

Broiler Production

Corn Screenings In Broiler Feeds

Corn screenings, a by-product of the massive U.S. feed grains production industry, are generated when corn stocks are cleaned for export or to meet grade specifications. The resulting product consists of a mixture of broken corn dust, chaff, weed seeds, and foreign matter in varying proportions. The attractive prices often attached to these products, and the relative abundance of stocks when corn exports are favorable have convinced many broiler operations to use corn screenings in broiler rations.

The major component of most corn screening samples consists of broken grain. For this reason, good quality corn screenings do have substantial nutritional value for poultry and livestock. The concerns with this by-product are variability in nutrient levels and toxic factors. An enhanced effort in sampling and testing is warranted to avoid unexpected performance drops due to these issues.

Discussions with industry nutritionists have indicated

that bushel weight may be a useful measure of general corn screening quality. Bushel weight varies with the quantities of chaff and foreign matter and can vary greatly compared to the values used for corn.

Nutrient Variation

A recent survey of 23 corn screening samples from three sources in the Southeast has allowed us to compile a nutrient profile of corn screenings and examine the nutrient variation among samples. Average values and standard deviations are given in the accompanying table (see page 2). These samples were grouped by bushel weight (35 to 50 lb/bu) to determine differences in nutrient density.

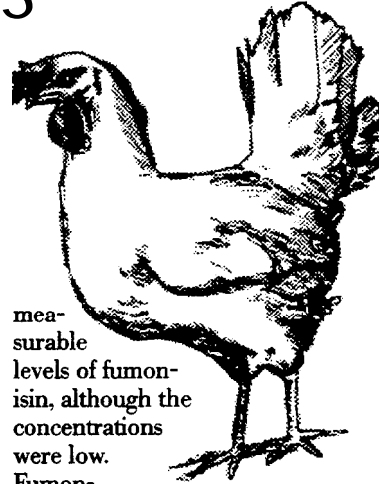
In the samples collected, little variation was seen in nutrients other than metabolizable energy and ash. Nitrogen corrected TME (energy) values for the light bushel weight group were 57 calories/lb lower (1472 vs 1530) than for the high bushel weight group. This is a significant factor in the worth of this ingredient as

a feedstuff. Corn screenings of low bushel weight should be given a lower TME value in formulation. Failure to make this correction will lead to unexplained variation in feed conversions. Ash values were higher in the low bushel weight group, presumably due to an increase in foreign matter.

Mycotoxin Sampling

Previous reports have linked corn screening mycotoxin contamination with lung and liver problems in swine and other farm animals. The very nature of the commodity lends itself to a concentration of mycotoxins from the corn from which screenings are derived. For this reason, Dr. Richard Shelby's lab at Auburn completed a mycotoxin profile for four of the more common toxins (aflatoxin, T-2, fumonisin, and zearalenone) on all corn screening samples collected. These samples were relatively clean, with only one of 23 samples having a T-2 level that may give reason for concern.

Many samples did show



measurable levels of fumonisin, although the concentrations were low.

Fumonisin have been shown to cause flushing in chicks and even moderate contamination with this toxin may reduce feed efficiency if digestion is disrupted.

Conclusions

Corn screenings sampled from the 1995 crop year did not show a problem with mycotoxin contamination. The major nutrient that altered as bushel weight dropped was energy (TME). The drop was sufficient to lower broiler feed energy levels by 14 kcal at 25% corn screening inclusion in the feed if not adjusted for.

Companies should undervalue corn screening energy levels or have several ingredient standards based on bushel weight to account for this variation. Prudent use of this ingredient would include limiting the percentage in the diet, especially in starter feeds, and monitoring mycotoxin levels.

This information was provided by J.B. Hess, Poultry Science Department, Auburn University.

AU Notes

Dead Bird Digester Systems Disallowed in Alabama. Research conducted into the use of digesters to dispose of poultry farm mortalities has raised serious questions as to the microbiological safety of this practice.

Three commercial broiler farms in the Coosa Valley area were selected for the study, conducted by Dr. Robert Norton and Dr. John Blake of Auburn's Poultry Science Department. Two concrete, water-tight digestion tanks were installed on each farm. An overflow tank was attached to the main tank to aid in evaporation and contain liquid overflow. After installation, the tank was filled with water and a bacterial inoculant added to aid in the digestion of the carcasses.

After monitoring the on-farm digestion units for a year, the researchers found bacterial contamination was at an unacceptable level that might pose a threat to farm biosecurity. As a result of these studies, J. Lee Alley, the State Veterinarian, has stated that the use of dead bird digester systems will not be permitted in Alabama.

Minimum Ventilation For Cold Weather

When it gets really cold outside, a poultry house needs a much lower ventilation rate than it does in summer. The need for ventilation, however, never goes away completely, never drops to zero even in the coldest weather. We must always provide at least some minimum rate of the right kind of ventilation to provide fresh air to the birds, and to exhaust ammonia, carbon dioxide, and moisture from the house.

Excess moisture is the most common cold-weather problem in poultry houses, causing wet litter and ammo-

nia build-up that can be very costly in terms of bird performance, bird health, even bird survival. Ventilation is the only practical way to prevent this problem, by bringing in outside air and exhausting moisture-laden in-house air. And we need to do this even when outside air is very cold and moist, and when there is no need to get rid of excess bird heat

The amount of house heat lost during proper minimum ventilation is insignificant compared with the benefits gained in bird performance. And since the relative humidity of air depends on its

temperature (a 20-degree rise in temperature cuts relative humidity in half), we don't have to worry about moisture coming into the house with outside air. Cold air can't hold that much moisture to start with, and as it is warmed by mixing with house air its relative humidity will drop. This enables air flow through the house to absorb and exhaust excess moisture. Thus we can-and must-operate minimum ventilation even when an all-day cold rain is falling outside.

Unlike warm-weather ventilation, which is typically operated by thermostats, low-level minimum ventilation is normally timer driven. For young birds, the timer setting may be as little as one minute in every ten. As birds grow larger, they generate more and more heat, so that eventually-especially if outside temperature is not too low-it will be necessary for thermostats to override timer fans to exhaust excess house heat. Typically in cold weather, however, minimum ventilation is cycled on and off even when the thermostat doesn't call for ventilation. And even when a small amount of excess heat must be removed, the poultry house should be ventilated at a very low rate.

The critical factor for successful minimum ventilation is making sure that incoming cold air mixes uniformly with and is warmed by in-house air before coming in contact with the birds. The setup that most consistently meets this requirement is a negative-pressure system using sidewall exhaust fans with adjustable-board sidewall air inlets. The partial vacuum created in the house (static pressure usually between 0.05 and 0.10 inches), pulls air in evenly and at the same high velocity through all inlets, so that the mixing of outside and in-

house air is uniform throughout the house.

The type of air inlet used can make a big difference to bird comfort and performance in cold weather ventilation. Negative-pressure minimum ventilation systems can use either curtain cracks, fixed board cracks, or adjustable louver-type board air inlets. The adjustable board type is best because it directs the incoming airflow upward toward the ceiling. When the board is positioned properly, the high-velocity incoming air shoots along the ceiling to the center of the house to mix with house air well above bird level so there is little chance of chilling or wetting the birds. A fixed-board crack tends to deliver air more in a level stream, so the cold air has less time to mix and be warmed. The curtain crack setup is least effective because its physical arrangement directs incoming air downward toward the birds.

The exact air exchange rate needed depends primarily on the age of the birds. As they grow larger and put out more moisture and heat, system on-time needs to be increased. In-house relative humidity and litter moisture, along with bird behavior, serve as guides in setting the minimum ventilation rate. Normally, meeting the birds' fresh air requirements, along with preventing ammonia buildup, will be taken care of if ventilation is operated to control relative humidity below about 70%. Thus, a good relative humidity meter is essential for monitoring in-house conditions and making the right ventilation decisions.

As with any negative-pressure ventilation system, successful minimum ventilation requires a tight house.

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Proximate Composition Of Corn Screening Samples

	Average	Standard Deviation
Protein (%)	8.44	0.53
Moisture- (%)	14.06	0.85
TME (Kcal/lb)	1501.00	44.00
Fat (%)	2.71	0.63
Fiber (%)	2.48	0.33
Ash (%)	1.45	0.21

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Current Concepts In Broiler Production is a publication of the Alabama Cooperative Extension System with the cooperation of the Department of Poultry Science at Auburn University. This publication is designed to provide new and emerging concepts and information to those involved in broiler and breeder production.

Information on management, feeding, and disease will be compiled from research underway at Auburn University, as well as from other sources. New technologies and practices will be highlighted as they become available.

Disease Diagnosis

Tax-supported laboratories for avian disease diagnosis were established in most states many years ago. Diseases were mainly bacterial or protozoal and diagnoses relatively simple. These laboratories provided a great service in contributing to the control of pullorum-typhoid and coccidiosis, a hurdle that had to be surmounted before the modern poultry industry could develop. Reduced also were such diseases as infectious coryza and tuberculosis.

While the incidence of bacterial diseases has declined, the incidence of viral diseases, mycotoxicosis, and metabolic diseases such as skeletal and circulatory problems has increased, and many of these viral diseases are of recent origin. Viral tenosynovitis, enteric reovirus infections, chicken anemia virus (CAV), and inclusion body hepatitis are viral diseases discovered during the last three decades.

The diagnosis of viral diseases and mycotoxicosis requires greater sophistication. The poultry industry has become very large and highly automated, and diagnostic services, where deficient, need to be upgraded. A balanced health service program consists of the following:

- Regional laboratories for posting and routine diagnosis.
- A central laboratory for microbiological isolations, histological procedures, chemical and immunological assays.
- An extension service for transmission of new information to the industry, and for investigation of field problems.
- Research facilities, when required, for the clarification of unresolved field problems.

Typical diagnostic procedures include the following:

Necropsy and culture. Initially, the diagnostician necropsies the bird, considers the case history, and performs routine culture or microscopic examinations. Often this suffices to establish a diagnosis.

Serological testing. Infection with a disease-producing agent usually stimulates the production of a specific antibody, which appears in the blood stream. Detection of the antibody is evidence that the bird is or has been infected with the corresponding disease-producing agent. Serological tests are important in diagnosis, and can usually be performed in the field laboratory. There are many modifications of serological testing. Some of these are as follows:

- Plate or tube agglutinations
- Serum neutralization
- Hemagglutination-inhibition
- Fluorescent antibody
- Agar gel precipitation test
- Enzyme-linked immunosorbent assay (ELISA). Kits available from IDEXX, Inc., Portland, Maine and KPL, Inc., Gaithersburg, MD
- Complement fixation assay (ELISA)

Microbial isolation and identification. Microbial isolation and identification is technical and normally performed in a central laboratory. Bacteria, mycoplasma, and fungi can be isolated and identified in artificial media in a few days, whereas viruses need a living host (cell culture or embryo) and may take a week or longer for identification.

Antigen capture ELISA. Monoclonal antibodies are attached to a micro-titer plate. Monoclonal antibodies are highly specific, produced against only a single antigenic determinant (epitope). Antigens from homogenized tis-

ues are captured by the antibody to the plate and a standard ELISA is done. This technique can be used to sero or subtype microorganisms, depending on the specificity of the reagents used.

Polymerase chain reaction (PCR). Nucleic acids of microorganisms are enzymatically amplified in tissues or cell culture and are then separated in electrophoretic gels, transferred to membranes, and detected with labeled recombinant probes. Commercial kits are now available from IDEXX, Inc. for detecting mycoplasma by PCR. More sensitive assays which combine PCR and in-situ hybridization are now being developed to detect organisms which are latent (not replicating) or which replicate at a low rate in the tissues or cell culture.

Histopathology. Prepared tissues are sliced into thin sections, mounted on glass slides, stained, and examined for microscopic lesions specific for certain diseases. A trained technician is required. Often more than one agent can cause similar microscopic pathology, so other tests are combined such as the fluorescent antibody or immune peroxidase assay.

Immunoperoxidase assay. Monoclonal antibodies against various organisms (sero or subtype specific) are attached to organisms found in tissue sections. Secondary anti-species monoclonal antibodies attached to a substrate are added. An enzyme (peroxidase) is then added, and a reaction produces a product which turns color when indicators are added. Stained tissue sections are viewed under a microscope and stained antigen particles are evident in cells. These sections can then

be counterstained for routine histopathological observation and viewed with a light microscope. With this technique, a correlation between antigen presence and microscopic lesions can be made, resulting in a definitive diagnosis.

How to submit birds and case histories: When in doubt, service personnel should submit problem cases promptly to a diagnostic laboratory. A good procedure is to call the laboratory before submission.

Both typically affected birds and dead birds should be submitted. A good rule of thumb is to submit six to eight birds if the birds are less than 3 weeks of age, about five birds if less than 12 weeks of age, and four birds if 12 weeks or older.

Birds should be transported in cardboard boxes, which can be burned. Care should be taken so that birds do not smother on the way to the laboratory. A complete case history should be prepared in case the laboratory requires it.

This information was provided by Dr. J. Giambone of Auburn's Poultry Science Society.

Research Shorts

Recent research of interest to poultry managers

1. May, J. D., B. D. Lott, and J. D. Simmons, 1997. Water consumption in high cyclic temperatures: Bell versus nipple waterers. *Poultry Science* 76: 944-947.

As expected, water consumption during heat stress was lower from nipples than from bell waterers. These authors found

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(Research Shorts, Continued
from page 3)

that birds were able to drink more water while panting if the nipples were maintained at a lower height above the litter.

2. Mathews, J. O., T. L. Ward, and L. L. Southern, 1997. Interactive effects of betaine and monensin in uninfected and *Eimeria acervulina*-infected chicks. *Poultry Science* 76:1014-1019.

Betaine appeared to help salvage performance during a cocci challenge. However, the effect may not be measurable over and above the control given by an ionophore.

3. Munch, P., 1997. Confessions of a used roll. *Feed Management* 48(6):29-30.

The author discusses pelleting efficiency as

affected by equipment alignment. Pictures are used to illustrate uneven wear patterns on pelleting equipment.

4. Bowers, P., 1997. HACCP as a second language. *Poultry Marketing and Technology* 5(4):20-22.

Efforts by poultry companies to prepare for the January 1998 startup of the USDA's HACCP-based inspection system are discussed

5. Bermudez, A. J., and J. D. Firman, 1997. Effects of biogenic amines on broiler performance and intestinal lesions. *Poultry Science* 76(Suppl.1):82.

These authors found no effects of biogenic amines on broiler performance and no lesions caused by these compounds at levels seen in feeds.

(Minimum Ventilation,
Continued from page 2)

What is needed is high velocity air flow coming in through high sidewall inlets. Any air leaks will tend to defeat this, and result in chilling the birds. Also, inlets must be adjusted for the proper static pressure. If openings are too small, static pressure will increase and fans will not be able to deliver their rated air flow or enough air volume. If the inlet area is too large, static pressure will decrease, resulting in lower air velocity

and a less uniform air flow pattern.

When set up and operated properly, providing adequate air exchange to control moisture and an air flow pattern that avoids chilling the birds, a minimum ventilation system helps a grower get maximum cold-weather bird performance.

This information was provided by James Donald, Department of Agricultural Engineering, Auburn University.

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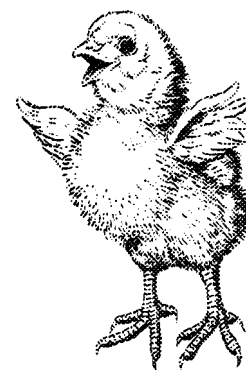
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