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Pathogenesis of Enteric Diseases

Material for this article was presented at the XI International Seminar of Poultry Pathology and Production organized by the Colombian Veterinary Poultry Association (AMEVEA) and the University of Georgia

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The digestive tract is a tube lined by specialized epithelial cells that are continuous with the epithelial layers covering the skin. Thus, the digestive tract is open to the external environment and to exposure from ingested organisms and toxins. Along the length of the tract, the epithelial cells differentiate and acquire a variety special functions that include the secretion of fluid, electrolytes, and enzymes, and in the gizzard, physical disruption of particulate digesta. The cells form a semipermiable surface that selectively allows passage of fluid, electrolytes, and dissolved nutrients.

Regardless of its specialized function, every digestive epithelial cell is part of a continuous physical barrier to protect against the entry of foreign materials and organisms into the bloodstream and gaining access to other viscera. The integrity of the protective barrier is broken when organisms and toxic agents damage epithelial cells.

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Broiler Performance Data (Region)
Live Production Cost

	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	143.43	145.78	145.94	131.74	147.00
Feed cost/lb meat (¢)	13.19	14.08	13.19	11.49	13.85
Days to 4.6 lbs	41	40	42	39	42
Chick cost/lb (¢)	4.09	3.38	3.97	4.36	3.83
Vac-Med cost/lb (¢)	0.06	0.06	0.06	0.06	0.05
WB & 1/2 parts condemn. cost/lb	0.08	0.11	0.12	0.17	0.13
% mortality	3.96	3.68	4.46	4.44	3.91
Sq. Ft. @ placement	0.84	0.87	0.81	0.77	0.84
Lbs./Sq. Ft.	6.74	7.81	7.08	6.80	7.33
Down time (days)	13	17	15	17	11

Data for week ending September 30, 2006

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This epithelial lining continually sheds cells into the center of the digestive tube (lumen) with ongoing regeneration of new cells that differentiate to assume the functions of those lost. The surface area of intestinal lining (mucosa) is greatly expanded from the extensive microscopic folding to form a carpet of finger-like projections called villi. Villi exist throughout the length of the small and large intestine, steadily decreasing in height along the way. The luminal surface of each enterocyte is also increased by many microvilli to facilitate absorption.

Each villus is lined with epithelial cells (enterocytes) that are differentiated according to location on the villus to absorb fluids and nutrients (tip), secrete electrolytes and fluids (side and crypt), and to regenerate and replace damaged cells or those lost to normal attrition (crypt).

Mucus and Fluid Secretion. Mucus that is secreted onto the epithelial surface lubricates movement of digesta along the digestive tract. It is secreted by specialized epithelial cells arranged into glands in the mouth and esophagus, and by individual goblet cells in the proventriculus and intestine. Mucus is not secreted in the crop or gizzard, however, digesta arrives in those organs softened and lubricated by the previous upstream site.

Mucus is a viscous material composed of water and glycoprotein. It protects the mucosal cells in the stomach and intestine from autodigestion by gastric acid, pepsin and other digestive enzymes (4). The protective effect of mucus is further evidenced by increased secretion on the mucosal surface and goblet cell hypertrophy in response to noxious stimuli. Mucus is one of the barriers to bacterial and fungal invasion. Virulent strains of Candida albicans, the agent of thrush, have a mucinolytic enzyme that dissolves the mucin barrier to enhance adherence to and penetration of epithelial cells (3). Helicobacter pylori, the agent causing gastric ulcers in humans, secretes urease that breaks down the protective layer of gastric mucus (10). Urease can be present in poultry feeds from improperly processed (under heated) soy meal (8).

In addition to mucus, the gut secretes a large volume of water and dissolved electrolytes. For every gram of food ingested, the gut secretes about 2 grams of water that facilitates digestion and absorption. The excessive water in the lumen is reabsorbed in the lower small intestine, cecum, and colon. The fluid in the upper small intestine, however, is protective in that it keeps bacteria in suspension and washes them downstream.

The Lamina Propria. The epithelial lining of the gut is supported by the lamina propria, which contains the connective tissue that underlies the specialized surfaces, the vascular and lymphatic channels, and the immune system, or gut-associated lymphoid tissue (GALT). The blood vessels going into and away from the tip of the villus form a countercurrent mechanism that creates a hyperosmolar condition to facilitate absorption of fluid. Throughout the gut, the rich vascular supply serves to rapidly dilute and carry away any agents or chemicals (endogenous or exogenous) that may breach the mucosal barrier.

Agents that directly damage the components of blood vessels may cause ischemic injury to the mucosa (infarction) or hemorrhage. Virulent forms of Newcastle disease and avian influenza, invasive candidiasis, coccidiosis caused by Eimeria tenella, and the more pathogenic forms of salmonellosis are examples of diseases that can injure the gut vascular system.

GALT represents the largest secondary immunological organ in the body. In the chicken, the immunological tissues are distributed in specific sites at the junction of the proventriculus and gizzard, and cecal tonsils; at concentrated ectopic locations; diffusely scattered through lamina propria; and as scattered individual intraepithelial lymphocytes. GALT is composed of B and T lymphocytes, plasma cells, macrophages, and dendritic cells (resident, antigen-processing macrophages). One important function of GALT is the secretion of secretory antibody (IgA) onto the mucosal surface in response to the heavy exposure of the gut to foreign antigens on infectious agents and ingesta.

Since the gut is continuously and heavily exposed to foreign materials, the lamina propria is quite active due to the responsiveness of GALT, and is actually in a normal state of reactivity and mild inflammation. The transition from normal, mild inflammation to subclinical disease is an important consideration in poultry, not only from an economic standpoint but also as a predecessor to fatal enteric disease. Multiple enteric stresses and disease challenges may occur simultaneously in production environments.

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Infectious bursal disease, chicken infectious anemia, Marek's disease, and hemorrhagic enteritis of turkeys potentially impact secondary lymphoid tissues of chickens and turkeys. It is common to have mild clinical coccidiosis in broilers during and immediately following the onset of acute bursal disease. Lymphocytolytic mycotoxins such as T-2 toxin and diacetoxyscirpenol rapidly deplete GALT (6).

DIGESTIVE PATHOGENS OF POULTRY

The digestive tract is compromised when the mucus layer is degraded; epithelial cells are effaced or destroyed, the vascular supply is interrupted, or the immune system is compromised. The epithelial layer can be damaged by viruses, bacteria, fungi, myriad parasites, and toxins; reviewed by Moon, 1997 (9). This section will focus on specific types of injury to intestinal epithelium.

Viruses. Infection and replication of an enteric virus usually kills an epithelial cell. In contrast to bacteria, viruses do not produce toxins. Each of the intestinal viruses has a tropism for cells in a specific state of differentiation along the villus: crypts, on the tips and sides of the villus, or only on the tip, respectively. The severity of the clinical disease and the course of the uncomplicated viral infection are a reflection of target cell injury. For a virus that destroys cells on the tip of the villus, the absorptive function of the gut is lost and surviving epithelium is secretory. Watery diarrhea occurs until the villi are repaired with mature functional cells on the tips.

A torovirus-like virus isolated from turkeys stimulates the enterocytes to release cytokines that interact with the immune system, and a series of reactions with the inflammatory response, and nerves in the wall of the intestine (Dr. Akbar Ali, personal communication). The result is increased fluid secretion in the gut that overrides its absorptive capacity, causing diarrhea and decreased digestive efficiency.

Bacteria. Bacteria damage epithelium by producing toxins, attaching to the cell, and invading the cell (5). The host can ingest bacterial toxin in contaminated feed. Staphylococcus, Clostridium and Bacillus are possible producers of enterotoxin in feed.

Ingested bacteria can produce toxins as they multiply in the gut. Escherichia coli, Clostridium perfringens, Clostridium colinum, and Campylobacter spp. produce enterotoxins that are polypeptides capable of causing diarrhea. Some enterotoxins increase fluid secretion and others are cytotoxic, causing cell lysis and death. Some E. coli attach and adhere to the surface of the enterocyte and secrete a toxin that disturbs the water regulation of the cell. This causes a net secretion of chloride, loss of water, and the development of diarrhea. Necrotic enteritis caused by Clostridium perfringens causes severe toxin-induced cell necrosis (death), mucosal destruction and death of the host.

Other bacteria proliferate, invade and destroy intestinal epithelium. Certain E. coli attach and damage the microvilli, causing the release of cytokines, inflammation, fluid secretion, and diarrhea. Enteroinvasive bacteria proliferate within cells after invasion, causing cell death and enabling cell-to-cell spread. Salmonella invades and passes through epithelial cells to invade to lymphatic and blood vessels, incites inflammation in the gut, and then disseminates to other organs.

Fungi and Mycotoxins. Candida colonizes mainly the stratified squamous mucosa of the mouth, esophagus, and crop, and sometimes the gizzard lining (koilin). Fungal infections of the intestinal mucosa are not significant in poultry. Mycotoxins are significant and damage the muscosa and interfere with digestive functions. Trichothecene mycotoxins cause caustic injury to the tips of villi, and radiomimetic injury to rapidly dividing crypt epithelium. Aflatoxin decreases bile secretion from the liver and bicarbonate secretion from the pancreas. Other toxins that influence digestion include fumonisins, sterigmatocystin, ochratoxin, and undefined toxins of Penicillium.

Protozoa and other Parasites. Coccidia invade and destroy epithelial cells, and some damage the lamina propria. This results in increased mucus secretion, reduced absorption, hemorrhage and fluid leakage from damaged mucosa, and a dynamic immune and inflammatory response. Coccidiosis enhances the adherence of pathogenic bacteria, such as Clostridium perfringens and Salmonella typhimurium and decrease the adherence of non-pathogens such as Bacteroides vulgatus and Bifidobacterium thermophilum (2).

The inflammatory response to nematodes brings a greater involvement of mast cells and the mediators of acute inflammation, which are also linked to neurological responses (1).

Toxic Injury. Oxidized, rancid fats produce free radicals (8) that cause sublethal injury to cells throughout the body, including gut epithelium. The most obvious clinical evidence of fat rancidity is vitamin E deficiency expressed as encephalomalacia. Biogenic amines, generated by bacterial spoilage of improperly handled fish and rendered substrates, target gastroenteric tissues.

FEED PASSAGE AND DIARRHEA

Feed passage is undigested particles of feed in the feces and represents a loss of digestive efficiency. The economic consequences involve feed conversion, growth, carcass yield, and cost of production. Feed passage usually occurs with diarrhea, which is characterized by increases in the mass of feces, the frequency of fecal passage, and/or the fecal fluidity. Feed passage represents a malabsorption or maldigestion syndrome that shares many of the same causes as diarrhea. For the purposes of this discussion, four underlying mechanisms of diarrhea and feed passage will be examined, according to the scheme of Crawford, 1997 (5).

Secretory Diarrhea. This involves the excessive secretion of fluid from the intestinal mucosa, relative to the fluid absorption capacity of the intestine. This is caused by viruses that destroy mature enterocytes on the tips of the villus, leaving functional secretory enterocytes in the crypt and on the side of the villus. It is also caused by bacterial enterotoxins that affect mediators of intestinal electrolyte transport. In general, the mediators increase chloride secretion from the crypts and decreasing NaCl uptake from the tips of villi (1). As water follows these electrolytes, the net result is fluid overload in the lumen of the intestine.

Osmotic Diarrhea. This involves excessive osmotic forces exerted by luminal solutes. Poultry diets high in salt are one cause, and some digestive problems associated antinutritional factors (non-starch polysaccharides, NSP) in barley, rye, and wheat, and other ingredients, reviewed by Iji, 1999 (7). These complex carbohydrates are resistant to digestive enzymes, create a viscous environment within the intestinal lumen, increase the mass of luminal digesta, and produce moist sticky droppings.

Malabsorption. This is the output of voluminous, bulky feces with increased osmolarity owing to unabsorbed nutrients and, in man, excessive fat. Digestion is inefficient due to either ineffective enzymes or a lack of enzymes. Defective absorption occurs with the loss of mature enterocytes and replacement by immature cells lacking full absorptive function. Increased fluid in the gut dilutes bile acid, impairing lipid absorption and allowing proliferation of bacteria (11).

Exudative disease. This is characterized by blood or tissue debris from necrosis and inflammation, such as with severe coccidiosis, clinical salmonellosis, necrotic enteritis, or histomoniasis. In this situation, the gut experiences severe insult involving the necrosis and loss of enterocytes, loss of fluid, electrolytes and plasma from the damaged mucosa, and inflammation. The host must contend with the escape of pathogens into the vascular system and dissemination to the liver. If the disease is not fatal, anorexia and diversion of nutrients for inflammation and repair will reduce growth and yield, impair feed conversion, and increase the cost of production.

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Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.109	0.153	0.164	0.263	0.132
% Airsac	0.026	0.018	0.022	0.026	0.035
% I.P.	0.005	0.006	0.007	0.012	0.033
% Leukosis	0.000	0.006	0.001	0.000	0.001
% Bruise	0.003	0.002	0.001	0.001	0.004
% Other	0.009	0.004	0.010	0.007	0.003
% Total	0.153	0.189	0.205	0.310	0.208
% 1/2 parts condemnations	0.213	0.267	0.292	0.627	0.330

Data for week ending September 30, 2006

Broiler Performance Data (Company)
Live Production Cost

	Average Co.	Top 25%	Top 5 Co.'s
Feed cost/ton w/o color ($)	145.59	143.80	140.00
Feed cost/lb meat (¢)	13.40	12.06	11.62
Days to 4.6 lbs	41	42	43
Chick cost/lb (¢)	4.01	5.41	5.38
Vac-Med cost/lb (¢)	0.06	0.04	0.03
WB & 1/2 parts condemn. cost/lb	0.12	0.08	0.09
% mortality	3.93	3.09	3.41
Sq. Ft. @ placement	0.81	0.72	0.72
Lbs./Sq. Ft.	7.05	5.67	5.63
Down time (days)	14	14	16

Data for week ending September 30, 2006

Broiler Whole Bird Condemnation (Company)

	Average Co.	Top 25%	Top 5 Co.'s
% Septox	0.144	0.074	0.118
% Airsac	0.025	0.023	0.013
% I.P.	0.014	0.018	0.007
% Leukosis	0.001	0.001	0.001
% Bruise	0.002	0.003	0.001
% Other	0.006	0.003	0.004
% Total	0.194	0.122	0.144
% 1/2 parts condemnations	0.319	0.223	0.212

Data for week ending September 30, 2006

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-Type Eggs Set In 19 Selected States Down 2 Percent

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 19-State weekly program set 206 million eggs in incubators during the week ending October 7, 2006. This was down 2 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 Down Slightly

Broiler growers in the 19-State weekly program placed 165 million chicks for meat production during the week ending October 7, 2006. Placements were down slightly from the comparable week a year earlier. Cumulative placements from January 1, 2006 through October 7, 2006 were 6.96 billion, down 1 percent from the same period a year earlier.

August Egg Production Up 1 Percent

U.S. egg production totaled 7.64 billion during August 2006, up 1 percent from last year. Production included 6.56 billion table eggs, and 1.08 billion hatching eggs, of which 1.01 billion were broiler-type and 65 million were egg-type. The total number of layers during August 2006 averaged 341 million, up slightly from last year. August egg production per 100 layers was 2,239 eggs, up 1 percent from August 2005.

All layers in the U.S. on September 1, 2006, totaled 342 million, up 1 percent from last year. The 342 million layers consisted of 285 million layers producing table or market type eggs, 53.9 million layers producing broiler-type hatching eggs, and 2.73 million layers producing egg-type hatching eggs. Rate of lay per day on September 1, 2006, averaged 72.6 eggs per 100 layers, up 1 percent from September 1, 2005.

Egg-Type Chicks Hatched Down 10 Percent

Egg-type chicks hatched during August 2006 totaled 34.9 million, down 10 percent from August 2005. Eggs in incubators totaled 35.8 million on September 1, 2006, up 4 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 253,000 during August 2006, down 3 percent from August 2005.

Broiler-Type Chicks Hatched Down Slightly

Broiler-type chicks hatched during August 2006 totaled 809 million, down slightly from August 2005. Eggs in incubators totaled 656 million on September 1, 2006, up slightly from a year earlier.

Leading breeders placed 7.63 million broiler-type pullet chicks for future domestic hatchery supply flocks during August 2006, up 2 percent from August 2005.

Turkey Eggs in Incubators on October 1 Up 12 Percent From Last Year

Turkey eggs in incubators on October 1, 2006, in the United States totaled 29.8 million, up 12 percent from October 1, 2005. Eggs in incubators were up 1 percent from the September 1, 2006 total of 29.5 million eggs. Regional changes from the previous year were: East North Central up 8 percent, West North Central up 7 percent, North and South Atlantic up 16 percent, and South Central and West up 28 percent.

Poults Placed During September Up 2 Percent From Last Year

The 23.2 million poults placed during September 2006 in the United States were up 2 percent from the number placed during the same month a year earlier. Placements were 7 percent below August 2006. Regional changes from the previous year were: East North Central up 9 percent, West North Central down 2 percent, North and South Atlantic up 5 percent, and South Central and West up 1 percent.

Third-Quarter Broiler Meat Production Up Slightly

According to the latest Economic Research Service (ERS) reports, The U.S. broiler meat production estimate for third quarter 2005 is 9.0 billion pounds, up less than 1 percent from the previous year. Almost all the production increase is expected to come from higher average weights at slaughter as the number of birds slaughtered in the third quarter is expected to be down slightly from the same period in 2005. Low prices for most broiler products over the first 4 to 5 months of 2006 led to reductions in the number of eggs placed in incubators and the number of chicks placed for grow out. However, total broiler meat production has continued to grow slightly due to higher average weights.

USDA Reports continued from page 5

Broiler meat production in July was 2.85 billion pounds, up 1.5 percent from a year earlier. The number of birds slaughtered in July was 716.5 million, down marginally from the previous year, while the average live weight at slaughter was 5.38 pounds, up 2.1 percent from July 2005.

For the week ending September 9, the National Agricultural Statistics Service estimated that 173.2 million broiler chicks were placed for grow out, less than a 1-percent increase from a year earlier. This is the second week of growth in chick placement, following an extended period where chick placements had declined compared with the previous year. Stronger prices for many broiler products and a generally better short-term outlook for grain prices may encourage an increased pace of broiler production in the future. However, any weekly increases in chick placements seen in early September 2006 are chiefly due to the lower chick placements in September 2005 caused by disruptions from hurricane Katrina.

Prices for a number of broiler products have begun to strengthen over the last several months. While prices for most broiler products in August were still lower than a year earlier, the prices for most broiler products were up considerably from earlier this year. Prices for whole birds averaged 68 cents per pound in August, down 4.5 percent from the previous year, but up about 9 cents per pound from April. Prices for leg quarters, breasts, and other products have also strengthened considerably over the last several months. Leg quarter prices in August averaged 39 cents per pound. This is down about 15 percent from the previous year, but up over 100 percent from the low prices seen in April of this year. The increase in leg quarter prices is partially the result of strength in the export market along with the slowdown in the growth in broiler production. Prices for breast meat products have also strengthened in the last several months. In August, prices for boneless/skinless breast meat in the Northeast market averaged $1.34 per pound, up just over 1 percent from August 2005, but up 37 cents per pound from the average in April 2006.

Turkey Production Up in July

U.S. turkey meat production totaled 3.25 billion pounds in the first 7 months of 2006, up 3 percent from the same period in 2005. The forecast for the third quarter of 2006 is for meat production of 1.41 billion pounds, an increase of 35 million pounds (2.5 percent) from a year earlier.

Turkey meat production in July was 458.4 million pounds, up 6.1 percent from a year earlier. The increase was mostly the result of a higher number of birds being slaughtered as the average weight rose only slightly. The number of turkeys slaughtered in July was 20.8 million, an increase of 5.1 percent from July 2005. The average live weight at slaughter was 27.8 pounds, up less than 1 percent from a year earlier.

Although turkey meat production has been higher in the first half of 2006 and turkey exports have been lower than the previous year, overall turkey stocks are about even with a year earlier. Ending stocks for the first half of 2006 were revised slightly to 507 million pounds, about the same as in 2005, but down considerably from comparable stock levels in 2002, 2003, and 2004.

Turkey stocks at the beginning of August were 511 million pounds, down 1.5 percent from a year earlier, but there is a wide difference in the stocks situation for whole birds and turkey meat parts compared with the previous year. Stocks of whole turkeys at the beginning of August were 247 million pounds, 13.7 percent lower than at the beginning of August 2005, reflecting strong domestic demand. Stocks of turkey parts at the beginning of August were 264 million pounds, 13.5 percent higher than the previous year. This increase is partly the result of lower turkey exports.

The decline of whole birds in cold storage holding has placed upward pressure on whole bird prices. In August, the average price for whole hen turkeys in the Eastern market was 78.7 cents per pound, up 3.6 percent from the previous year. Prices for whole hens in the third quarter are forecast to average 78-79 cents per pound (up about 2 cents per pound from a year earlier).

Meetings, Seminars and Conventions

2006 October

October 9-11: ***National Meeting On Poultry Health & Processing,*** Clarion Resort Fountainebleau Hotel, Ocean City, Maryland. Contact: Karen Adams, Delmarva Poultry Industry, Inc., 16686 County Seat Highway, Georgetown, Delaware 19947-4881. PPhone: 302-856-9037; Fax: 302-856-1845. For information about meeting rooms and food accommodations at the Clarion Resort Fountainebleau Hotel, contact Kay Windwor, Phone: 1-800-638-2100.

October 10-11: ***Alabama Broiler Industry Seminar,*** Auburn University Hotel and Dixon Conference Center, Auburn, Alabama. Contact: Alabama Poultry & Egg Association, P.O. Box 240, Montgomery, AL 36101-0240. Phone: 334-265-2732; Fax: 334-265-0008.

October 10-14: ***World Poultry Science Association (WPSA) European Poultry Conference 2006,*** Verona, Italy. Contact: Secretariat - XII WPSA European Converence, Department of Food Science, University of Bologna, Via San Giacomo 9, 40126 Bologna, Italy. Phone: +39 041 209 4221; Fax: +39 051 251 936; Email: epc2006@wpsa.it; Website: www.epc2006.veronafiere.it

October 12-13: ***Poultry Protein And Fat Seminar,*** Nashville, Tennessee. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, Georgia 30084-7303. Phone: 1-770-493-9401; Fax: 1-770-493-9257.

October 17-20: ***16th Expoaviga,*** Gran Via 2 exhibition complex, Barcelona, Spain. Contact: Fira Barcelona, Av. Reina Maria Cristina s/n, 08004 Barcelona, Spain. Phone: +34 655 98 53 56; Fax: +34 93 233 21 77; Email agurri.premsa@firabcn.es: Website: www.expoaviga.com

October 25-26: ***North Carolina Broiler Breeders and Hatchery Management Conference,*** Statesville, North Carolina. Contact: Mike Wineland. Phone: 919-515-5529

2006 November

November 6-7: ***4th World Mycotoxin Forum,*** Cincinnati, Ohio. Contact: Bastiaanse Communication, P.O. Box 179, 3720 AD Bilthoven, The Netherlands. Phone: +31 30 229 4247; Fax: +31 30 225 2910; Email: wmf@bastiaanse-communication.com; Website: www.bastiaanse-communication.com

November 7-8: ***Alabama Breeders/Hatchery Workshop,*** Auburn University Hotel annd Dixon Conference Center, Auburn, Alabama. Contact: Alabama Poultry & Egg Association, P.O. Box 240, Montgomery, AL 36101--0240. Phone: 334-265-2732; Fax: 334-265-0008

November 14-17: ***EuroTier 2006,*** 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: eurotier@DLG-Frankfurt.de; Website: www.eurotier.de

2007 January

Jan. 22-23: ***International Poultry Scientific Forum,*** Georgia World Congress Center, Atlanta, Georgia. Contact: International Poultry Scientific Forum. Phone: 770-493-9401; Fax: 770-493-9257. sEmail: poultryscientificforum@poultryegg.org. Website: www.poulryegg.org

Jan. 24-26: ***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

2007 February

Feb. 12-14: ***Australian Poultry Science Symposium 2007,*** University of Sydney, Sydney, Australia. Contact: Poultry Research Foundation, University of Sydney, 425 Werombi Road, Camden, NSW 2570, Australia. Phone:+61 2 46 550 656; Fax: +61 2 46 550 693; Website: www.vetsci.usyd.edu.au/apss

Feb. 21-23: ***XIII Jornada Medico Avicola,*** Auditorio Pablo Zierold, Mexico City, Mexico. Contact: Organizer, DPA: Aves, FMVZ-UNAM, Facultad de Medicina Veterinaria y Zootecnia, UNAM, Av. Universidad 3000 Ciudad Universitaria, Mexico DF 04510 Mexico. Email: jma_unam@yahoo.com.mx or jma_unam@hotmail.com. Website: www.fmvz.unam.mx/fmvz/educontinua/DECcal

2007 March

March 1-3: ***5th International Poultry Show and Seminars 2007,*** Dhaka, Bangladesh. Contact: International Seminar, Dr. Q.M.E. Huque, Bangladesh Livestock Research Institute, Savar, Dhaka 1341, Bangladesh. Phone: +8802 770 8324: Fax +880 2 770 8325; Email: qmehuque@bangla.net

March 7-9: ***VIV Asia 2007,*** Bangkok, Thailand. Contact: VNU Exhibitions Europe B.V., P.O. Box 8800, 3503 RV Utrecht, The Netherlands. Phone: +31 30 295 2778: _+66 2 229 3737; Fax: +31 30 295 2809; Website: www.viv.net

March 5-6: ***8th Asia Pacific Poultry Conference,*** Swissotel Le Concorde, Bangkok, Thailand. Contact: Swanvajokkasikit Animal R&D Institute, Kasetsart University, Bangkok, Thailand. Phone: +66 2 579 0193; Fax: +66 2 579 0193 Email: info@appc2007.org; Website: www.appc2007.org

March 7-8: ***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, Nebraska 68583-0908. Phone: 402-472-2051.

March 12-15: ***PEPA Convention,*** Loews Coronado Bay Resort, Coronado, California. Contact: Pacific Egg & Poultry Associatioin, 1521 I Street, Sacramento, California 95814. Phone: 916 441 0801; Fax: 916 446 1063.

March 13-15: ***Midwest Poultry Federation Convention 2007,*** St. Paul, Minnesota USA. Contact: Midwest Poultry Federation, 108 Marty Drive, Buffalo, Minnesota 55313 USA. Phone: +1 763-682-2171; Fax: +1 763-682-5546; Email: Nicole@midwestpoultry.com; Website: www.midwestpoultry.com

March 26-29: ***56th Western Poultry Disease Conference and ACPV Workshop,*** Riviera Hotel & Casino, Las Vegas, Nevada. Contact: R.P. Chin. Email: rpchin@ucdavis.edu

March 27-29: ***4th Internatioinal Poultry Conference,*** Sharm El-sheikh, Egypt. Contact: Dr. MA. Kosba, Facultry of Agriculture, Alexandria University, Alexandria, Egypt. Phone: +20 35 921960; Fax _20 35 231939; Email: mkosba@hotmail.com

2007 April

April 12-15: ***Chicken Biology Meeting,*** Universitat Pompeu Favra, Barcelona, Spain. Contact: Claudia D. Stern, Department of Anatomy & Developmental Biology, University College London, Gower Street, London WC1E 6BT, United Kingdom, Phone: +44 20 7679 3346; Fax: +44 20 7679 2091; Email: c.stern@ucl.ac.uk: Website: www.lists.bbsrc.ac.uk/mailman/listinfo/chicken-genome

Meetings, Seminars and Conventions

2007 May

May 8-10: ***Victam International 2007,*** Jaarbeurs Hall, Utrecht, The Netherlands. Contact: Victam International BV, P.O. Box 197, 38600 AD Nijkerk, The Netherlands. Phone: +31 33 246 4404; Fax: +31 33 246 4706; Website: www.victam.com
May 21-23: ***VIV Russia 2007,*** Moscow, Russia. Contact: VNU Exhibitions Europe B.V., P.O. Box 8800, 3503 RV Utrecht, The Netherlands. Phone: +31 30 295 2772; Fax: +31 30 295 2809; Email: viv.russia@vnuexhibitions.com; Website: www.viv.net

2007 June

June 19-21: ***AgroFarm 2007,*** VVC exhibition grounds, Moscow, Russia. Contact: DLG (Deutsche Landwirtschafts-Gesellschaft e.V.) Eschborner-Landstrasse 122, 60489 Frankfurt-am-Main, Germany, Phone: +49 69 244788 265; Fax: +49 69 24788 113, Email: O.Hunger@DLG.org; Website: www.DLG.org
June 28-30: ***VIV Turkey 2007,*** Istanbul, Turkey. Contact: Richard deBoer, VNU Exhibitions Europe, P.O. Box 8800, 3503 RV Utrecht, Netherlands. Phone: +31 30 295 2714; Fax: +31 30 295 2809; Email: richard.de.boer@vnuexhibitions.com; Website: vnuexibitions.com or www.viv.net

2007 October

October 8-10: ***2007 National Meeting on Poultry Health Processing,*** Clarion Resort Fountainebleau Hotel, Ocean City, Maryland. Contact: Karen Adams, Delmarva Poultry Industry, Inc., 16686 County Seat Highway, Georgetown, Delaware 19947-4881. Phone: 302-856 9037; Fax: 302-856-1845. For information about meeting rooms and food accommocations at the Clarion Resort Fontainebleau Hotel, contact Kay Windsor, Phone: 800-638-2100.

2008 January

January 23: ***International Poultry Expo 2008,*** Georgia World Congress Centre, Atlanta, Georgia. Contact: UD Poultry & Egg Association, 1530 Cooledge Road, Tucker, Georgia 30084-7804. Phone: 1-770-493-9401; Fax: 1-770-493-9257; Email: expogeneralinfo@poultryegg.org. Website: www.poultryegg.org or www.ipe08.org

2008 March

March 5-6: ***Nebraska Poultry Industries Annual Convention,*** New World Inn & Conference Center, Columbus, Nebraska. Contact: Nebraska Poultry Industries, Inc. University of Nebraska, A103 Animal Sciences, PO Box 830908, Lincoln, Nebraska 68583-0908; Phone: 1-402-472-2051.
March 5-7: ***Victam Asia 2008,*** Bangkok, Thailand. Contact: Henk van de Bunt, Victam International B.V., P.O. Box 197, 3860 AD Nijkerk, The Netherlands, Phone: +31 33 246 4404, Fax: +31 33 246 4706, Email: expo@victam.com; Website: www.victam.com or Contact: Mr. Phusit Sasitaranondha, Thailand, Phone: +66 2 640 8013; Fax: +66 2 664 2076; Email: phusit@expolink.net

2008 March

March 5-6: ***Nebraska Poultry Industries Annual Convention,*** New World Inn & Conference Center, Columbus, Nebraska. Contact: Nebraska Poultry Industries, Inc. University of Nebraska, A103 Animal Sciences, PO Box 830908, Lincoln, Nebraska 68583-0908; Phone: 1-402-472-2051.

2008 June

July 29-July 4: ***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.wpc2008.com

2008 July

July 8-12: ***Poultry Science Association Annual Meeting 2007,*** San Antonio, Texas. Contact: Website: www.poultryscience.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
August 17-21: ***8th International Marek's Disease Symposium,*** Townsville, Queensland, Australia. Contact: Dr. G. Burgess, School of Veterinary & Biomedical Sciences, James Cook University, Townsville, Queensland 4811, Australia. Phone: +61 7 4781 5472; Fax: +61 7 4781 6833; Email: graham.burgess@jcu.edu.au
August 26-30: ***16th European Symposium on Poultry Nutrition,*** Strasbourg, France. Contact: Groupe Francais de la WPSA, BP 5, 37380 Nouzilly, France. Fax: +33 2 47 56 11 39; Email: WPSAFrance@aol.com; Website: www.wpsa.fr

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 Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	148.46	150.57	150.03	137.36	150.84
Feed cost/lb meat (¢)	13.80	14.39	13.83	11.90	14.23
Days to 4.6 lbs	43	42	44	40	43
Chick cost/lb (¢)	4.16	3.59	4.18	4.25	3.84
Vac-Med cost/lb (¢)	0.05	0.14	0.07	0.05	0.06
WB & 1/2 parts condemn. cost/lb	0.10	0.14	0.15	0.15	0.14
% mortality	4.69	3.87	4.75	4.00	4.48
Sq. Ft. @ placement	0.83	0.84	0.82	0.81	0.86
Lbs./Sq. Ft.	6.55	7.41	6.84	6.74	7.19
Down time (days)	12	16	14	13	10

Data for week ending August 26, 2006

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.106	0.145	0.163	0.256	0.136
% Airsac	0.046	0.041	0.042	0.031	0.046
% I.P.	0.007	0.026	0.007	0.009	0.036
% Leukosis	0.001	0.016	0.001	0.000	0.000
% Bruise	0.003	0.003	0.002	0.001	0.003
% Other	0.011	0.007	0.015	0.004	0.007
% Total	0.174	0.239	0.229	0.301	0.227
% 1/2 parts condemnations	0.220	0.329	0.344	0.519	0.343

Data for week ending August 26, 2006

Broiler Performance Data (Company) Live Production Cost

	Average Co.	Top 25%	Top 5 Co.'s
Feed cost/ton w/o color ($)	148.99	147.81	145.16
Feed cost/lb meat (¢)	13.80	12.47	12.07
Days to 4.6 lbs	43	44	44
Chick cost/lb (¢)	4.05	5.29	5.44
Vac-Med cost/lb (¢)	0.08	0.08	0.01
WB & 1/2 parts condemn. cost/lb	0.14	0.10	0.09
% mortality	4.36	3.87	3.56
Sq. Ft. @ placement	0.83	0.72	0.72
Lbs./Sq. Ft.	6.86	5.56	5.49
Down time (days)	12	13	15

Data for week ending August 26, 2006

Broiler Whole Bird Condemnation (Company)

	Average Co.	Top 25%	Top 5 Co.'s
% Septox	0.155	0.078	0.103
% Airsac	0.044	0.040	0.019
% I.P.	0.020	0.020	0.007
% Leukosis	0.004	0.002	0.001
% Bruise	0.003	0.003	0.001
% Other	0.009	0.006	0.002
% Total	0.234	0.150	0.133
% 1/2 parts condemnations	0.323	0.243	0.236

Data for week ending August 26, 2006

COBB-VANTRESS

Aviagen

Hubbard

Primary Breeders Veterinary Association

HERITAGE

The Poultry Informed Professional Newsletter is published with support from The Primary Breeders Veterinary Association.