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FUNDAMENTALS OF LIGHT MANAGEMENT IN BROILER PRODUCTION

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Environmental management of broiler houses is an intricate process with the purpose of providing feed, water, heat, fresh air, and shelter in order to maximize bird weight gains and minimize stress. Improper management of any of these factors might result in poor feed efficiency, low weight gains and increased mortality. Light affects physical activity, metabolic rate, and other physiological factors such as reproduction and hormonal status. Light is a factor that was at one time not managed in broiler grow-out operations on a daily or weekly basis. Instead, light was provided continuously from 23 to 24 hours a day to maximize feed intake (Morris, 1967). Over the last two decades, light has become a component in house environment that is regulated as the broiler grows. This has yielded positive performance results in today's high yield broilers. These birds are more susceptible to

Broiler Performance Data (Region)
Live Production Cost

	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	143.94	134.59	152.51	153.92	148.57
Feed cost/lb meat (¢)	13.39	12.47	14.02	14.84	13.89
Days to 4.6 lbs	44	43	43	43	43
Chick cost/lb (¢)	4.12	4.17	4.21	3.73	3.92
Vac-Med cost/lb (¢)	0.08	0.02	0.09	0.06	0.04
WB & 1/2 parts condemn. cost/lb	0.25	0.22	0.14	0.22	0.19
% mortality	5.48	7.91	3.99	5.27	4.95
Sq. Ft. @ placement	0.75	0.75	0.78	0.79	0.81
Lbs./Sq. Ft.	7.06	7.05	6.72	7.36	6.87
Down time (days)	15	13	16	15	15

Data for week ending 03/29/03

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metabolic diseases such as ascites, sudden death syndrome, tibial dyschondroplasia and other skeletal disorders which have been lessened by decreasing photoperiod (Classen and Riddell, 1989; Classen et al., 1991; Renden etal., 1991).

Intensity

It is important to understand how light can affect birds. Factors that are important to broiler production include intensity (brightness), photoperiod (duration), and wavelength (color). The literature on reducing light intensity is conflicting. Some studies have seen no improvements in body weight or leg disorders (Newberry et al., 1985). But Charles et al. (1992) observed an increase in body weight when birds were grown under 5 lux. It has been suggested that this was accomplished by reduced physical activity and thus less energy expenditure. Low light intensities have been associated with less walking and standing, and less aggressive behavior such as fighting, feather pecking and cannibalism (Buyse et al., 1996). Field studies have generally shown that higher light intensities (greater than 5 lux) decrease body weight, which is thought to be related to increased bird activity levels. These same studies have indicated a reduction in the incidence of skeletal disorders such as tibial dyschondroplasia and enlarged hocks when birds were exposed to low intensities. This is thought to be the result of slowing growth rates early, allowing proper maturation of skeletal and physiological systems before adding additional muscle mass. Most modern lighting programs begin with a high light intensity at 20 lux (2 fc) and during the second or third week of age, reduce it to 5 lux (0.5 fc) and hold them at this reduced intensity for the remainder of the grow-out.

Photoperiod

Photoperiod is the second aspect of light that can be altered to improve broiler performance. Most research involving light management has explored this factor. Livability, average body weight, feed efficiency, and percent condemnations were enhanced in broilers exposed to restricted photoperiod over broilers that were exposed to continuous light. Recent work has indicated that the improvement in bodyweights and feed conversion resulting from reduced photoperiods were due to a combination of less energy on physical activity and better feed utilization (metabolizability) of the diet (Apeldoorn et al., 1999). Broilers on intermittent photoperiods exhibit less stress as measured by plasma corticoids (Buckland et al., 1976). Plasma corticoids have been shown to be greater in birds that were stressed (Buckland et al., 1974). However, Freeman et al. (1981) and Renden et al. (1994) did not report differences in plasma stress (corticosterone) hormones among the different light programs. However, increased adrenal size and elevated plasma free fatty acid concentrations indicated that the chicks were stressed (Freeman et al., 1981). Broilers exposed to restricted photoperiods have an improved immune response to disease challenges. This improved immune response may be due to the rest period that is provided during dark periods, to the production of melatonin or to a combination of both. Melatonin is a hormone that is synthesized by the pineal gland during dark periods. The pineal gland is light sensitive and melatonin production is inhibited during light periods. The production of this hormone could be beneficial in other ways, as melatonin affects a variety of physiological systems that include the cardiopulmonary, reproductive, excretory, thermoregulatory, behavioral, immunomodulatory, and neuroendocrine systems.

Wavelength

Wavelength, the third aspect of light, produces variable effects on broiler performance. This is due to reasons such as possible overlap of wavelengths within treatments and the interaction of behavior

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.316	0.358	0.149	0.235	0.179
% Airsac	0.186	0.120	0.103	0.177	0.103
% I.P.	0.048	0.031	0.033	0.028	0.073
% Leukosis	0.008	0.003	0.001	0.008	0.001
% Bruise	0.010	0.007	0.009	0.006	0.007
% Other	0.026	0.011	0.025	0.006	0.005
% Total	0.594	0.530	0.320	0.460	0.373
% 1/2 parts condemnations	0.460	0.424	0.276	0.446	0.445

Data for week ending 03/29/03

Broiler Performance Data (Company) Live Production Cost

	Average Co.	Top 25%
Feed cost/ton w/o color ($)	140.35	141.29
Feed cost/lb meat (¢)	13.74	12.48
Days to 4.6 lbs	43	42
Chick cost/lb (¢)	4.16	3.88
Vac-Med cost/lb (¢)	0.06	0.03
WB & 1/2 parts condemn. cost/lb	0.21	0.12
% mortality	4.97	3.59
Sq. Ft. @ placement	0.77	0.74
Lbs./Sq. Ft.	6.86	6.53
Down time (days)	15	14

Data for week ending 03/29/03

with performance. In other words, it is hard to determine whether the results that are observed are due to the wavelength of the light itself or is it more of a behavior effect. In situations where blue and green lights are used, do the birds act calmer because of the wavelength or is it because they perceive it as a low light intensity? Do we not observe similar results with low light intensities? This is currently unknown and requires more work to separate the wavelength and behavior components if possible. At this point in time it may be just as beneficial to run lights at lower intensities as spending the money on colored lights.

Light Program Management

If broilers are maintained on short photoperiods through the end of grow-out, it becomes a problem during catching. Birds that are maintained on short photoperiods are more flighty, creating a less than desirable (dusty) atmosphere for themselves as well as the catching crew. This increased activity could result in more carcass downgrades at the processing plant in the form of excess scratches, broken bones and bruising. The added stress of high activity during catching could also affect DOA's at the plant. As a result, current commercial broiler lighting programs bring the photoperiod back up to 22 to 23 hr of light by the end of the fourth week.

Lighting programs can be divided into three types: Restricted, intermittent and ahemeral. Restricted lighting periods use photoperiods of 16 hours and dark periods of 8 hours within a 24 hour day. Intermittent lighting programs can use one hour of light followed by three hours of dark within a 24 hour day, thus providing a total of six hours of light. Both of these lighting programs are utilized by broiler companies today and permit the birds to experience a dark period allowing rest, melatonin synthesis and less stress to occur. Ahemeral lighting programs are not used in broiler production, but may be employed in layer or breeder operations. This lighting program employs a day length longer than 24 h to increase egg production, egg size and egg quality. Restricted lighting programs are the most popular and an example is provided in Table 1.

However, very few companies make six alterations to their programs, instead only three changes may be used (Table 2).

TABLE 1. Sample lighting program*

Age (days)	Intensity (lux)	Hours Light (L): Hours Dark (D) per day
0	20	24L:0D
4	20	18L:6D
8	5	14L:10D
15	5	16L:8D
22	5	18L:6D
29	5	22L:2D

* This lighting program is compiled from several different programs currently used. Company lighting programs do vary but this overallscheme is maintained.

TABLE 2. Sample lighting program*

Age (days)	Intensity (lux)	Hours Light (L): Hours Dark (D) per day
0	20	24L:0D
4	5	16L:8D
14-20**	5	22L:2D

* Again, there are variations on this program that are currently in use.
**The day the birds are returned to 22 to 23 hours of light is variable.

These lighting programs have a central purpose of slowing the early growth rate of broilers which allows the birds to achieve a superior maturity level before putting on excess muscle mass. Many producers may not be experiencing the full effect of restricted light regimes because the programs are not applied company wide. If every complex or region utilizes a unique program then it will be difficult to ascertain which is the most beneficial. The literature indicates that restricted lighting programs enhance broiler production through improvements in body weights, feed efficiency, immune status, and health as a result.

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For Your Information

Bayer has launched a website that will keep you informed of the Notice of Opportunity of Hearing proceedings with FDA to withdraw Baytril from the U.S. market. The site gives the science behind Bayer's defence of Baytril as a tool in poultry production. It will be continually up-dated. The address is www.healthypoultry.com

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.	Top 25%
% Septox	0.246	0.218
% Airsac	0.138	0.069
% I.P.	0.048	0.018
% Leukosis	0.004	0.002
% Bruise	0.008	0.011
% Other	0.015	0.010
% Total	0.459	0.327
% 1/2 parts condemnations	0.417	0.325

Data for week ending 03/29/03

Aviagen™

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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 Down 2 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 March 29, 2003. 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 1 Percent

Broiler growers in the 19-State weekly program placed 169 million chicks for meat production during the week ending March 29, 2003. Placements were down 1 percent from the comparable week a year earlier. Cumulative placements from December 29, 2002 through March 29, 2003 were 2.15 billion, down 2 percent from the same period a year earlier.

February Egg Production Up 1 Percent

U.S. egg production totaled 6.62 billion during February 2003, up 1 percent from last year. Production included 5.63 billion table eggs and 985 million hatching eggs, of which 927 million were broiler-type and 58.0 million were egg-type. The total number of layers during February 2003 averaged 338 million, up slightly from a year earlier. February egg production per 100 layers was 1,957 eggs, up 1 percent from February 2002.

All layers in the U.S. on March 1, 2003, totaled 338 million, up slightly from a year ago. The 338 million layers consisted of 278 million layers producing table type eggs, 57.4 million layers producing broiler-type hatching eggs, and 2.62 million layers producing egg-type hatching eggs. Rate of lay per day on March 1, 2003, averaged 69.6 eggs per 100 layers, down 1 percent from a year ago.

Laying flocks in the 30 major egg producing States produced 6.18 billion eggs during February 2003, up slightly from a year ago. The average number of layers during February, at 316 million, was down slightly from a year ago.

Egg-Type Chicks Hatched Down 13 Percent

Egg-type chicks hatched during February totaled 30.0 million, down 13 percent from February 2002. Eggs in incubators totaled 30.5 million on March 1, 2003, down 7 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 221,000 during February 2003, down 11 percent from February 2002.

Broiler Hatch Down 1 Percent

The February 2003 hatch of broiler-type chicks, at 695 million, was down 1 percent from February of the previous year. There were 630 million eggs in incubators on March 1, 2003, down 3 percent from a year earlier.

Leading breeders placed 6.7 million broiler-type pullet chicks for future domestic hatchery supply flocks during February 2003, down 8 percent from February 2002.

Turkey Eggs in Incubators on March 1 Down 4 Percent

Turkey eggs in incubators on March 1, 2003, in the United States totaled 31.3 million, down 4 percent from March 1 a year ago. Eggs in incubators were 2 percent above the February 2003 total of 30.7 million. Regional changes from the previous year were: East North Central, down 1 percent; West North Central, up 2 percent; North and South Atlantic, down 8 percent; South Central, down slightly; and West, down 21 percent.

Poults Placed During February Down 2 Percent From Last Year

The 23.8 million poults placed during February 2003 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 January 2003 total of 25.4 million. Regional changes from the previous year were: East North Central, down 1 percent; West North Central, up 3 percent; North and South Atlantic, down 3 percent; South Central, down 16 percent; and West, down 6 percent.

Broiler Production Down in January, Lower Production Expected in 2003

According to the latest Economic Research Service (ERS) reports, Broiler Production Down in January, lower Production Expected in 2003 Broiler production for January 2003 was estimated at 2.748 billion pounds, down 1.1 percent from the previous year. With weekly chick placements continuing to be lower than the previous year, the forecast for broiler production in the first quarter of 2003 is now 7.725 billion pounds, 1.2 percent down from the previous year. The estimates for the second and third quarters have also been lowered to 8.200 billion pounds, making the overall estimate for 2003, 32.325 billion pounds, just barely above 2002. This is the smallest increase in broiler production since 1973.

Revisions in broiler production contained in the Poultry Slaughter Annual Summary for 2002 lowered total broiler production for 2002, to 32.240 billion pounds, up 3.1 percent from 2001. The increase is the result of a 1.7-percent increase in the number of broilers slaughtered and a 1.6-percent increase in the average weight at slaughter.

One of the results of falling broiler production has been gradually increasing prices for some broiler products at both the wholesale and retail levels. Over the first 2 months of 2003, the 12–city whole broiler price has averaged 60.5 cents a pound, 7.2 percent higher than during the same time in 2002. Prices have also risen for breast meat products. Prices for boneless-skinless breasts in the Northeast market averaged 135.8 cents a pound during January and February, about 13 percent higher than the previous year. Prices for rib-on breasts averaged 83.5 cents a pound, up 37 percent from the same time in 2002. These prices have risen the most because these products are sold primarily in the domestic market. Prices for other broiler products that are more dependent on the export market, while moving higher during January and February are still below their year-earlier levels. Leg quarter prices averaged 20 cents a pound, up significantly from their average price over the second-half of 2002, but still below where they were at the start of 2002. The same pattern can be seen for wings, thighs and drumsticks, which have increased since the end of 2002, but still remain below a year earlier. With a forecast of lower production through the first three-quarters of 2003, domestic broiler prices are expected to strengthen further, given no additional disease outbreaks or disruptions to broiler exports.

Disease Issues Continue To Affect Poultry Industry

Disease outbreaks continue to cloud the outlook for the domestic industry both in terms of lower production and lost export opportunities. The outbreak of Exotic Newcastle Disease (END) in the West has continued to spread with smaller outbreaks in Arizona. However, no new END cases have been reported in California, the State that has been most severely affected by the outbreak. The latest disease problem has been in Connecticut where officials have placed some egg laying operations under quarantine as they test to see if the birds have been infected with Avian Influenza (AI). The AI outbreak in Connecticut is expected to be of the low-pathogenic variety. In response to the reports of the outbreak in Connecticut, importing countries such as Japan and Korea have placed a temporary ban on the importation of poultry and egg products from the United States. The ban placed on imports of U.S. poultry and egg products will likely remain in place until the Japanese and Korean Governments are given information by APHIS on the extent and severity of the outbreak. As of March 12, Japan has lifted its ban on all U.S. poultry products, but the ban on products from Connecticut remain in effect.

The United States is not alone in dealing with poultry disease outbreaks. Presently the Netherlands is dealing with an outbreak of high-pathogenic AI in broiler flocks. The Netherlands is one of the largest broiler producers in the EU. Some countries normally importing from the Netherlands are likely to restrict imports until the extent of the outbreak is known.

Turkey Production Seen Down in 2003

Turkey production in 2003 is forecast at 5.675 billion pounds, down less than 50 million pounds or 0.7 percent lower than the previous year. With beginning stocks up considerably from the previous year and limited growth expected in exports, turkey prices are expected to be relatively flat in 2003, especially for turkey parts. In 9 of the last 11 months, the number of poults placed for growout
has been below the level of the same month the previous year.

The lower poult placements during most of 2002 are expected to result in lower turkey production in the first two quarters of 2003. While beginning stocks in 2003 for turkey parts were 68 percent higher than in the previous year, stocks of whole birds at the start of 2003 were down 10 percent. The smaller stocks for whole birds and the lower production has pushed the 3-region average price for whole birds higher in January and February, after being lower on a year-over-year basis for the previous 20 months. Revisions in turkey production lowered 2002 production to 5.713 billion, down slightly from the earlier estimate and 2.7 percent higher than the previous year. Like broilers, the increase in turkey production was a result of both higher numbers of birds going to slaughter (up 0.7 percent) and an increase in their average weight (up 2.5 percent).

Meetings, Seminars and Conventions

2003 April

April 20-23: ***Middle East Poultry Show,*** Dubai World Trade Center Exhibition Complex, United Arab Emirates. Contact: Mediac Communication and Promotion, P.O. Box 5196, Dubai, UAE. Phone: +971 4 2692004; Fax: +971 4 2691298

April 28-30: ***U.S. Poultry Human Resources Management,*** Park Vista Hotel, Gatlinburg, TN. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

2003 May

May 1-4: ***GPF Annual Meeting,*** Brasstown Valley Resort, Young Harris, GA. Contact: Georgia Poultry Federation, P.O. Box 763, Gainsville, GA 30503. Phone: 770-532-0473; claudette@gapf.org

May 8-9: ***U.S. Poultry Nationial Breeders Roundtable,*** Airport Marriott Hotel, St. Louis, MO. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone: 770-493-9401; http://www.poultryegg.org

May 11-14: ***Alltech International Feed Industry Symposium,*** Lexington, Kentucky. Contact: Roel Coenders, Phone: 859-887-3244; Email: rcoenders@alltech.com

May 14-15: ***U.S. Poultry Processor Workshop,*** DoubleTree Hotel, Nashville, TN. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone: 770-493-9401; http://www.poultryegg.org

May 14-16: ***AveSui 2003,*** Centrosul, Florianopolis, Santa Catarina, Brazil, The Latin American Fair for the Poultry and Pig Industries. Contact; Gessulli Agribusiness, Caixa Postal 198, Porto Felix, SP, DEP 18540-000, Brazil. Phone: 55-15-262-3133; Fax: 55-15-262-3919.

May 17: ***GPF Night of Knights,*** Cobb Galleria Centre, Atlanta, GA. Contact: Georgia Poultry Federation, P.O. Box 763, Gainsville, GA 30503. Phone: 770-532-0473; claudette@gapf.org

May 29-31: ***Chicken Cooking Contest,*** Baltimore Convention Center, Baltimore, MD. Contact: National Chicken Council, 1015 15th St., N.W., Suite 930, Washington, DC 20005-2625. Phone: 202-296-2622

May 29-June 1: ***Georgia Veterinary Medical Association 2003 Annual Conference,*** Sandestin Golf and Beach Resort, Florida. Reservations (800) 320-8115

2003 June

June 5-7: ***VIV Poultry Yutav,*** World Trade Center Yesulsky, Istanbul, Turkey. Contact: Jaabeurs Exhibitions and Media, P.O. Box 8800, 3503 RM Utrecht, The Netherlands. Phone: +31 30 295 2772; Fax: +31 30 295 2809

June 6-7: ***The Poultry Federation's Festival,*** Arlington Hotel, Hot Springs, AR. Contact: Judy Kimbrell, The Poultry Federation, P.O. Box 1446, Little Rock, AR 72203. Phone: 501-375-8131

June 11-13: ***75th Annual Northeastern Conference on Avian Disease,*** University of Maine, Oronon, ME. Contact: H. Michael Opitz, 134 Hitchner Hall, University of Maine, Orono, ME 04469-5735, Phone: (207) 581-2771; Fax: (207) 581-2729; Email: mopitz@umext.maine.edu; Website: http://www:umaine.edu/livestock/necad.htm

June 14-16: ***Agrena 2003,*** 5th International Exhibitionof Poultry & Livestock Production, Cairo International Conference Centre, Egypt. Contact: Crose Fairs Organisers, 87 El Alameen Street, Sahfeen, Mohandeseen, Cairo, Egypt. Phone/Fax: +20 2 30 38 994; Email: crose@access.com.eg; Website: www.agrena.com

June 16-18: ***U.S. Poultry Financial Management,*** Sawgrass Marriott Hotel, Ponte Vedra Beach, FL. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

June 19-23: ***140th AVMA Annual Convention,*** Colorado Convention Center, Denver, Colorado. Contact: American Veterinary Medical Association, 1931 North Meacheam Road, Suite 100, Schaumburg, IL 61073-4360. Phone: 847-925-8070; Fax: 847-925-9329; Email: avma.org; http://www.avma.org

June 20: ***Delmarva Chicken Festival,*** Dover, DE. Contact: Delmarva Poultry Industry, 16686 County Seat Highway, Georgetown, DE 19947. Phone: 302-856-9037; Fax: 302-856-1845; Email: dpi@dpichicken.com

June 25-27: ***Georgia Egg Association's 42nd Annual Meeting,*** King & Prince Hotel, St. Simons Island, GA. Contact: Robert Howell, Georgia Egg Commission, 16 Forest Park, GA 30297. Phone: 404-363-7661; Fax: 404-363-7664 or email: goodeggs@bellsouth.net

2003 July

July 6-10: ***92nd Poultry Science Association's Annual Meeting,*** Madison, WI. Contact: PSA, 111 N. Dunlap Ave., Savoy, IL 61874. Phone: 217-356-3182; Fax: 217-398-4119.

July 15-16: ***U.S. Poultry Hatcher-Breeder Clinic,*** Marriott Marquis, Atlanta, GA. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

July 19-23: ***XIII Congress of the World Veterinary Poultry Association and the American Association of Avian Pathologists,*** Denver, CO, USA. Contact: Details are posted on the web site of the American Association of Avian Pathologists. Website: http://www.avian.uga.edu/~wvpa/

July 28-30: ***U.S. Poultry Information Systems,*** Sawgrass Marriott Hotel, Ponte Vedra Beach, FL. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

2003 August

Aug. 10-14: ***14th European Symposium on Poultry Nutrition,*** Lillehammer, Norway. Contact: Mrs. M.F. Bagley, Centre for Poultry Science, P.O. Box 4377, Nydalen, N-0402 Oslo, Norway. Phone: +47 22 79 87 73; Fax: +47 22 79 87 71; Email: wpsa@fjorfe.org; Website: www.wpsa.no

Aug. 21-23: ***Livestock Asia 2003,*** The Mines, Kuala Lumpur, Malaysia. Contact: Mr. Richard Yew, AMB Exhibitions Snd Bhd, Suite 1701, 17th Floor Plaza Permata, 6 Jalan Kampar, off Jalan Tun Razak, 50400 Kuala Lumpur, Malaysia. Phone: +603 4045 4993; Fax: +603 4045 4989; Email: info@ambexpo.com; Website: www.alliedmedia.org

Aug. 25-Feb. 27 2004: ***International Course on Poultry Husbandry,*** IPD Plant.Dier, Barneveld, the Netherlands. Deadline for Applications: April 1, 2003. Contact: IPC Plant.Dier Barneveld, Department of International Studies and Programmes, P.O. Box 64, 3770 AB Barneveld, the Netherlands. Phone: +31 342 406500; Fax: +31 342 406501; Email: barneveld@ipc-training.nl

Meetings, Seminars and Conventions

2003 September

Sept 17-18: ***U.S. Poultry Production & Health,*** The Peabody Hotel, Memphis, TN. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

Sept 23-26: ***XVI European Symposium on the Quality of Poultry Meat & European Symposium on the Quality of Eggs and Egg Products,*** Saint-Brieve, Brittany, France. Contact: ISPAIA, Zoopole Development, BP7-22400 Ploufragen, France. Phone: +47 22 79 87 72, Fax: +47 22 79 87 71. Email: wpsa2003@zoopole2550.fr

2003 October

Oct 7-10: ***XVIII Latin American Poultry Congress,*** Hotel Los Tajibos, Santa Cruz, Bolivia. Contact: Casilla Postal 1133, Santa Cruz, Bolivia. Phone: 591-333-4807; Fax: 591-333-1528; Email: infomes@xviii-alabolivia.org

Oct 9-10: ***U.S. Poultry Protein & Fat,*** The Peabody Hotel, Memphis, TN. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

Oct. 11-15: ***Anuga Food Show,*** KslnMesse, Cologne, Germany. Contact: KslnMesse, GmbH, Messeplatz 1, D-50679 Klsn, Germany. Phone: +49 821 33 05; Fax: +49 821 34 10. Email: m.schlveter@koeln-messe.de

Oct. 22-24: ***National Meeting on Poultry Health and Processing,*** Clarion Resort Fountianebleau Hotel, Ocean City, Maryland.Contact: Karen Adams, Delmarva Poulty Industry, Inc., Phone (302)856-9037, Email: adams@dpichicken.com

Oct. 23-24: ***U.S. Poultry Women in Management,*** Park Vista Hotel, Gatlinburg, TN. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

Oct. 27: ***Mycoplasma 2003,*** NH Utrecht Hotel, Utrecht, The Netherlands. Contact: Positive Action Conferences, P.O. Box 4, Driffield, East Yorkshire, Y025 9DJ, England. Phone: +44 1377 256316; Fax: +44 1377 253640. Email: conf@positiveaction.co.uk; Website: www.positiveaction.co.uk

Oct. 28-31: ***VIV Europe 2003,*** Jaarbeurs-venure, Utrecht, the Netherlands. Contact: Jaarbeurs Exhibitions & Media, P.O. Box 8800, 3503 RM utrecht, the Netherlands. Phone: +31 30 295 27 72; Fax: +31 30 295 28 09; Email: viv.europe@jem.nl.

2003 November

Nov. 12: ***U.S. Poultry Grain Forecast and Economic Outlook,*** Atlanta Airport Hilton Hotel, Atlanta, GA. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401; http://www.poultryegg.org

2004 January

Jan 28-30: ***2004 International Poultry Exposition,*** Georgia World Congress Center, Atlanta, GA Contact: US Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084. Phone: 770-493-9401; Fax: 770-493-9527.

2004 March

Mar. 10-11: ***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.

2004 April

Apr. 21-23: ***VIV China,*** Beijing, China, China International Exhibition Center. Contact; CNAVS Trade Fair Office, c/o Beijing Tech convention & Exhibition Center, Rm 3011, Yuanliwuye Building, No. 23, Hui Xin East Road, Beijing 100029-P.R. China. Phone: +86 10 649 88 358; Fax: +86 10 649 50 374 or Email: fair@public.east.cn.net

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 4404; Fax: +31 33 246 4706; Email: expo@victam.com

2004 June

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

June 16-19: ***5th International Symposium on Turkey Diseases,*** Berlin, Germany. Contact: Prof. Dr. H.M. Hafez, Institute of Poultry Diseases, Free University Berlin, Koserstrasse 21, 14195 Berlin, Germany. Phone: 49-30-8385-3862; Fax: 49-30-8385-5824; Email: hafez@zedat.fu-berlin.de