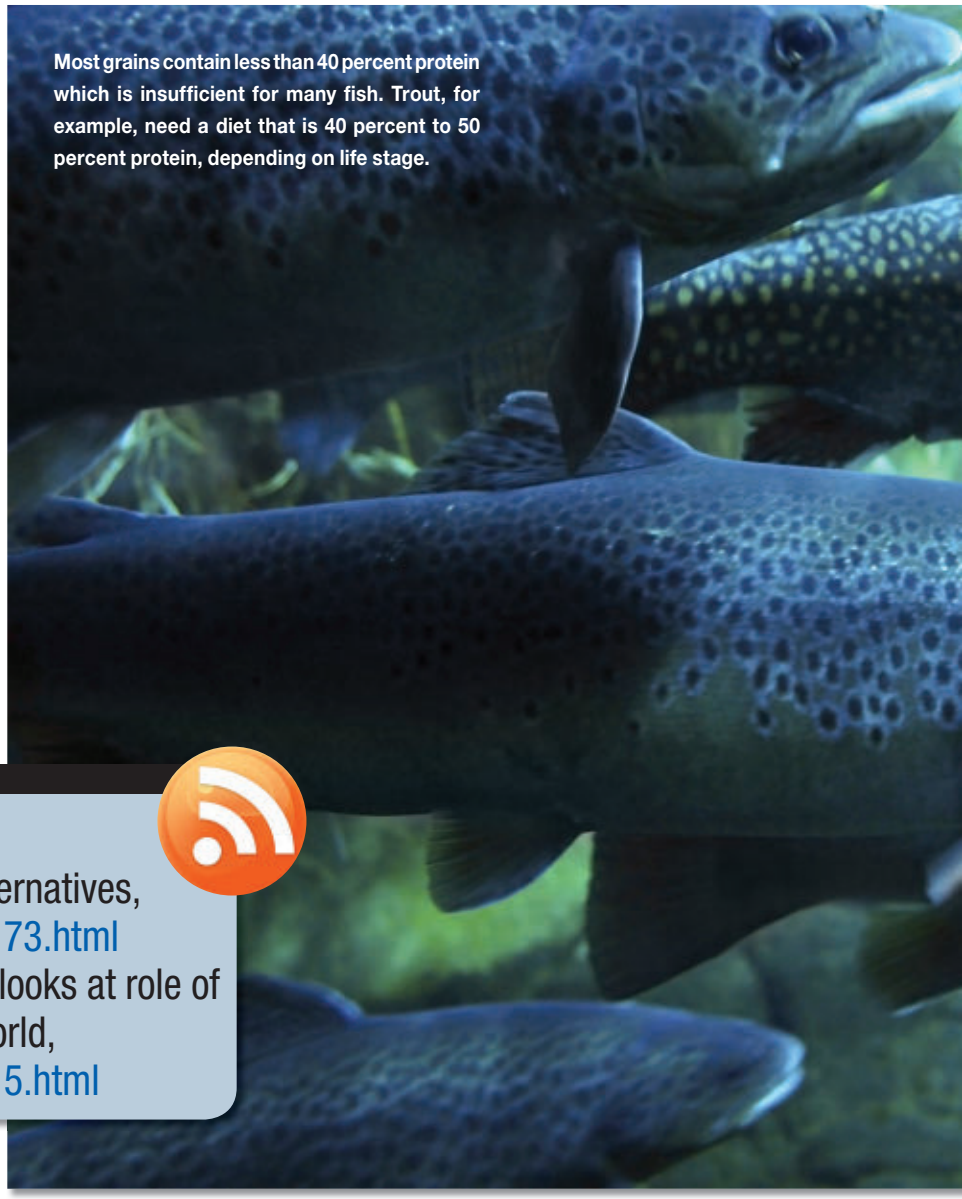
Increasing protein in grain-based fish meal

Grain-based aquaculture diets, while good, have some clear disadvantages. However, some researchers think that separating compounds may be a way to get around those disadvantages.

Grain-based aquaculture diets can reduce the amount of fish meal fed and improve water quality by reducing the amount of phosphorus in fish effluent. However, from a fish's standpoint, grain-based diets have a large disadvantage – they are low in protein.

Most grains contain less than 40 percent protein, and trout, for example, need a diet that is 40 percent to 50 percent protein, depending on life stage. Feed manufacturers have a hard time reaching the needed protein level without using expensive ingredients or ingredients that can inhibit feed conversion.

However, now researchers are testing processes to modify grains and other feed ingredients to boost crude protein levels and improve feed value for the least cost.



Most grains contain less than 40 percent protein which is insufficient for many fish. Trout, for example, need a diet that is 40 percent to 50 percent protein, depending on life stage.

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Modifying ingredients

"We're modifying ingredients to increase protein or remove anti-nutrients," said Rick Barrows, a fish nutritionist with the U.S. Department of Agriculture Agricultural Research Service in Bozeman, Mont.

One of those methods is an air classifier. John Hamilton, founder of Adaptive Bio-Resources, LLC, has installed a pilot-size air classifier in the Bozeman lab. The equipment was never intended for use in feed mills, it was

Cindy Snyder is a freelance agribusiness writer based in Idaho.

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[Aquaculture]

John Hamilton, founder of Adaptive Bio-Resources, LLC, checks the pilot-sized air classifier at the Bozeman Fish Technology Center before running a batch of algae through it.

actually designed to separate powders, such as talc, from coarse to fine.

However, Hamilton has run ingredients from algae to wheat through it. "The beauty of it is that we can concentrate proteins without using a lot of water," Hamilton said. Every time water is added to a product to concentrate the protein, processors have to dry the product. Keeping the product dry from start to finish is not only more cost-effective, but it reduces the chances the product could be contaminated.

Improving protein

Barrows sees great promise for the classifier to take a waste product and make it more useful, or take a commodity and make it more valuable. "By improving the protein, we can add value and sell feed for $850 a ton instead of $200 to $250 a ton," Barrows said.

An air classifier works by injecting the material stream to be sorted into a chamber that contains a column of rising air. Inside the separation chamber, air drag on the objects supplies an upward force, which counteracts the force of gravity and lifts the material to be sorted up into the air. Due to the air drag on object size and shape, the objects in the moving air column are sorted vertically and can be separated in this manner.

Denser materials drop through the wheel classifier, while finer materials go through the cyclone and then through four socks to get the ultra fines. Operators can adjust the revolutions of the wheel classifier and the airflow according to the material's characteristics.

Once the material has been separated, the operator is left with distinct groups of product with unique properties. Tests have shown classifying barley can boost the protein level from 12 percent to 28 percent. That's good enough for tilapia rations, but not aquafeeds for species that are primarily carnivorous, such as trout or salmon.

Benefits

Getting barley into trout feeds means a barley concentrate of 50 percent to 70 percent crude protein, and getting to that level will likely require the use of microbes. The Agricultural Research Service laboratory at Bozeman is experimenting with an enzymatic process patented by the USDA that a corporate partner hopes to commercialize in the near future.

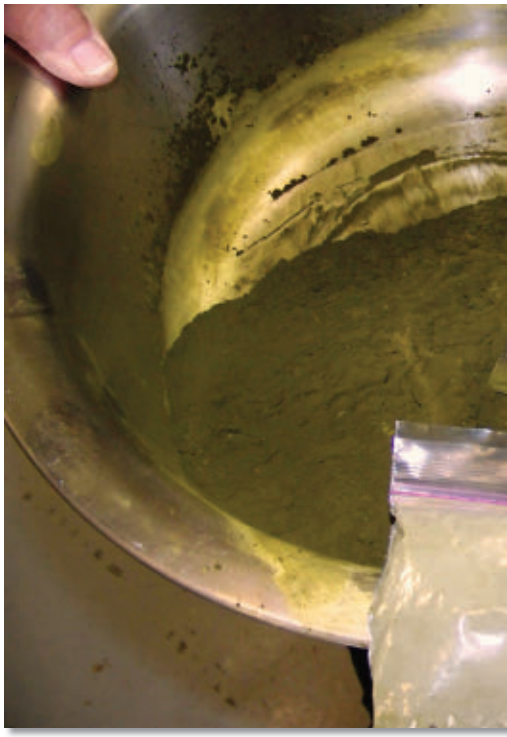
Even ingredients that are high in protein, such as algae that is 58 percent to 60 percent protein, can benefit from being classified. Hamilton separated a batch of algae to demonstrate the point. The classifier divided the lot roughly into a 50-50 split with the darker material, the coarser material, and the lighter material, the fines. The lot had 60 percent crude protein before the split, with coarse material testing 61 percent and the lighter material 60 percent crude protein after the split.

"We didn't shift the protein much," Hamilton said. But researchers hypothesize that classifying algae may remove non-nutrients that could make the ingredient a better alternative. The next step is to feed both the coarse ingredient and the fine ingredient to see which fish perform better on.

Pilot mill

Hamilton is testing a pilot mill at the USDA Bozeman lab but is hoping to install a full-scale mill. He estimates a whole mill could be purchased for around $5 million and is looking at funding options.

However, low protein isn't the only problem with barley – it's also sticky. The same beta glucans (fiber) that make barley a heart-healthy food for humans are indigestible fiber that may become viscous in the intestinal tract. Camelina, an alternative to soybean meal that is



sometimes called wild flax, exhibits the same characteristic. Some animals such as poultry and fish lack the glucanese enzyme needed to break down beta glucans, and if fed a barley-based diet, they will always remain small.

BY IMPROVING THE PROTEIN WE CAN ADD VALUE AND SELL FEED FOR $850 A TON INSTEAD OF $200 TO $250 A TON.

Hamilton and Barrows are using a fat/lipid extractor to modify barley and camelina to make it more useful in fish diets.

Boosting protein in oil seeds

Including soybean meal in fish feeds can help offset fish meal in the area of protein, but soybeans contain anti-nutrients that can have negative impacts on fish growth and health.

Of the anti-nutrients in soybeans, trypsin inhibitors are of the greatest concern to fish nutritionists. Trypsin inhibitors reduce protein digestibility by binding with the digestive enzyme trypsin in the animal's intestine. Trypsin inhibitors are sensitive to heat, and ordinary processing after oil is extracted from raw soybeans lowers the level of trypsin inhibitors in the dried meal to levels that do not affect the growth of most domestic animals. However, salmon and trout are more sensitive. More extensive heat treatment is necessary to reduce residual trypsin inhibitor levels to levels that don't affect protein digestibility and growth. However, processors must be careful not to overcook the meal or fish won't eat it.

Duckweed algae that was classified into coarser (darker) and lighter (finer) material. Although the protein levels of both are roughly the same, researchers think the lighter material may contain fewer non-nutrients. Fish feeding trials are planned to test the theory.

Barrows is looking at using a one-step process to boost the protein level of soybean meal from 48 percent to 70 percent without overheating the meal. This food-grade process does not involve ethanol, and therefore reduces the chances of explosion.

Barrows is also working with a company that is trying to breed anti-nutrients out of soybeans using traditional plant breeding methods. They are showing some success. Instead of 48 percent crude protein in conventional soybean meal, the soybeans for aquaculture feeds have 58 percent protein which is more digestible. Running the resulting meal through the one-step extraction process can boost protein to 76 percent.

Numerous fish feeding studies have shown that fish can do just as well on diets made from alternate proteins as they do on diets formulated with fish meal, but processing matters. It is for this reason that modifying ingredients to maximize protein levels and reduce anti-nutrients is just as important as identifying new ingredients. [FM]

POULTRYNUTRITION

by Sheila E. Purdum

Getting more value from poultry feed ingredients

At the 2012 International Poultry Scientific Forum, all eyes were focused on how to get the most from available resources.

How do you get more nutritive and economic value out of your current and alternative ingredients? This is a common topic for poultry nutritionists in today's high feed cost environment. With a volatile high priced commodity market, getting more from less has become the number one goal.

New research presented recently at the 2012 International Poultry Scientific Forum in Atlanta clustered around several re-occurring themes in the area of poultry nutrition: value of dried distillers grains with solubles in poultry diets; use of feed enzymes to improve nutritive value of poultry feed; optimization of grain particle size to improve feed digestion; and importance of early life nutrition.

Research presented at the 2012 International Poultry Scientific Forum indicated that the first feed the chick is given must complement the eggs' depleted reserves, meaning the first diets should be high in essential fatty acids, phosphorus and simple amino acids.

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Oil and DDGS

Presentations and posters about the value of de-oiled DDGS as well as enzyme supplementation of poultry diets with high levels of DDGS were presented by students from the Universities of Nebraska, Georgia and Kentucky, respectively. The University of Nebraska research (Kreifels and Purdum, 2012) was conducted in laying hens, looking at the effects of low oil DDGS (20 percent of the ration) on feed intake and egg production. Three DDGS samples were tested: normal oil (11.2 percent), medium (7.30 percent), or low (5.62 percent) oil and compared to a diet with no DDGS. Despite the lower levels of

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oil in DDGS, hens consumed the same amount of feed/day and produced equal numbers of eggs.

Since the diets used in this research had high metabolizable energy levels, it was theorized that the low oil DDGS only lowered overall dietary ME by 10 kcal, thus not having an extreme effect on total energy available to the hen. University of Georgia research (Guney et al., 2012) reported an average oil value of 10 low oil DDGS samples to be 7.6 percent compared to a normal value of 9 percent. They also reported that the protein content of low oil DDGS was slightly higher (27.6 percent) than that found in normal DDGS (27 percent).

Leghorn hens

Research from the University of Kentucky (Quant et al., 2012a) fed 0 percent, 15 percent or 30 percent DDGS with or without Allzyme SSF enzymes for a 60-week production cycle in white and brown Leghorn hens. In the white leghorn hens, they reported that eggs from hens fed 30 percent DDGS and Allzyme SSF had improved albumen Haugh unit values compared to other treatments. There were no other significant effects of feeding such high levels of DDGS to white leghorn hens; however, several negative effects of feeding high levels of DDGS to brown leghorn hens were observed by the same authors (Quant et al., 2012b). Adding 15 percent to 30 percent DDGS to brown leghorn diets caused a decrease in shell weight and shell breaking strength, which was alleviated by adding Allzyme SSF to the 15 percent DDGS diets. Brown hen body weight was lower in all diets containing 15 percent or 30 percent DDGS regardless of enzyme supplementation. The authors concluded that the detrimental effect of DDGS on brown layer egg shell quality was alleviated by the addition of Allzyme SSF.

Researchers at the University of Minnesota (Farahat et

Related stories:

Using vitamins to improve poultry production, www.WATTAgNet.com/26715.html

Selenium and adding value to poultry products, www.WATTAgNet.com/25426.html

2012 International Poultry Scientific Forum Abstracts are available at the website: www.internationalpoultryexhibition.com/edu_prgrms/docs/12AbstractBook.pdf

al., 2012) fed turkeys a combination of 0 percent or 20 percent DDGS, with or without 10 percent canola meal, in combinations with different levels of dietary Cl (.22 percent, .32 percent or .42 percent) from 2-14 weeks of age. Chloride was fed to help balance the positive electrolyte balance in diets high in DDGS. Their results showed no differences in body weight, but did show higher feed intake (6 percent) and feed efficiency in turkeys on diets with DDGS, with and without canola meal. Litter moisture also increased in pens with turkeys fed DDGS (6.5 percent) and DDGS plus Canola Meal (8.0 percent), compared to the 0 percent DDGS control diet. The authors recommended that attention be paid to dietary electrolyte balance and chloride level during incorporation of DDGS with canola meal in turkey diets and that Cl levels greater than .22 percent can be detrimental to feed efficiency.

Table 1. University of Nebraska Study – Low Oil DDGS Treatment Effects on Laying Hen Performance

Treatment	Feed Intake g/hen/day	Egg Production%	Egg Wt. (grams)	Feed Conversion	Hen Wts. Avg. (grams)
Control	103.8	97.8	58.8	1.76	1515
Normal DDGS	103.7	95.5	59.0	1.77	1541
Med. Oil DDGS	105.8	95.8	59.9	1.76	1506
Low Oil DDGS	106.2	94.9	59.7	1.75	1530

*No significant effects of low oil DDGS treatments on egg production variables (p>0.05)

Despite the lower levels of oil in DDGS, hens consumed the same amount of feed/day and produced equal numbers of eggs.

Feed enzymes

The second common theme of research presented at the forum was the efficacy of feed enzymes in poultry rations. Many of the papers presented investigated phytase and carbohydrase activities in the presence of supplemental proteases as well as the value of carbohydrase combinations. Klein et al. (2012) from Texas A & M University tested a mannanase (Hemicel-L) and a cocktail NSPase (Enspria) alone and in combination to broilers in a negative control ration formulated with 130 kcal/kg less energy (ME) than the positive control rations.

Their results indicate that either enzyme alone did not return body weight gain to normal, but the additive effects of the two enzymes combined did restore body weight gain to the normal diets levels of growth. Dr. Gene Pesti, from the University of Georgia, gave a succinct economic evaluation of enzyme supplementation to broiler diets in his presentation (Tahir, et al., 2012). In their study, they fed Hostazyme X or Avizyme 1505 to broiler chickens in replacement of 30 kcal/lb ME in the negative control rations compared to positive control rations with no enzymes and normal ME levels. Based on their production results, they estimated between $7.02 - $17.64/ton feed savings adding Hostazyme to the negative control diet dependent on feed costs (a range of $200 to $400/ton) and broiler market body weight (4-8 lbs).

When adding Avizyme 1505 to the negative control diet, the value of feed savings ranged from $3.94 to $9.96/ton. Broilers fed Avizyme 1505 also weighed more, and the value of extra meat from birds fed Avizyme ranged from $11.49/ton for 6-lb. broilers selling for $.68/lb to $18.51/ton for 8-lb. broilers selling for $1.00/lb. The value of more sellable product from feeding enzymes was two to three times greater than feed savings alone.

Feed size

North Carolina State University researchers (Stark, Brake and Ferket) presented several papers on fine versus coarse roller mill ground corn in broiler diets. They compared feeding all fine (400 microns) hammermill ground corn versus a 50:50 blend of fine: coarse roller mill ground corn (>1350 microns) in the diets of broiler chickens. They found that the coarse corn combination decreased feed

intake in two studies (Xu et al., 2012 and Stark et al., 2012) resulting in improved feed conversion and a decreased mortality rate. Excreta N was also reduced when feeding the coarse corn combination.

Early life nutrition

Early life nutrition for broiler chicks was the forum's keynote address topic presented by Dr. E. T. Moran, professor emeritus, Auburn University. Dr. Moran discussed how the embryo uses egg yolk, albumen and shell nutrient reserves during embryogenesis and hatch. The first feed the chick is given must complement the eggs' depleted reserves, meaning the first diets should be high in essential fatty acids, phosphorus and simple amino acids (glycine, proline, glucosamine) in order to help the newly hatched chick transition to an exogenous source of nutrients that its immature digestive tract can utilize. Feeding a poor quality feed early on will have negative consequences for the remaining performance of the broiler chicken. Actual costs of a well-fortified feed for the first week of production aren't that great given the chick will likely consume less than a pound of it.

Researchers at North Carolina State University found that a 50:50 blend of fine and coarse roller mill ground corn in the diets of broiler chickens resulted in improved feed conversion and a decreased mortality rate.

In summary, technologies keep pushing poultry nutritionists forward with new strategies to maximize nutrient value of basal ingredients such as corn, DDGS and soybean meal. Management and nutrition formulation are continually challenged to do more with less. Fortunate for the poultry industry, universities and suppliers continue to provide quality information and research to keep moving forward in this challenging environment. [FM]

ADDITIVES by Michaela Mohnl DI (MSc)

Improving poultry's intestinal morphology, performance with feed additives

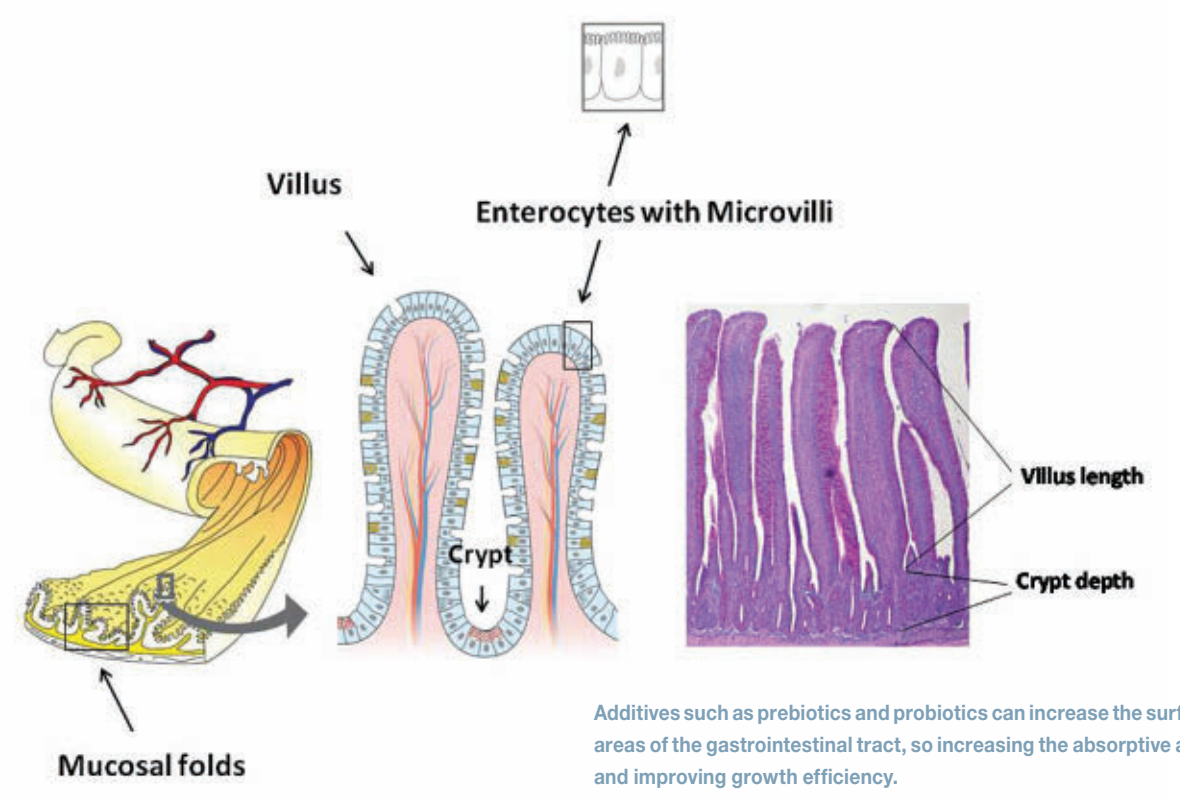
Encouraging the optimal performance of birds' gastrointestinal tract can pay dividends in health and growth.

The proper functioning of a newborn chick's gastrointestinal tract is essential for growth and performance, so achieving optimal intestinal development and the functional capacity of young birds should never be overlooked.

The intestine of hatchlings increases in weight as much as five times more rapidly than most of its other organs or body mass. This fast development of the intestinal mucosa with villi, crypts and enterocytes is essential for absorption of nutrients and subsequent performance.

The gastrointestinal tract can adapt and react morphologically to external factors, such as changes in diet. An increase in the

Michaela Mohnl DI (MSc), product manager for probiotics at BIOMIN Holding GmbH, Michaela.mohnl@biomin.net



Additives such as prebiotics and probiotics can increase the surface areas of the gastrointestinal tract, so increasing the absorptive area and improving growth efficiency.

mucosal surface area, for example, could result in an improved capacity to absorb available nutrients.

To understand how to best influence the development, maintenance and functioning of the gastrointestinal tract, it is import to understand how it is structured.

Rapid change

The development of the gastrointestinal tract begins soon after epithelial cells form a tube in the embryo. The intestine – including the external muscular layers and the villi – grow quickly and the structure of the small intestine changes rapidly. Immediately after hatching, further rapid changes with significant morphological development of the small intestine occur. The gastrointestinal tract must be ready to absorb nutrients to sustain the bird as well as to provide a barrier to external challenges.

Structure of the small intestine

The inner surface of the small intestine is not flat, but is thrown into circular mucosal folds that increase its surface area and aid in mixing the ingesta.

The mucosa form intestinal villi – tiny, finger-like projections that increase the surface and absorptive area of the intestinal wall, providing efficient absorption of nutrients from the lumen. Crypts are moat-like invaginations of the epithelium around the villi. Toward the base of the crypts are stem cells, which continually divide and provide the source of all the epithelial cells in the crypts and on the villi.

Additives influence villi development

While performance parameters may be the most common way of evaluating feeding trials, they can be evaluated through histological examination of the gastrointestinal tract, as it is well known that many substances can affect the development of intestinal villi.

The gastrointestinal tract can adapt and react morphologically to factors such as dietary changes, for example to the addition of probiotics and prebiotics in the diet, and investigations to determine changes can reveal useful information on intestinal function.

Enterocyte enzymatic activity and structure are two of the most important features of the intestinal mucosal physiology, and it has been reported that the intestine can change its surface by growing in length, and/or by increasing the height of its villi.

By growing in length, and/or by increasing or decreasing the height of the villi and microvilli, it is possible to change the effective surface area. Fusion and shortening of the villus, on the other hand, can lead to a loss of surface area for the digestion and absorption of nutrients and consequently, lower performance.

SEVERAL SCIENTIFIC STUDIES HAVE SHOWN THAT PROBIOTICS CAN HAVE A POSITIVE EFFECT

Increasing the villus height would suggest an increased surface area capable of greater absorption of available nutrients, and enterocytes have more time to fully differentiate and to fulfill their digestive and absorptive functions.

The villus crypt is considered as the villus factory, and deeper crypts indicate fast tissue turnover to renew the villus in response to normal sloughing or inflammation resulting from pathogens or their toxins.

Because the energy required to maintain the gut accounts for some 25 percent of the total basal metabolic needs of an animal, any reduction of need for renewal of gut tissue can have a significant impact on the amount of energy available for growth and caloric conversion efficiency.

Positive influences

Several scientific studies have shown that the addition of probiotic products to broiler diets can have a positive effect on gut morphology and consequently, on performance parameters.

These histomorphological changes are represented by elongated villi and a higher villi/crypt ratio, which indicates a lower rate of enterocyte-cell migration from the crypt to the villus. When less energy is needed for renewal of the gut epithelium, more energy is available for growth.

Feeding probiotic growth additives has been shown to increase the villus surface area, which consequently may lead to higher nutrient absorption. It can be speculated that increased integrity of the gastrointestinal tract associated with a greater surface area of the villi results in improved production results. Probiotic feed additives could reduce both damage to enterocytes and the need for cell renewal in the gut, contributing to an increase in overall productivity. [FM]

To learn more about feeding probiotics, read: Poultry production: How probiotics can play a role at www.WATTAgNet.com/23492.html

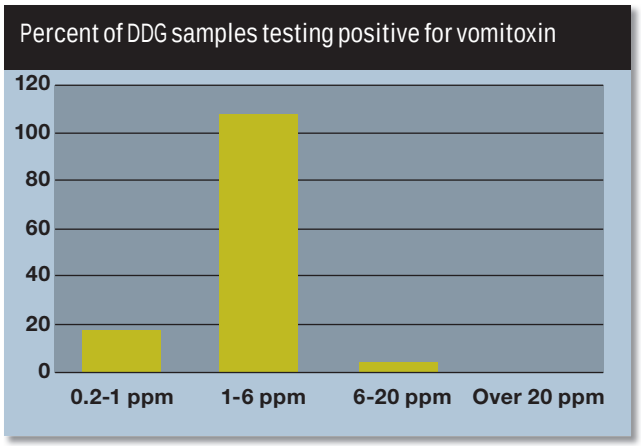
MYCOTOXIN *by Dr. Swamy Haladi*

The importance of implementing a mycotoxin control program

With alternative raw material usage on the rise, now more than ever, the feed industry needs to be aware of risks coming down the supply chain.

The game is changing when it comes to feeding livestock and poultry. Many factors have impacted this, from the renewable fuels act to the weather, but the net result is that energy and protein markets are at record highs with producers looking at every possible way to reduce feed costs. Many in the industry are turning to so-called "alternative raw materials" – commodities such as dried distillers grains with solubles, mill run, corn gluten, rice bran and others. These ingredients can be significantly cheaper than traditional energy and protein sources, and should not affect animal performance if used as part of a balanced diet.

When assessing any new feed ingredient it is always critical to characterize it. A part of that, particularly for some of the ingredients mentioned above, should relate to mycotoxin contamination.



A recent report from Dairyland Labs showed that 100 percent of 130 DDG samples tested positive for vomitoxin at some level, with 108 testing positive between 1ppm and 6ppm.

Increased risks

As we move toward the increased use of processed and fibrous materials, the risk of mycotoxin contamination increases through the distillation and fractionation of mycotoxins into the finished by-products. Figure 1 shows a recent report from Dairyland Labs showing that 100 percent of 130 DDG samples tested positive for vomitoxin at some level, with 108, or 83 percent of these, testing positive between 1ppm and 6ppm.

Given the economic current scenario, it is hard to suggest not using by-products or alternatives. However, as the industry moves to include a greater amount of these in any given diet, it is important to understand the potential risk of contamination each ingredient can bring into the final diet.

Monitoring procedures

When choosing an effective mycotoxin control program, feed mills and producers should follow a program that includes detailed management for critical control points at the farm and feed mill levels. This involves setting up good monitoring procedures as well as identifying critical levels for the given animal species being fed.

A successful mycotoxin control program should:

- Incorporate monitoring procedures
- Establish corrective actions
- Contain checks and measurements
- Include a way to record information
- Importance of motivation

With any mycotoxin control program, it is important to build a motivated team that can create and implement the program within the organization. The implementation of the program requires knowledge and motivation from the start, and, as with any long-term project, it should involve education and training so that everyone can feel responsible for its success.

The goal of a good mycotoxin control program should be to understand the level of mycotoxin challenges coming in to the supply chain so that steps can be taken to mitigate their negative effects on animal performance. This involves setting up good monitoring procedures as well as identifying critical levels for the species being fed.

With this information, the correct balance can be struck between economical feeding and optimal animal performance as it relates to mycotoxins. [FM]

Dr. Swamy Haladi is Global Technical Services for the Alltech Mycotoxin Management Team

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www.binmaster.com

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www.cardinalscale.com

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www.acsvalves.com

Biomin Levabon

Biomin's Levabon is a spray-dried autolyzed yeast that is a fiber digesting bacteria for cows. Biomin says that the yeast provides prebiotic cell wall polysaccharides (mannan, glucan) and peptides that serve as a source of nutrients for beneficial gut microbes as well as yeast cell wall components that adhere to deleterious bacteria.

www.biomin.net

Nissan Forklift Corp. APX Series pallet trucks

APX Series pallet trucks are rated at 4,000 pounds capacity, according to Nissan Forklift Corp. The design features a short truck length and narrow width, which the company says makes it easy to maneuver in small warehouses or tight settings. Features of the APX Series trucks include an offset tiller arm, chassis with steel skirt, brushless AC drive motor and onboard diagnostics system.

www.nissanforklift.com

Vytol Biosystems Inc. Oregain

Vytol Biosystems Inc. has a product called Oregain that stimulates feed and water intake aiding in the proper balance of intestinal microflora for livestock and poultry. The company said that it increases feed efficiency and each application requires a one-gallon stock solution.

www.vytol.com

Flexicon Corp. Block-Buster Bulk Bag Conditioner

Flexicon Corp.'s Block-Buster Bulk Bag Conditioner features two hydraulic rams and specially contoured end plates. The system controller and hydraulic pump can be mounted on the exterior of the safety cage or remotely. The conditioner is fully enclosed on all four sides and includes full-height doors.

www.flexicon.com

Immucell Corp. First Defense Technology Immediate Immunity single dose gel tubes

Immucell Corp.'s First Defense Technology Immediate Immunity single dose health tubes are a nutritional health supplement for newborn calves. The tubes are packaged in single dose increments and do not require refrigeration. Inside the tubes are specific proteins that are derived from bovine colostrum and are colored blue for traceability. Animal vaccination stress is to be used in conjunction with a quality colostrum program.

www.immucell.com

Sioux Automation Center 5300 series spreader

Sioux Automation Center 5300 series spreader is designed to be more tolerant for managing foreign objects while protecting driveline, undercarriage and apron chain. The company says this machine allows for easier lubricating and improved strength by having grease banks and remote zerks along with a better hitch design and a high capacity pintle hitch with safety chains. The box interior is 3/4-inch plastic with stainless steel retainers.

www.siouxautomation.com

William W. Meyer & Sons Inc. DDV Dust Duty Valve

The DDV Dust Duty Valve comes with a cast housing designed for greater capacity in applications where a quality air seal is necessary in light duty, non-abrasive applications, William W. Meyer & Sons Inc. says. The DDV valve is designed for under Baghouse, Cyclone and dust collectors with a maximum pressure differential of 60-inch wc and a maximum temperature of 300 F. The DDV is available in cast iron or stainless construction with square or round flanges, in sizes from 6 to 14 inches.

www.rotaryvalve.com

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VIEW FROM WASHINGTON *by Richard Sellers, American Feed Industry Association*

The national election: Do we really need more than 30 primaries/caucuses?

Most people don't realize the impact - positive and negative - that an election has on major industries.

As I write this, the Florida "winner-take-all" Republican primary has just ended, and many are saying the Republican presidential candidate has been decided. Maybe by the time you read this it will have changed, but I doubt it.

I remember my college American history professor lecturing that Alexander Hamilton strongly preferred that the electoral college elect our president instead of direct election because he thought people, i.e. the electorate, were an "illiterate mass." My professor's words, not mine. I don't think Hamilton envisioned primaries, but if he had, he might have had a different opinion.

Candidates

Most folks don't realize the election of a president, entire House of Representatives and one-third of the Senate every four years has a major impact on U.S. industries because of the differing views of candidates on business, regulation and the "role of government." The current administration has been very enforcement-oriented and more "protective" of the populace than the previous one— a sort of "government-must-protect-the-people-from-evil-industry" approach. Is that good? It has been costly.

The president, as head of the Executive Branch of our government, controls, by his appointments, almost all federal regulatory philosophy and program efforts except those legally independent of his grasp, such as the Federal Reserve Bank. This is enormous power when you look at the laws regulating the feed industry administered by the U.S. Food and Drug Administration, U.S. Environmental Protection Agency, and Occupational Safety and Health Administration.

Change direction

It typically takes almost two years after a presidential election for the executive agencies to change direction and for the industry to find out what's new. For instance, FDA commissioner Margaret Hamburg announced last year FDA was changing its enforcement efforts from pursuing consent degrees to filing directly against company CEOs for serious violations. That woke up some company boards in the industry and got the attention of a few CEOs at the same time. It's a long-term issue, likely to carry over to the next administration.

As a representative of an industry trade group, I work with any elected or appointed official. We have to, in order to educate them and allow our industry to operate in a reasonable business environment. It's a lot of work to educate a new administration and even when agency heads leave after two years, education is still required.

I once heard a story about an esteemed medical man, who, when appointed FDA commissioner, was reputed to have said, "We regulate animal drugs?! What else do we do that I didn't know?" This gentleman was both an M.D. and a food and drug attorney.

I wish "Super Tuesday" was over, don't you Mr. Hamilton?

Richard Sellers is vice president for feed regulation & nutrition of the American Feed Industry Association. His responsibilities include interacting with FDA, state feed control agencies and legislative bodies, and providing comments to those agencies and information about those agencies to the AFIA membership.

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