THE RELATIONSHIP BETWEEN
POULTRY HEALTH AND FOOD SAFETY

Presented at the 53rd Western Poultry Disease Conference, Sacramento, CA., March 7-9, 2004

James F. Dawe
Bayer Health Care, Animal Health Division,
12707 West 63rd Street,
Shawnee, KS, 66216

SUMMARY
As more is learned about the science linking flock health and finished product microbial prevalence and load, the Veterinary Avian Specialist’s role in Food Safety will enlarge. Recent research shows a surprising relationship between a number of common poultry diseases and carcass microbial loads in the processing plant. It follows that maintaining optimal flock health is essential to minimizing food borne pathogens. If pre-harvest HACCP is to be meaningful, the live-production critical control points that impact food safety must be recognized. Management methods, disease prevention biologics, antimicrobials and therapeutics are valuable veterinary tools, and must remain available. Following is a review of what is currently known about the inter-relatedness of flock health and carcass microbial contamination.

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— Research during the past decade points to a connection between Pre-Harvest flock health status and carcass microbial loads/prevalence.
— We have learned that Food Safety goals are linked to live production Health and Management goals, not just to in-plant processes. (1)

**What do the following have in common?**
1) Feed withdrawal (FW)
2) Molting
3) Coccidiosis
4) Flock Uniformity
5) Cut intestinal tracts (processing errors)
6) Fecal Contamination
7) Airsacculitis
8) Cellulitis (Infectious Process, I.P.)
9) Total Condemnation (2)

**Answer:** All have been shown to impact Food Pathogen prevalence and/or load, pre- or post-harvest. (Salmonella spp., Campylobacter, E. coli)
— Following is a review of the relevant literature to date.. . (3)

**Broiler Whole Bird Condemnation (Region)**

<table>
<thead>
<tr>
<th></th>
<th>SW %</th>
<th>Mid-West</th>
<th>S. East</th>
<th>Mid-Atlantic</th>
<th>S. Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Septox</td>
<td>0.155</td>
<td>0.213</td>
<td>0.248</td>
<td>0.228</td>
<td>0.116</td>
</tr>
<tr>
<td>% Airsac</td>
<td>0.068</td>
<td>0.092</td>
<td>0.206</td>
<td>0.179</td>
<td>0.122</td>
</tr>
<tr>
<td>% I.P.</td>
<td>0.098</td>
<td>0.010</td>
<td>0.032</td>
<td>0.019</td>
<td>0.050</td>
</tr>
<tr>
<td>% Leukosis</td>
<td>0.001</td>
<td>0.000</td>
<td>0.002</td>
<td>0.020</td>
<td>0.000</td>
</tr>
<tr>
<td>% Bruise</td>
<td>0.006</td>
<td>0.003</td>
<td>0.002</td>
<td>0.004</td>
<td>0.003</td>
</tr>
<tr>
<td>% Other</td>
<td>0.011</td>
<td>0.003</td>
<td>0.017</td>
<td>0.014</td>
<td>0.014</td>
</tr>
<tr>
<td>% Total</td>
<td>0.339</td>
<td>0.319</td>
<td>0.508</td>
<td>0.463</td>
<td>0.305</td>
</tr>
<tr>
<td>% 1/2 parts condoms</td>
<td>0.485</td>
<td>0.631</td>
<td>0.522</td>
<td>0.449</td>
<td>0.282</td>
</tr>
</tbody>
</table>

Data for week ending March 27, 2004

**Feed Withdrawal (FW)**
— FW is necessary to process broilers with minimal ingesta and fecal contamination of carcasses.
— Prior to FW, 25% of any flock is “off-feed” - individual broilers eat every 4 hours, and gut passage time is 4 hours. (Savage, 1997)
— Therefore, 5 hours of managed FW pre-catch results in 25% of the flock on 5 hours FW, 25% on 9 hours FW, and 50% somewhere between. (Savage, 1997) (4)

**Feed Withdrawal (ctd.)**
— Changes in ventilation, lighting, house temperature, water availability, and other factors within 5 days of catching affect uniform and proper feed withdrawal. (Savage, 1997)
— Diseases that produce fever, morbidity or reduce bird mobility to feed and water put broilers “ogg-feed” for extended periods. Therefore, good flock health is essential to proper FW pre-slaughter. (5)

**Broiler Performance Data (Company)**

**Live Production Cost**

<table>
<thead>
<tr>
<th></th>
<th>Average Co.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed cost/ton w/o color ($)</td>
<td>179.97</td>
</tr>
<tr>
<td>Feed cost/lb meat (¢)</td>
<td>16.84</td>
</tr>
<tr>
<td>Days to 4.6 lbs</td>
<td>42</td>
</tr>
<tr>
<td>Chick cost/lb (¢)</td>
<td>4.10</td>
</tr>
<tr>
<td>Vac-Med cost/lb (¢)</td>
<td>0.07</td>
</tr>
<tr>
<td>WB &amp; 1/2 parts condemn. cost/lb</td>
<td>0.22</td>
</tr>
<tr>
<td>% mortality</td>
<td>5.35</td>
</tr>
<tr>
<td>Sq. Ft. @ placement</td>
<td>0.79</td>
</tr>
<tr>
<td>Lbs./Sq. Ft.</td>
<td>7.06</td>
</tr>
<tr>
<td>Down time (days)</td>
<td>13</td>
</tr>
</tbody>
</table>

Data for week ending March 27, 2004

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**REVIEW**

A variety of bacterial, viral and “management” diseases of poultry cause morbidity and mortality, increase feed conversion, and reduce body weights and the uniformity of the flock at the time of harvest and processing. Northcutt states that, “Variation in bird size (uniformity) within a flock or over time can affect the efficiency of processing plant equipment, specifically at the vent opener during evisceration”, and that “Frequency of carcass contamination depends upon the amount of material present in the digestive tract, the condition of the digesta (partially digested food and feces) remaining in the intestines (watery or firm), the integrity of the intestines, and the efficiency of the eviscerating equipment and plant personnel” (1).

How does disease impact these conditions? As in other species, bacterial and viral infections in poultry produce a fever, leading to cachexia (“off feed”) in a portion of the flock. Northcutt and Bilgili find that “When the length of feed withdrawal is too long (greater than 13 or 14 hours), a number of problems may occur that increase the likelihood of carcass contamination….Weaker intestines have a higher incidence of intestinal tearing during viscera-tion….Intestinal strength of broilers has been found to be approximately 10% lower when broilers were without feed for 14 or more hours before processing as compared to full-fed broilers” (1,2,8,9). So any disease that takes birds “off feed” can potentially impact carcass contamination prevalence in the plant.

Carcass pathogen load can be affected, as well. Byrd et al. reported that Campylobacter positive crops increase from 25% before feed withdrawal to 62.4% after feed withdrawal (3). Corrier et al. found that Salmonella positive crops increased from 1.9% to 10% following feed withdrawal (4). Stern et al. produced a five-fold increase in Campylobacter pos-

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Data for week ending March 27, 2004
Feed Withdrawal (ctd.)
Northcutt states, "When the length of feed withdrawal is too long (greater than 13 or 14 hours), a number of problems may occur that increase the likelihood of carcass contamination... Weaker intestines have a higher incidence of intestinal tearing during evisceration... Intestinal strength of broilers has been found to be approximately 10% lower when broilers were without feed for 14 or more hours before processing as compared to full-fed broilers" (Northcutt, 2001; Bilgili, 1997; Buhr, 1998; Northcutt, Savage, 1887)

Diseases causing fever, morbidity and ambulatory problems result in prolonged periods of pathology-induced inappetance (FW).

Feed Withdrawal (ctd.)
— Campylobacter positive crops increased from 25% before FW to 64.4% after FW. (Byrd, 1998)
— Campylobacter positive carcasses increased five-fold in broilers on 16-18 hours FW in coops vs. on litter with full-feed. (Stern, 1995)
— Humphrey (1993) and Hinton (1998) found elevated Salmonella levels in broiler crops during feed withdrawal, perhaps due to the higher crop pH in feed-withdrawn birds causing a microflora shift. In commercial layers, the molting process involves dramatic reductions in feed consumption, and results in amplification of Salmonella enteriditis (SE) infections and horizontal transmission (10, 11) and increases the onset and degree of intestinal inflammation from SE infection (12). Coccidiosis (Eimeria tenella challenge) in chickens also infected with SE resulted in higher cecal SE populations (13), recrudescence of previous SE infections (14) and increased invasiveness of Salmonella typhimurium (ST) into the cecal wall (15). Coccidiosis control should be considered a pre-harvest critical control point.

Bilgili states that, "Preventing fecal contamination of the carcasses from spillage of digestive tract contents or smearing of fecal material on edible meat surfaces is the single most important aspect of sanitary slaughter and dressing regulations" (16). In Generic HACCP Application in Broiler Slaughter and Processing (National Advisory Committee on Microbiological Criteria for Foods), McNamara states, "Evisceration can be a major source of additional fecal contamination, particularly if the intestines are cut. This would be expected to increase contamination by mesophilic bacteria, including intestinal pathogens (i.e., Salmonella, Campylobacter, and C. perfringens). Cut intestines can lead to contamination of equipment, workers, and inspectors and can be a major source of cross-contamination" (17). A variety of disease conditions produce non-uniform broiler flocks (size and weight). These birds present poorly to mechanized plant equipment (versus uniform broilers) and as the distribution curve for uniformity flattens, the equipment cuts and tears more intestinal tracts. To test this observation, Russell conducted a replicated processing plant study, The Effect of Airsacculitis on Bird Weights, Uniformity, Fecal Contamination, Processing Errors, and Populations of Campylobacter and Escherichia coli (18).

Russell summarizes his findings: "The net loss (air sac positive carcass weights) averaged over five repetitions was 84 g/carcass, equating to a loss of 14,686.9 k (32,379 lb) of chicken meat for one growout house per year as the result of AS (airsac
titive carcasses of cooped broilers off-feed for 16-18 hours, versus broilers on litter with full feed (5). Humphrey et al.(6) and Hinton et al. (7) found elevated Salmonella levels in broiler crops during feed withdrawal, perhaps due to the higher crop pH in feed-withdrawn birds causing a microflora shift. In commercial layers, the molting process involves dramatic reductions in feed consumption, and results in amplification of Salmonella enteriditis (SE) infections and horizontal transmission (10, 11) and increases the onset and degree of intestinal inflammation from SE infection (12). Coccidiosis (Eimeria tenella challenge) in chickens also infected with SE resulted in higher cecal SE populations (13), recrudescence of previous SE infections (14) and increased invasiveness of Salmonella typhimurium (ST) into the cecal wall (15). Coccidiosis control should be considered a pre-harvest critical control point.

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**Disease and Flock Uniformity at Processing**

1. **DISEASE**
   - FEVER
   - MORBIDITY
   - INAPTITUDE
   - IMMObILITY

2. **PROLONGED PATHOLOGY**
   - INDUCED FEED WITHDRAWAL
   - INCREASED CAMPYLOBACTER
     - SALMONELLA IN CROPS,
     - COOPS OR GIT

3. **POOR GROWTH**
   - HIGH FEED CONVERSION
   - WEAKER INTESTINAL STRENGTH WITH MORE TEARS AT PROCESSING

4. **NON-UNIFORM SIZE BIRDS**
   - PRESENTING TO PLANT EQUIPMENT

5. **PROCESSING ERRORS**
   - CUT INTESTINES

6. **FECAL CONTAMINATION OF CARCASSES**

7. **INCREASED MICROBIAL LOAD AND PREVALENCE PRE-CHILLER**

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**Airsacculitis - Making the Connections:**

- 5 airsac negative (ASN) flocks (REPs) compared to 5 airsac positive (ASP) flocks (REPs) in the plant.
- 100 bird per REP, randomized samples, post-inspection, pre-chiller (1000 carcasses total), statistics applied.
- Individual bird weights, visual fecal contamination scoring, processing errors (cut or torn viscera), whole-bird rinses, blind-coded bacteriology.

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**Airsacculitis - Replicated Plant Study - Results:**
- 84 g. average weight loss, for ASP, post-inspection*
- Sig. more fecal contamination ASP in 4/5 REPs
- Sig. more cut/torn intestines ASP in 5/5 REPs (49% vs. 17%)
- Sig. higher Campylobacter counts ASP in 3/5 REPs
- Sig. higher Campylobacter counts ASN in 1/5 REPs
- In three repetitions, when AS was absent, Campylobacter counts were absent or extremely low (<0.05 log10 cfu/mL).
- In all repetitions, for ASP flocks, Campylobacter was present at levels greater than 1.4 log10 cfu/mL.

*All sampling occurred post inspection and salvage, i.e., on carcasses that had passed inspection.

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**Uniformity (cont d.).**

Variation in bird size (uniformity) within a flock or over time can affect the efficiency of processing plant equipment, specifically at the vent opener during visceration. (Northcutt, 2001).

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**Russell’s conclusion:**
“Because flocks of chickens showing signs of AS have lower weights, more fecal contamination, more processing errors, and higher levels of Campylobacter, it is essential to ensure that AS in the broiler industry be controlled to prevent subsequent food-borne bacterial infection.” (16)
infection. ASP (airsac positive) carcasses had higher (p< or = 0.05) fecal contamination in four of five repetitions. The number of total digestive tract cuts or tears were much higher on ASP carcasses at 42, 49, 37, 60, and 59% as compared to 14, 12, 17, 24, and 16% for ASN (airsac negative) carcasses in repetitions 1 to 5, respectively. In three of the five replications, the presence of AS in the flocks increased (P< or = 0.05) the number of Campylobacter recovered from broiler carcasses. Hence, there appears to be a relationship between the presence of AS and Campylobacter-positive carcasses.... Because flocks of chickens showing signs of AS have lower weights, more fecal contamination, more processing errors, and higher levels of Campylobacter spp., broiler companies should emphasize control of AS in the flocks as a means of preventing subsequent food-borne bacterial infection” (18). Pilot studies conducted by Russell in two integrated broiler companies in 1997 demonstrated that on carcasses removed by FSIS inspectors for airsacculitis, a total of 96% had questionable or unacceptable E. coli counts pre-salvage, versus 42% for inspector-passed, pre-chill carcasses. (1997) — Another study in a different plant: pre-chill E. coli counts on ASP carcasses were 3.93 log10 cfu/mL vs. ASN carcasses at 2.63 log10 cfu/mL. Salmonella prevalence on ASP carcasses was 70% vs. ASN at 40%. (2002, unpublished.)

**Airsacculitis - Additional Plant Studies - Russell** — 96% ASP carcasses removed by FSIS had questionable or unacceptable E. coli counts pre-salvage versus 42% for inspector passed, pre-chill carcasses. (1997) — Another study in a different plant: pre-chill E. coli counts on ASP carcasses were 3.93 log10 cfu/mL vs. ASN carcasses at 2.63 log10 cfu/mL. Salmonella prevalence on ASP carcasses was 70% vs. ASN at 40%. (2002, unpublished.)

Conclusion

As Hargis summarizes, “Research has clearly demonstrated that the reduction of microbial contamination of processed poultry requires the identification of both pre- and postharvest critical control points where contamination may occur, and the implementation of integrated control programs” (20). Known factors affecting carcass microbial contamination or food pathogen prevalence are airsacculitis, infectious process (IP), coccidiosis, total condemnation, flock uniformity, cut intestinal tracts, fecal contamination, extended feed withdrawal and the molting process. Disease prevention and treatment are therefore essential to meeting Food Safety goals, as are the use of current and future vaccines and drugs.
REFERENCES


### Broiler Whole Bird Condemnation (Company)

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<thead>
<tr>
<th></th>
<th>Average Co.</th>
</tr>
</thead>
<tbody>
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<tr>
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</tr>
<tr>
<td>% Bruise</td>
<td>0.004</td>
</tr>
<tr>
<td>% Other</td>
<td>0.013</td>
</tr>
<tr>
<td>% Total</td>
<td>0.383</td>
</tr>
<tr>
<td>% 1/2 parts condemnations</td>
<td>0.449</td>
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</tbody>
</table>

Data for week ending March 27, 2004

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The University of Georgia is committed to the principle of affirmative action and shall not discriminate against otherwise qualified persons on the basis of race, color, religion, national origin, sex, age, physical or mental handicap, disability, or veteran's status in its recruitment, admissions, employment, facility and program accessibility, or services.

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The Poultry Informed Professional Newsletter is published with support from The Primary Breeder Veterinarians Association.
According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 19-State weekly program set 211 million eggs in incubators during the week ending April 3, 2004. This was up slightly 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 Growers in the 19-State Weekly Program Placed 172 Million Chicks for Meat Production During the Week Ending March 27, 2004. Placements were up 3 percent from the comparable week a year earlier. Cumulative placements from December 28, 2003 through April 3, 2004 were 2.36 billion, up 2 percent from the same period a year earlier.

February Egg Production Totaled 6.89 Billion During February 2004, Up 3 Percent from Last Year. Production Included 5.89 Billion Table Eggs, and 1.00 Billion Hatching Eggs, of Which 948 Million Were Broiler-Type and 54.0 Million Were Egg-Type. The Total Number of Layers During February 2004 Averaged 339 Million, Down Slightly from a Year Earlier. February Egg Production per 100 Layers was 2,033 Eggs, up 4 Percent from February 2003.

All Layers in the U.S. on March 1, 2004, Totaled 340 Million, Down Slightly from a Year Ago. The 340 Million Layers Consisted of 281 Million Layers Producing Table or Commercial Type Eggs, 56.8 Million Layers Producing Broiler-Type Hatching Eggs, and 2.44 Million Layers Producing Egg-Type Hatching Eggs. Rate of Lay per Day on March 1, 2004, Averaged 70.5 Eggs per 100 Layers, up 1 Percent from a Year Ago.

Laying Flocks in the 30 Major Egg Producing States produced 6.44 Billion Eggs During February 2004, up 1 Percent from a Year Ago. The Average Number of Layers During February, at 316 Million, was Down 1 Percent from a Year Ago.

Individual State Estimates are Available for the 30 Major Egg Producing States. These States are listed on page 8 of this release and account for approximately 94 Percent of the Total U.S. Egg Production. Production for the Other States are Grouped into an "Other States" Category and Combined with the 30 States Published Individually to Obtain a U.S. Estimate.
Avian Influenza Outbreaks Cloud Trade Outlook

The U.S. poultry industry continues to be rocked by outbreaks of Avian Influenza (AI) in various States. There have been outbreaks in Delaware, New Jersey, Pennsylvania, Texas, and most recently in Maryland. The outbreak in Maryland was at a commercial broiler operation and located where there are a large number of other operations within a relatively short distance. The current assumption is that the countries currently banning all U.S. poultry shipments will, over time, eventually target specific States, provided there are no further outbreaks of AI. The timetable for this regionalization process will vary from country to country. Mexico recently announced that some exports from the United States can resume. There are restrictions on what products specified States can export to Mexico and on the storage of poultry products in Texas before entering Mexico. Due to the number of bans or restrictions placed on the export of broiler products, the forecast for broiler exports was lowered to 4.96 billion pounds from the previous forecast of 5.28 billion pounds.

Broiler Production Rises in January, Production Expected Higher in 2003

Broiler production for January 2004 was reported at 2.84 billion pounds, up 2.3 percent from the previous year. Weekly chick placements are continuing to average about 1.5 percent higher than the previous year, and the forecast for broiler production in the first quarter of 2004 is now almost 8.1 billion pounds, 3.6 percent higher than a year ago. Along with the increase in the number of chicks being placed for growth, the average weight of birds at slaughter has been running over 2 percent higher than the previous year. The overall broiler production estimate for 2004 is now 33.93 billion pounds, up 3.6 percent from 2003.

Revisions in broiler production contained in the Poultry Slaughter-Annual Summary for 2003 increased total broiler production for 2003, to 32.75 billion pounds, up 1.6 percent from 2002. The increase is due to an increase in the average weight at slaughter, as total broiler slaughter declined slightly.

A strong domestic economy and relatively small growth in broiler production has pushed prices for broiler products well above year-earlier levels. Over the first 2 months of 2004, the 12-city whole broiler price has averaged 71.8 cents a pound, 19 percent higher than during the same time in 2003. Prices have also risen for other broiler products. Prices for boneless-skinless breast meat in the Northeast market averaged $1.69 per pound during January and February, 24 percent higher than the previous year. Prices for rib-on breasts averaged 96.4 cents per pound, up 15 percent from the same time in 2003. Prices of these products, which are mostly sold on the domestic market, have risen due to the combination of a strengthening economy, strong prices for other protein products, the effects of consumer reaction to the BSE situation, and high-protein diets increasing broiler demand. Prices for other broiler products, more dependent on the exports market, have also moved significantly higher. Leg quarter prices in January and February averaged 34.6 cents per pound, up 73 percent from the same period in 2003. The same pattern can be seen for wings, up 72 percent and thighs, up 32 percent. Even with a forecast of higher production in 2004, domestic broiler prices are expected to remain strong. How strong will depend on both the domestic economy and how quickly other countries relax bans and restrictions on imports of U.S. poultry products.

Turkey Production Seen Down in 2004

Turkey production in 2004 is forecast at 5.63 billion pounds, down about 25 million pounds from the previous year. Over the last 13 months, the number of pouls being placed for growout has only been above its year-earlier level once. While prices for turkey products have begun to strengthen, they have not shown the price strength that broiler products have.

The lower poult placements are expected to result in lower turkey production over the first half of 2004. Turkey stocks at the end of January were down 9 percent from the previous year, a wide departure from the beginning of 2003 when they were up over 30 percent. Smaller stocks of both whole birds and parts, along with lower production is expected to gradually strengthen prices over 2004. The outlook for turkey production and prices has been helped by Mexico’s announcement that poultry exports from the United States can resume, under certain restrictions. While no turkey production operations have tested positive for AI they have been under the same trade bans as broilers. Also, Mexico accounts for about 50 percent of all U.S. turkey exports.

Revisions in turkey production slightly raised 2003 production to 5.65 billion pounds, still down 1 percent from 2002. The decrease in turkey production was the result of a lower number of birds being slaughtered, as the average weight was unrevised.
### Meetings, Seminars and Conventions

#### 2004

**May**

- May 11-13: Victam Europe 2004, Jaarbeurs Trade Halls, The Netherlands. Contact: Victam International, P.O. Box 197, 3860 AD Nijkerk, The Netherlands. Phone: +31 33 246 4444; Fax: +31 33 246 4706; Email: expovictam.com

- May 22: 76th Annual Northeastern Conference on Avian Diseases, Ramada Inn, State College, PA. Contact: P.A. Dunn, Penn State University, Orchard Road, University Park, PA 16802-1110. Phone: 814-863-1983; Fax: 814-865-3907.

**June**

- June 1-4: Poultry Industry 2004 International Forum, Coccox Expo Exhibition Center, Moscow, Russia. Contact: Karapetyan Nune, Asia Group Exhibition Company. Phone: +7 095 797 6914; Fax: +7 095 797 6915; Email: nune@meatindustry.ru; Website: www.chickenking.ru

- June 8-12: XXII World's Poultry Congress, WPSA Turkish Branch, Istanbul, Turkey. Contact: congress Organiser. ITU Joint Venture, Cumbhuriyet Cad. 18/5, 80230 Elmadag, Istanbul, Turkey. Phone: +90 212 231 3021; Fax: +90 212 232 1522; Email: wpsa2004@wpsa2004.org

**August**

- August 25-27: XVII Central American Poultry Congress, San Pedro Sula, Honduras. See www.anavih.org for details. Contact: Email: anavih@honduras.quik.com

**September**

- September 8-9: Delmarva Breeder Hatchery and Grow-out Conference, Delmarva convention Center, Delmar, Maryland. This is a University of Delaware meeting and not a DPI meeting. Contact: Bud Malone, University of Delaware. Ph: 302-856-7303 or email: malone@udel.edu

- September 28-29: Georgia Poultry Conference, Classic Center, Athens, GA. Contact: Georgia Poultry Federation, P.O. Box 763, Gainesville, GA 30503; Phone: 770-532-0473; or Extension Poultry Science, university of Georgia, Athens, GA 30602; Phone: 706-542-1325.

#### 2004 October

- October 6-8: National Meeting on Poultry Health & Processing, Clarion Resort Fontainebleau Hotel, Ocean City, Maryland. Contact: Karen Adams, Ph: 302-856-9037 or email: adams@dpi

#### 2004 November

- November 9-12: EuroTier 2004, Hanover, Germany. Contact: DLG (Deutsche Landwirtschafts-Gesellschaft e.V.), Eschbomer-Landstrasse 122, 60489 Frankfurt-am-Main, Germany. Phone: +49 69 24788 257; Fax: +49 69 24788 113; www.agritechnica.de
### 2005

#### January

**January 26-28:** 2005 International Poultry Exposition, Georgia World Congress Center, Atlanta, GA. Contact: US Poultry & Egg Assn., 1530 Coodedge Rd., Tucker, GA 30084; Phone: 770-493-9401; Fax: 770-493-9257; www.poultryegg.org

#### 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

#### June

**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

### 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

### 2008

#### August

**August 10-15:** XXIII World’s Poultry Congress, Convention and Exhibition Centre, Brisbane, Australia.
### Broiler Performance Data (Region)

#### Live Production Cost

<table>
<thead>
<tr>
<th></th>
<th>SW</th>
<th>Midwest</th>
<th>Southeast</th>
<th>Mid-Atlantic</th>
<th>S-Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed cost/ton w/o color ($)</td>
<td>171.00</td>
<td>156.19</td>
<td>174.29</td>
<td>173.15</td>
<td>173.36</td>
</tr>
<tr>
<td>Feed cost/lb meat (¢)</td>
<td>15.85</td>
<td>14.28</td>
<td>16.26</td>
<td>17.09</td>
<td>16.27</td>
</tr>
<tr>
<td>Days to 4.6 lbs</td>
<td>44</td>
<td>42</td>
<td>42</td>
<td>44</td>
<td>43</td>
</tr>
<tr>
<td>Chick cost/lb (¢)</td>
<td>4.24</td>
<td>3.96</td>
<td>4.15</td>
<td>3.68</td>
<td>3.94</td>
</tr>
<tr>
<td>Vac-Med cost/lb (¢)</td>
<td>0.07</td>
<td>0.03</td>
<td>0.07</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>WB &amp; 1/2 parts condemn. cost/lb</td>
<td>0.30</td>
<td>0.25</td>
<td>0.21</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>% mortality</td>
<td>6.03</td>
<td>4.89</td>
<td>4.85</td>
<td>5.86</td>
<td>4.63</td>
</tr>
<tr>
<td>Sq. Ft @ placement</td>
<td>0.75</td>
<td>0.75</td>
<td>0.79</td>
<td>0.79</td>
<td>0.81</td>
</tr>
<tr>
<td>Lbs./Sq. Ft.</td>
<td>7.08</td>
<td>7.16</td>
<td>6.93</td>
<td>7.44</td>
<td>6.93</td>
</tr>
<tr>
<td>Down time (days)</td>
<td>15</td>
<td>14</td>
<td>14</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

Data for week ending February 21, 2004

### Broiler Performance Data (Company)

#### Live Production Cost

<table>
<thead>
<tr>
<th></th>
<th>Average Co.</th>
<th>Top 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed cost/ton w/o color ($)</td>
<td>170.68</td>
<td>140.71</td>
</tr>
<tr>
<td>Feed cost/lb meat (¢)</td>
<td>15.94</td>
<td>13.07</td>
</tr>
<tr>
<td>Days to 4.6 lbs</td>
<td>43</td>
<td>40</td>
</tr>
<tr>
<td>Chick cost/lb (¢)</td>
<td>4.26</td>
<td>4.52</td>
</tr>
<tr>
<td>Vac-Med cost/lb (¢)</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>WB &amp; 1/2 parts condemn. cost/lb</td>
<td>0.24</td>
<td>0.16</td>
</tr>
<tr>
<td>% mortality</td>
<td>5.22</td>
<td>3.46</td>
</tr>
<tr>
<td>Sq. Ft @ placement</td>
<td>0.78</td>
<td>0.77</td>
</tr>
<tr>
<td>Lbs./Sq. Ft.</td>
<td>6.94</td>
<td>7.86</td>
</tr>
<tr>
<td>Down time (days)</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

Data for week ending February 21, 2004

### Broiler Whole Bird Condemnation (Region)

<table>
<thead>
<tr>
<th></th>
<th>SW</th>
<th>Mid-West</th>
<th>S. East</th>
<th>Mid-Atlantic</th>
<th>S. Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Septox</td>
<td>0.369</td>
<td>0.370</td>
<td>0.195</td>
<td>0.288</td>
<td>0.195</td>
</tr>
<tr>
<td>% Airsac</td>
<td>0.175</td>
<td>0.139</td>
<td>0.083</td>
<td>0.158</td>
<td>0.067</td>
</tr>
<tr>
<td>% L.P.</td>
<td>0.048</td>
<td>0.039</td>
<td>0.175</td>
<td>0.089</td>
<td>0.091</td>
</tr>
<tr>
<td>% Leukosis</td>
<td>0.002</td>
<td>0.002</td>
<td>0.001</td>
<td>0.006</td>
<td>0.003</td>
</tr>
<tr>
<td>% Bruise</td>
<td>0.009</td>
<td>0.003</td>
<td>0.007</td>
<td>0.007</td>
<td>0.007</td>
</tr>
<tr>
<td>% Other</td>
<td>0.024</td>
<td>0.005</td>
<td>0.039</td>
<td>0.012</td>
<td>0.008</td>
</tr>
<tr>
<td>% Total</td>
<td>0.627</td>
<td>0.567</td>
<td>0.499</td>
<td>0.559</td>
<td>0.371</td>
</tr>
<tr>
<td>% 1/2 parts condemnations</td>
<td>0.505</td>
<td>0.472</td>
<td>0.295</td>
<td>0.303</td>
<td>0.484</td>
</tr>
</tbody>
</table>

Data for week ending February 21, 2004

### Broiler Whole Bird Condemnation (Company)

<table>
<thead>
<tr>
<th></th>
<th>Average Co.</th>
<th>Top 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Septox</td>
<td>0.272</td>
<td>0.296</td>
</tr>
<tr>
<td>% Airsac</td>
<td>0.121</td>
<td>0.061</td>
</tr>
<tr>
<td>% L.P.</td>
<td>0.083</td>
<td>0.029</td>
</tr>
<tr>
<td>% Leukosis</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>% Bruise</td>
<td>0.008</td>
<td>0.004</td>
</tr>
<tr>
<td>% Other</td>
<td>0.018</td>
<td>0.007</td>
</tr>
<tr>
<td>% Total</td>
<td>0.505</td>
<td>0.400</td>
</tr>
<tr>
<td>% 1/2 parts condemnations</td>
<td>0.396</td>
<td>0.388</td>
</tr>
</tbody>
</table>

Data for week ending February 21, 2004