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Phone (706) 542-5645 Fax (706) 542-0249
e-mail: sclanton@uga.edu

Feed Toxicity vs. Toxin Detection

Dr Steve Collett
Assistant Professor
University of Georgia
Poultry Diagnostic and Research Center
Athens, GA 30602-4875

INTRODUCTION

Economic pressure to cut cost has driven producers to scrutinize every aspect of production to maximize return on investment. The genetic potential for meat and egg production continues to improve linearly but the stress induced by cost cutting practices frequently has a negative impact on profitability. In modern intensive production systems stress is the most frequent underlying cause for phenotypic response to deviate from expected genotypic response. Once a production system reaches this zone of diminishing returns relatively minor perturbation of the gastro intestinal environment can compromise gut integrity, nutrient assimilation and productivity. Attention to detail becomes increasingly important. Factors such as low-grade toxicity once considered to be unimportant are now significant.

Broiler Performance Data (Region)
Live Production Cost

	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	167.15	156.60	173.69	175.79	173.53
Feed cost/lb meat (¢)	15.41	13.92	16.10	16.91	16.48
Days to 4.6 lbs	43	41	42	41	42
Chick cost/lb (¢)	4.11	4.40	4.26	3.56	3.74
Vac-Med cost/lb (¢)	0.006	0.12	0.05	0.07	0.05
WB & 1/2 parts condemn. cost/lb	0.022	0.21	0.18	0.18	0.23
% mortality	5.18	4.35	4.18	4.44	4.46
Sq. Ft. @ placement	0.81	0.76	0.82	0.87	0.87
Lbs./Sq. Ft.	6.91	6.77	6.74	7.49	7.01
Down time (days)	14	9	10	12	10

Data for week ending September 25, 2004

Contents

There are numerous toxins frequently present in animal feed that can adversely affect bird performance. Some of the more commonly encountered toxins include mycotoxins, biogenic amines, dioxin, extract-chemical residues, bacterial endo- and exo-toxins, rancid fats and plant toxins. **The significance of these toxins in terms of flock productivity becomes increasingly significant as bird performance approaches genetic potential.**

TOXIN DETECTION

Although several different techniques have been developed for specific toxin analysis it is probably **the mycotoxins that have received the most attention** in this regard.

Currently the technique of Gas Chromatography (GC) has been replaced by High Pressure Liquid Chromatography (HPLC) as the standard by which all tests are measured. These systems require expensive equipment and careful sample preparation, which makes them slow and costly. To satisfy the need for a rapid and accurate test several different ELISA based tests including, plate, card, tube and membrane (dip-stick) systems have been developed. More recently attention has been directed at the use of near infra red (NIR) to detect mycotoxin contaminants. This is an exciting development since not only is the NIR technique sensitive enough to satisfy the stringent EU requirements but the result is well correlated with the HPLC (>0.9) and the test can be completed in 1-5 minutes.

While these modern techniques are known to be very sensitive and specific the test results seldom show good correlation with signs of toxicity in the field, thus indicating a high degree of detection error. The process of toxin determination involves several generic steps *so total detection error* is the summation of the error encountered at each one of these steps.

Detection error = sampling error + sample preparation error + analytical error

Sample preparation error and analytical error is limited since research in this area has been directed at improving test system *specificity* and *sensitivity* and good laboratory practice control has become the norm. If this type of error does occur it is usually consistent and predictable especially if analysis is performed at a specific facility.

In contrast, sampling error is notoriously variable, as reflected in table 1, and accounts for the majority of toxin detection error.

Table1. Aflatoxin test results for 20 replicate 5 lb samples from 10 lots of cotton seed (Whitaker, Dickens, Giesbrecht. 1991. In: Mycotoxins and Animal Foods. CRC Press).

Lot Number	Mean, ppb	Range	Variance	C.V.
1	2.7	0 - 14	17	156
2	9.5	0 - 44	174	140
3	12.6	0 - 50	234	122
4	14.0	0 - 56	223	107
5	30.3	0 - 100	819	95
6	41.7	6 - 165	1259	85
7	51.1	10 - 117	959	60
8	73.8	15 - 160	2183	63
9	109.9	1 - 266	4990	64
10	169.8	70 - 269	4741	41

TOXICITY

While a highly sensitive and specific mycotoxin test may accurately predict the degree of contamination with a single toxin it will inevitably fall short of determining potential *toxicity* in a field situation. The relative toxicity of a feed is influenced by several factors and it is these confounding factors that make it difficult to find a consistent correlation between the presence or absence of a single mycotoxin and toxicity. To ensure that the effect of a *single* variable is evaluated reported trials have to be carefully designed to eliminate confounding factor influence. Toxicity is a dose dependent variable affected by the inherent properties of the *toxin* and the susceptibility of the *victim*.

Unfortunately current knowledge limits the capability of toxicity determination to toxin detection. Very little is known about the additive or synergistic effects of mycotoxins or the impact of intrinsic and extrinsic factors on tolerance, so they are simply ignored. Instead, an ingredient is arrogantly termed "mycotoxin-free " and considered safe after receiving a negative HPLC test for four of the 300 plus known mycotoxins. Even when the HPLC test is positive for one or more of the four mycotoxins tested for, the ingredient is not considered to be a risk if the level of contamination is below certain limits despite the fact that detection error is often in excess of these limits.

In order to determine the potential toxicity of an ingredient an effective test system needs to be sensitive to the additive and synergistic effect of the various toxins potentially present. Once the relative risk has been determined through toxicity determination, identification of the individual toxins helps decide strategy to correct, prevent or manage the risk.

CYTOTOXICITY ASSAY

The cytotoxicity assay is an in vitro assay developed to provide a means of more accurately estimating the in vivo toxicity of a feed sample or ingredient. The test is designed to quantify the overall toxicity of the ingredient and gives no indication of what toxin(s) is/are present. As with the more conventional test procedures the problem of detection error still exists and every effort must be made to limit this source of error.

The procedure involves five steps:

1. Feed sampling
2. Extraction - fat and water soluble feed extract
3. Tissue culture preparation
4. Incubation - feed extract and cell culture
5. Evaluation

INTERPRETATION OF RESULTS

It is inappropriate to assume that a particular feed will not affect bird performance merely because the level of contamination with a specific mycotoxin is below the toxic threshold, previously determined by research trials. Simultaneous contamination with several different toxins has been shown to increase the relative toxicity of a single toxin and stressed individuals within an apparently healthy flock will have a lower toxin tolerance threshold.

Low level antibiotic inclusion in poultry rations has been used for more than 5 decades to improve performance and the impact of these products on gut flora has been well documented. In feed antibiotic selection and dose determination for performance enhancement has been established through sound research. Some antibiotics can have a detrimental effect on gut flora and performance so nutritionist and veterinarians are very careful in designing growth promoter programs. The same degree of care needs to be taken when evaluating the risk of feed ingredient toxin contamination. Many mycotoxins are known to have antimicrobial properties and penicillin is an excellent example of this. Low level mycotoxin contamination can affect bird performance through perturbation of the gut flora without necessarily causing lesions characteristic of poisoning. **Feed passage is the most obvious sign of malassimilation** but subtle changes in gut and caecal content are good indicators of flora disturbance.

Although there are literally thousands of trials demonstrating the antibiotic efficacy or lack thereof, the literature is devoid of data showing the long-term effect of such programs. Single point evaluation gives no indication of the influence that an intervention which alters gut flora has in a continuous production system. Gut flora determines the composition of the litter/house flora (Lilijebjelke et.al., 2003) which in turn acts as the seed stock for the gut flora of the next placement. While the use of an antibiotic or presence of mycotoxins can alter the gut flora within a couple of weeks it takes several grow-out cycles to change the house flora (Avellaneda et.al., 2003; Idris et. al. 2003; Lilijebjelke et. al., 2003; Schildknecht, et. al. 2003a; 2003b). The negative impact of feeding mycotoxin containing feed may only become apparent some time after the fact, once the house flora composition has changed. Although recently reported this is by no means a new concept. Both rotation and shuttle programs have been used for decades to maintain additive growth promoting capabilities

In the late summer of 2004 a broiler company had problems with severe feed passage in chicks 1-2 weeks of age, "runting and stunting " and poor uniformity.

Despite there being obvious signs of mycotoxin poisoning (lesions in mouth, gizzard, small intestine and liver) feed was "negative" for mycotoxins on thin layer chromatography for aflatoxin, zearalonone, ochratoxin and vomitoxin. The cytotoxicity assay test results were as detailed in table 1.

Table 2. Result of cytotoxicity assay performed on individual feed ingredient samples collected at the feed mill.

Sample	Cytotoxcicity score	Comment
Soybean meal	5	Score of 4-5 indicates a significant toxicity=> expect production/digestion effect especially if high-concentration ingredient.
Soybean meal	5	
Soybean meal	4	
Soybean meal	4	
Meat and bone	3	Score of 3 indicates non significant toxicity for a low-concentration ingredient
Meat and bone	3	
Meat and bone	3	
Meat and bone	5	Score of 5 indicates significant toxicity
Poultry Meal	4	
Corn	1	Score 0-1 indicates non-significant toxicity even for a high concentration ingredient
Corn	0	
Corn	1	
Corn	2	

In this case it would appear that the soybean meal, one of the meat and bone meal samples and the poultry meal could potentially be the cause for production problems despite the feed being "free" of mycotoxins. The corn, usually assumed to be the offending ingredient, is in this case non-cytotoxic.

FIELD EXPERIENCE

The cytotoxicity assay has been used to evaluate ingredient toxicity for over a decade. In the early 1990s a poultry company in the UK used the assay to screen feed ingredients and the technique was later used in South Africa and the USA. A laboratory in the US has been using the cytotoxicity assay to test incoming raw materials since 1999 (Table 1.).

Table 1. Cytotoxicity results of routine feed ingredient screening from a production company in the USA

	# samples tested	# positive	% positive
Corn	891	87	9.76
Soy	571	34	5.95

Corn and soy are by far the highest inclusion ingredients in US diets and consequently deserve the most scrutiny. Corn is traditionally assumed to be the most significant in terms of mycotoxin contamination but routine testing with the cytotoxicity assay indicates that **soybean meal is equally problematic in terms of *cytotoxicity.*** During the last 6 months the prevalence of cytotoxicity in soy samples has exceeded that of corn which demonstrates the impact of ingredient availability on cytotoxicity.

The seasonal variation in US ingredient toxicity mimics that found in other countries with late summer through early winter being the worst period. This coincides with the transition from the end of the previous season 's crop and the start of the new season 's crop. After extended storage feed ingredients are more likely to be contaminated with mycotoxins (storage toxins) and the high moisture content of newly harvested grain will exacerbate the problem (field toxins).

CONCLUSION

It may not be adequate to rely on traditional methods of feed ingredient screening for toxicity evaluation. Toxicity is a dose dependent variable that is influenced by intrinsic (bird) and extrinsic (environment) disease determinants and the type, concentration and combination of toxins present. The traditional, highly specific and sensitive tests accurately determine the presence and concentration of toxins in feed ingredients. The additive or synergistic effect of ingredient contamination with a spectrum of toxins is neglected and these tests consequently provide little insight into the relative toxicity of the ingredient.

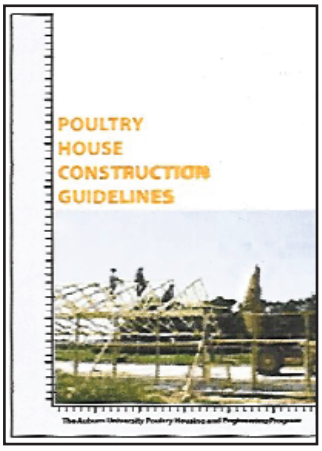
The cytotoxicity assay provides an estimate of the toxicity of an ingredient which encompasses the additive or synergistic effects of toxin type, concentration and combination. This test provides a very useful means of screening feed ingredients for suitability and helps to quantify the risk associated with the use of the ingredient. In contrast to traditional toxin detection tests the cytotoxicity assay provides no specific information as to the type and concentration of toxins present.

References available upon request at colletts@uga.edu

POULTRY HOUSE CONSTRUCTION GUIDELINES PUBLICATION NOW AVAILABLE

The Auburn University Poultry Housing and Engineering Program in cooperation with the U.S.. Poultry and Egg Association has published a 64-page complete guide to best-practice poultry house construction methods. The publication is designed to be useful for growers, integrators and other industry professionals including builders, lenders and insurers.

Illustrated with full-color photos and diagrams, the book shows the right ways to build and economical house that will stand up to hard use over its life span and provide the right environment for profitable poultry production. it also identifies and illustrates typical construction mistakes that are too often made.



Contents include explanations of business relationships involved, insurance considerations, house design and planning steps, and details on all construction stages from site preparation to equipment installation. Each chapter on construction includes checklists of the most important details ... In the back of the book are detailed checklists for house construction and equipment installation.

The price is $25.00 (U.S.) ppd. Contact: Jess Campbell, Biosystems Engineering Department, 215 Tom Corley Building, Auburn University, Alabama 36849. Phone: (334) 844-3546 or E-mail: jesscamp@aces.edu

Authors:

James Donald, Extension Engineer, Auburn University, AL

Jess Campbell, Poultry House Technician, Auburn University, AL

Gene Simpson, Agricultural Economist, Auburn University, AL

John Langston, Consulting Engineer, North Little Rock, AR

Lester Cole, Insurance Consultant, Montezuma, GA

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.224	0.298	0.181	0.229	0.223
% Airsac	0.077	0.039	0.075	0.063	0.082
% I.P.	0.016	0.010	0.072	0.015	0.087
% Leukosis	0.002	0.000	0.001	0.008	0.001
% Bruise	0.003	0.002	0.004	0.004	0.008
% Other	0.021	0.006	0.023	0.008	0.010
% Total	0.343	0.356	0.356	0.326	0.411
% 1/2 parts condemnations	0.496	0.741	0.294	0.373	0.461

Data for week ending September 25, 2004

Broiler Performance Data (Company)
Live Production Cost

	Average Co.
Feed cost/ton w/o color ($)	172.03
Feed cost/lb meat (¢)	16.03
Days to 4.6 lbs	42
Chick cost/lb (¢)	4.00
Vac-Med cost/lb (¢)	0.06
WB & 1/2 parts condemn. cost/lb	0.21
% mortality	4.51
Sq. Ft. @ placement	0.83
Lbs./Sq. Ft.	6.97
Down time (days)	12

Data for week ending September 25, 2004

REMINDER

All previous issues of the Poultry Informed Professional are archived on our website www.avian.uga.edu under the Online Documents and The Poultry Informed Professional links.

Broiler Whole Bird Condemnation (Company)

	Average Co.
% Septox	0.223
% Airsac	0.071
% I.P.	0.043
% Leukosis	0.002
% Bruise	0.004
% Other	0.016
% Total	0.358
% 1/2 parts condemnations	0.425

Data for week ending September 25, 2004

COBB-VANTRESS

Aviagen

Hubbard

Primary Breeders Veterinary Association

HERITAGE

The Poultry Informed Professional Newsletter is published with support from The Primary Breeder Veterinarians Association.

Excerpts from the latest USDA National Agricultural Statistics Service (NASS) "Broiler Hatchery," "Chicken and Eggs" and "Turkey Hatchery" Reports and Economic Research Service (ERS) "Livestock, Dairy and Poultry Situation Outlook"

Broiler Eggs Set In 19 Selected States Up 4 Percent

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 19-State weekly program set 204 million eggs in incubators during the week ending October 9, 2004. This was up 4 percent from the eggs set the corresponding week a year earlier. Average hatchability for chicks hatched during the week was 83 percent. Average hatchability is calculated by dividing chicks hatched during the week by eggs set three weeks earlier.

Broiler Chicks Placed Up 2 Percent

Broiler growers in the 19-State weekly program placed 161 million chicks for meat production during the week ending October 9, 2004. Placements were up 2 percent from the comparable week a year earlier. Cumulative placements from December 28, 2003 through October 9, 2004 were 7.05 billion, up 2 percent from the same period a year earlier.

August Egg Production Up 2 Percent

U.S. egg production totaled 7.52 billion during August 2004, up 2 percent from last year. Production included 6.43 billion table eggs, and 1.09 billion hatching eggs, of which 1.03 billion were broiler-type and 60.0 million were egg-type. The total number of layers during August 2004 averaged 342 million, up 2 percent from a year earlier. August egg production per 100 layers was 2,197 eggs, down slightly from August 2003.

All layers in the U.S. on September 1, 2004, totaled 342 million, up 2 percent from a year ago. The 342 million layers consisted of 284 million layers producing table or market type eggs, 55.8 million layers producing broiler-type hatching eggs, and 2.64 million layers producing egg-type hatching eggs. Rate of lay per day on September 1, 2004, averaged 70.8 eggs per 100 layers, up slightly from a year ago.

Laying flocks in the 30 major egg producing States produced 7.03 billion eggs during August 2004, up 2 percent from a year ago. The average number of layers during August, at 320 million, was up 2 percent from a year ago.

Egg-Type Chicks Hatched Up 9 Percent

Egg-type chicks hatched during August totaled 36.0 million, up 9 percent from August 2003. Eggs in incubators totaled 32.5 million on September 1, 2004, up 1 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 313,000 during August 2004, up 66 percent from August 2003.

Broiler Hatch Up 3 Percent

The August 2004 hatch of broiler-type chicks, at 810 million, was up 3 percent from August of the previous year. There were 654 million eggs in incubators on September 1, 2004, up 3 percent from a year earlier.

Leading breeders placed 7.28 million broiler-type pullet chicks for future domestic hatchery supply flocks during August 2004, down 2 percent from August 2003.

Turkey Eggs in Incubators on September 1 Down Slightly

Turkey eggs in incubators on September 1, 2004, in the United States totaled 28.3 million, down slightly from September 1 a year ago. Eggs in incubators were 7 percent below the August 2004 total of 30.6 million eggs. Regional changes from the previous year were: East North Central down 3 percent, West North Central down 2 percent, North and South Atlantic up 3 percent, South Central up 4 percent, and West down 5 percent.

Poults Placed During August Down 2 Percent From Last Year

The 23.7 million poults placed during August 2004 in the United States were down 2 percent from the number placed during the same month a year ago. Placements were down 6 percent from the July 2004 total of 25.3 million. Regional changes from the previous year were: East North Central up 1 percent, West North Central up 5 percent, North and South Atlantic down 11 percent, South Central up 10 percent, and West down 11 percent.

Broiler Production Estimate Increased

According to the latest Economic Resarch Service (ERS) reports, the U.S. broiler production estimate for third-quarter 2004 has been increased to 8.8 billion pounds, up 25 million pounds from the previous estimate. This is a 4.1- percent increase compared with a year earlier and reflects an expected upward turn in the number of birds slaughtered and continued growth in their average weight. The broiler meat production estimate for the fourth quarter has also been increased and is now 8.6 billion pounds. This is a seasonal decline from the third quarter, but it is 4.1 percent higher than the same period in 2003. Throughout July and August, the number of chicks being placed for growout ranged between 2.5 and 5.6 percent higher than the previous year. This pattern is expected to change slightly going into the fourth quarter, with the growth in chick placements averaging slightly lower due to the recent decline in prices for most broiler products.

USDA Reports continued from page 7

Over the last 2 months, prices for almost all broiler products have fallen strongly. While average prices for most broiler parts were considerably higher than a year earlier during the first and second quarters of 2004, prices for many parts are now only slightly higher or below their year-earlier levels. Prices for whole birds are still higher than the previous year, but prices for boneless/skinless breasts dropped over 70 cents a pound between June and August and in August averaged slightlyless than the previous year.

Broiler Exports Lower in Second Quarter; Third Quarter Also Forecast Down

Second-quarter 2004 broiler exports totaled 1.008 billion pounds, down 14 percent from the same period in 2003. The chief reason for the reduction is continued low shipments to Asian countries, primarily Hong Kong/China, Korea, and Japan. Over the first half of 2004, exports to these markets totaled only 141 million pounds, well below the 459 million pounds exported in the same period in 2003. Partially offsetting the decline in shipments to these Asia markets have been strong exports to both Canada and Mexico. Exports to Canada were 26-percent higher in the first half of 2004, and exports to Mexico totaled 195 million pounds, 21 percent higher than the previous year. In July, broiler exports totaled 407 million pounds, considerably higher than the last several months, but still down slightly from July 2003. The increase from the last several months is mostly attributable to higher shipments to Russia, but also to higher exports to countries such as Cuba, Turkey, and Georgia.

The export forecast for the third and fourth quarters was reduced by 50 million pounds a piece to 1.050 and 1.1 billion pounds. Lower shipments to Asia are the chief cause of the reduction. The lower shipments to Asia are expected to be partially offset by higher exports to a number of other markets due to the reduction in the price of leg quarters. In the Southern market, leg quarters averaged 26.5 cents per pound in August, down 5.5 cents per pound from June and 1 percent below a year earlier.

Turkey Production and Stocks Down, Prices Higher

Over the first 7 months of 2004, U.S. turkey production totaled 3.13 billion pounds, down 5.5 percent from the same period in 2003. Although turkey exports have also declined (down 19 percent in the first half of 2004 compared with the first half of 2003), they have been more than offset by the lower production, resulting in declining cold storage stocks of turkey (whole and products). Turkey exports turned upward in July, with shipments totaling 40.8 million pounds, up over 5 million pounds from July 2003. Most of the increase was due to larger exports to Mexico.

Cold storage estimates at the beginning of August place turkey stocks at 603 million pounds, down 17 percent from a year earlier. The decrease in turkey stocks is almost evenly divided between whole birds (down 16 percent) and stocks of turkey products (down 17 percent). The decline in stocks along with lower production has placed upward pressure on turkey prices. In August, the average price for a whole hen turkey in the Eastern market was 73.2 cents per pound, up 27 percent from the previous year. Prices for whole hens in the third and fourth quarters are expected to remain considerably higher than in the same period in 2003, as poult placements continue to point towards lower turkey production.

Meetings, Seminars and Conventions

2004 November

November 8: ***Chick Quality 2004,*** The Queens Hotel, Hanover, Germany. Contact: Alison Burdass, Conference Organiser, Positive Action Publications LTD, P.O. Box 4, Driffield, East Yorkshire, YO25 9DJ. Phone: +44 1377 241724; Fax: +44 1377 253640; Email: ab@positiveaction.co.uk; Website: www.positiveaction.co.uk
November 9-12: ***EuroTier 2004,*** Hanover, Germany. Contact: DLG (Deutsche Landwirtschafts-Gesellschaft e. V.), Eschborner-Landstrasse 122 60489 Frankfurt-am-Main, Germany. Phone: +49 69 24788 265; Fax: +49 69 24788 113; Email: eurotiet@DLG-grankfurt.de
November 23-26: ***EXPOAVIGA International Poultry & Livestock Technology Exhibition,*** Montjudc Exhibition Center, Barcelona, Spain. Contact: Expoaviga, Av. Reina Ma Cristina, s/n, 08004 Barcelona, Spain. Phone: +34 902 23 3200; Fax: +34 93 233 2355; Email: expoaviga@firabcn.es; Website: www.expoaviga.com

2005 January

January 24-25: ***International Poultry Scientific Forum,*** Georgia World Congress Center, Atlanta, GA. Contact: International Poultry Scientific Forum. Phone: +1 770-493-9401; Fax: +1-770-493-9257; Email: poultryscientificforum@poultryegg.org. Website: www.internationalpoultryexposition.org
January 26-28: ***2005 International Poultry Exposition,*** Georgia World Congress Center, Atlanta, GA. Contact: US Poultry & Egg Assn., 1530 Cooledge Rd., Tucker, GA 30084; Phone: 770-493-9401; Fax: 770-493-9257; www.poultryegg.org

2005 February

February 6-8: ***National Turkey Federation Convention,*** Long Beach, California USA. Contact: National Turkey Federation, 1225 New York Avenue, NW, Suite 400, Washington, DC 20005 USA, Phone: +1 202 898 0100, Fax: +1 202 898 0203, Website: www.eatturkey.com
February 20-25: ***1st Nigerian International Poultry Summit (NIPS),*** Ota, Ogun State, Nigeria. Contact: 1st NIPS, c/o Obasanjo Farms, Ota, Owode, Idiroko Road, Ote Ogun State, Nigeria, West Africa. Phone: +234 803 405 3035; Email: first_nips@yahoo.com Website: www.nipsng.com

2005 March

March 9-10: ***Nebraska Poultry Industries Annual Convention,*** New World Inn & Conference Center, Columbus, Nebraska. Contact: Nebraska Poultry Industries, Inc., University of Nebraska, A103 Animal Sciences, P.O. Box 830908, Lincoln, NE 68583-0908. Phone: 402-472-2051
March 10-12: ***4th International Poultry Show and Seminar 2005,*** Dhaka, Bangladesh. Contact: Dr. Q.M.E. Huque. Phone: +880-2-7708326; Fax: +880-2-7708325; Email: dgblri@bangla.net or techcomm@wpsa-bb.com
March 15-17: ***Midwest Poultry Federation Convention,*** St. Paul, Minnesota USA. Contact: Lara Durben, Phone: +1 763 682 2171; Email: lara@midwestpoultry.com
March 16-18: ***VIV Asia,*** BITEC (Bangkok International Trade & Exhibition Centre), Bangkok, Thailand. Contact: Organisation: VNU Exhibitions Europe BV, PO Box 8800, 3503 RV Utrecht, The Netherlands. Phone: +31 30 295 2772; Fax: +31 30 295 2809; Email: viv.asia@vnuexhibitions.com; Website: www.viv.net. Visitors: NCC Management & Development Co. Ltd. 60 New Rachadapisek Road, Klongtoey, Bangkok 10110 Thailand. Phone: +66 2 229 3000; Fax: +66 2 229 3191; Email: viv@gsncc.co.th; Website: www.qsncc.co.th

2005 April

April 4-7: ***3rd International Poultry Conference,*** Hurghada, Egypt. Contact: Prof. M. Kosba, Alexandria University, Faculty of Agriculture 'El-Shatby', Poultry Production Department, Aflaton Street, 21545 Alexandria, Egypt. Phone: +20 10 644 6339; Email: mkosba@hotmail.com
April 25-27: ***54th Western Poultry Disease Conference,*** The Fairmont Hotel Vancouver, Vancouver, BC, Canada. Contact: Dr. R.P. Chin. Email: rpchin@ucdavis.edu

2005 May

May 23-26: ***XVII European Symposium on the Quality of Poultry Meat and the XI European Symposium on the Quality of Eggs and Egg Products,*** Golden Tulip Parkhotel Doorwerth, Doorwerth, The Netherlands. Contact: Dorien Kleverwal, Symposium Secretariat, Wolterinkhofstraat 39, 7437 AX Bathmen, The Netherlands. Phone: +31 570 541948; Fax: +31 570541948 or +31 55 506 4858; Email: info@eggmeat2005.nl; Website: www.eggmeat2005.nl

2005 June

June 3-4: ***Georgia Veterinary Medical Association Annual Convention,*** Sandestin Resort, Florida. Contact: Beth Monte, GVMA. Phone: 678-309-9800; Email: gvma@gvma.net; Website: www.GVMA.net
June 22-24: ***Georgia Egg Association's 44th Annual Meeting,*** St. Simons Island, GA. Contact: Robert Howell, Executive Director, Georgia Egg Association, 16 Forrest Parkway, Forest Park, GA 30297. Phone: 404-363-7661; Fax: 404-363-7664; Email: goodeggs@bellsouth.net
June 30-July 2: ***Agrena 2005,*** 7th International Exhibition for the Administration & Production of Poultry & Livestock, International Conference Centre, Cairo, Egypt. Contact: Crose Fairs Organisers. Phone/Fax: +1 202 30 38 994; Email: crose@access.com.eg

2005 July

July 16-20: ***AVMA/AAAP Meeting,*** Minneapolis, MN. Contact: AVMA (800) 248-2862, Ext. 268, or www.avma.org
July 16-20: ***94th Annual Meeting of the Poultry Science Association,*** Auburn University, Auburn , Alabama. Contact: James W. Kessler, Executive Director, Poultry Science Association, 1111 North Dunlap Avenue, Savoy, IL 61874. Phone: 909-677-0069; Fax: 909-677-2420. Email: jamesk@assochq.org

Meetings, Seminars and Conventions

2005 August

August 22-26: ***14th World Veterinary Poultry Congress & Exhibition,*** Istanbul, Turkey. Contact: Congress organiser: IT Consortium, Mete Cad. 16/11, 34437 Taksim, Istanbul, Turkey. Phone: +90 212 244 71 71; Fax: +90 212 244 71 81; Email: info@wvpc2005.org. Website: www.wvpc2005.org. Scientific matters: Ankara University Veterinary Faculty, Department of Animal Nutrition, 06110 Ankara, Turkey. Phone: +90 312 517 25 65; Fax: +90 312 517 25 65; Email: akan@veteinary.ankara.edu.tr; Website: www.veterinertavukculuk.org

2005 September

September 15-17: ***Avian Gut Function, Health and Disease,*** 28th Poultry Science Symposium, Bristol, UK. Contact: Langford Continuing Education Unit. Phone: +44 117 928 9502; Fax: +44 1934 852170; Email: Langford-CE@bristol.ac

September 24-29: ***15th European Symposium on Poultry Nutrition,*** Balatonfüred, Hungary. Contact: Dr K Dublecz, University of Veszprem, Georgikon Faculty of Agriculture, Hungary. Tel: +36 83 312 330; Fax: +36 83 315; Email: dublecz@georgikon.hu, Website: growcare.katki.hu/wpsa2005

2005 October

October 6-8: ***4th European Poultry Genetics Symposium,*** (WPSA Working Group 3, Breeding annd Genetics), Dubrovnik, Croatia. Contact: Helga Medic, Phone: +385 1 4605126; Email: hmedic@pdf.hr

2005 November

November 1-4: ***VIV Europe 2005,*** Jaarbeurs, Utrecht, The Netherlands. Contact: VNU Exhibitions Europe BV, PO Box 880. 3503 RV Utrecht, The Netherlands, Phone: +31 30 295 2772; Fax: +31 3 295 2809; Email: viv.europe@vnuexhibitions.com, Website: www.viv.net

2006 January

January 25-27: ***2006 International Poultry Exposition,*** Georgia World Congress Center, Atlanta, Georgia USA, Contact: US Poultry & Egg Assn., 1530 Cooledge Road, Tucker, Georgia 30084 USA, Phone: +1 770 403 0401; Fax: +1 770 403 9257, Website: www.poultryegg.com

2006 September

Sept. 10-14: ***12th European Poultry Conference,*** Veronafiere Congress Centre, Verona, Italy. Contact: Secretariat XII WPSA European Conference, Department of Food Science, Via San Giacoma 9, 40126 Bologna, Italy. Phone: +39 051 209 4221; Fax: +39 051 251 936; Email: wpsa@alma.unibo.it; Website: www.epc2006.veronafiere.it

2007 January

Jan. 31-Feb. 2: ***2007 International Poultry Exposition,*** Georgia World Congress Center, Atlanta, Georgia, USA. Contact: US Poultry & Egg Association, 1530 Cooledge Road, Tucker, Georgia 30084 USA. Phone: +1 770 493 9401; Fax: +1 770 493 9257; Website: www.poultryegg.org

2008 August

August 10-15: ***XXIII World's Poultry Congress,*** Convention and Exhibition Centre, Brisbane, Australia. Contact: WPC 2008 Congress, Intermedia Convention & Event Management, PO Box 1280, Milton, Queensland 4064, Australia. Phone: +61 7 3858 5594; Fax: +61 7 3858 5510; Email: wpc2008@im.com.au; Website: www.wpsa.info

Broiler Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	184.84	173.17	186.67	189.89	186.22
Feed cost/lb meat (¢)	17.22	15.69	17.67	18.40	17.05
Days to 4.6 lbs	44	41	43	41	43
Chick cost/lb (¢)	4.16	4.20	3.81	3.62	4.39
Vac-Med cost/lb (¢)	0.06	0.10	0.05	0.07	0.06
WB & 1/2 parts condemn. cost/lb	0.24	0.21	0.20	0.20	0.14
% mortality	4.82	4.47	4.16	4.66	3.50
Sq. Ft. @ placement	0.81	0.80	0.87	0.86	0.81
Lbs./Sq. Ft.	6.80	6.78	6.76	7.37	6.44
Down time (days)	13	9	9	11	10

Data for week ending August 28, 2004

Broiler Performance Data (Company)
Live Production Cost

	Average Co.
Feed cost/ton w/o color ($)	186.05
Feed cost/lb meat (¢)	17.32
Days to 4.6 lbs	42
Chick cost/lb (¢)	4.15
Vac-Med cost/lb (¢)	0.05
WB & 1/2 parts condemn. cost/lb	0.19
% mortality	4.18
Sq. Ft. @ placement	0.82
Lbs./Sq. Ft.	6.79
Down time (days)	10

Data for week ending August 28, 2004

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.224	0.291	0.180	0.210	0.111
% Airsac	0.078	0.033	0.054	0.056	0.050
% I.P.	0.012	0.009	0.042	0.014	0.056
% Leukosis	0.002	0.000	0.001	0.007	0.001
% Bruise	0.003	0.002	0.006	0.004	0.003
% Other	0.020	0.005	0.007	0.007	0.008
% Total	0.338	0.340	0.289	0.298	0.227
% 1/2 parts condemnations	0.495	0.675	0.438	0.436	0.276

Data for week ending August 28, 2004

Broiler Whole Bird Condemnation (Company)

	Average Co.
% Septox	0.184
% Airsac	0.056
% I.P.	0.028
% Leukosis	0.002
% Bruise	0.004
% Other	0.009
% Total	0.283
% 1/2 parts condemnations	0.421

Data for week ending August 28, 2004