



The Poultry Informed Professional

Published by the Department
of Avian Medicine, University of Georgia
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of Avian Medicine

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Reprinted from *Hatchery/Breeder Tip . . .*

Factors Affecting Chick Quality

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A recent review article entitled "The day-old chick: a crucial hinge between breeders and broilers" published in World's Poultry Science Journal (Decuyper et al., 2001) challenges the idea that chick quality will be optimized by maximizing hatchability. Here is an overview of the points these authors make.

What are the characteristics of high quality chicks? When removed from the hatcher the chick should be clean (free from adhering dried yolk, shell and membrane), dry with a completely sealed navel, no deformities (straight feet and legs with no lesions or swellings), and alert and ready to engage the world. Let's review the management practices that influence hatchability and chick quality.

Broiler Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color (\$)	128.00	120.25	131.10	131.46	131.94
Feed cost/lb meat (¢)	12.06	11.32	12.17	13.12	12.34
Days to 4.6 lbs	44	43	43	44	43
Chick cost/lb (¢)	3.97	3.63	3.89	3.54	3.86
Vac-Med cost/lb (¢)	0.06	0.02	0.06	0.04	0.07
WB & 1/2 parts condemn. cost/lb	0.25	0.19	0.21	0.22	0.19
% mortality	4.81	3.91	3.93	4.74	4.11
Sq. Ft. @ placement	0.75	0.75	0.80	0.78	0.79
Lbs./Sq. Ft.	6.73	7.30	6.74	7.52	6.77
Down time (days)	16	16	16	21	16

Data for week ending 01/12/02

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Quality of hatching eggs:

- Size, shape, color, and integrity of the shell are influenced by nutrition, genetics, age of flock, and house temperature.
- Shell contamination is affected by house environmental management (temperature, relative humidity, ventilation and drinker height and flow rate) and the frequency of egg collection.

Embryo development and time of collection:

- Stage of embryo development at the time the egg is laid differs by genetic strain in cell division rates. The embryos in the more advanced stages (gastrulation) prior to being laid by the hen withstand storage better or more successfully restart development when placed in the incubator.
- Egg cooling stops embryo development. House temperature and collection frequency impacts time needed to cool the eggs. Gastrulation stage is preferred for good embryo survival after storage. Exposing newly laid eggs to prolonged high temperatures before storage causes continued development past this preferred stage.

Egg Storage

- Carbon dioxide level in the albumen is inversely related to albumen pH and is influenced by storage time. Carbon dioxide level is high when an egg is laid and decreases with time causing the pH of the albumen to increase. Eggs stored less than 6 hours have too low a pH decreasing hatchability. Too high a pH impedes the initiation of embryo development once eggs are placed in the incubator. The higher the storage temperature the faster albumen pH will increase. Each day of egg storage increases incubation time by 1 hour.
- Short-term (5 days or less) egg storage temperature should be 60-70 F. For long-term storage, lower the temperature to 52-55 F, which is thought to reduce the amount of disproportionate or out of sequence embryo development that occurs at these higher temperatures.
- Note the interaction of stage of embryo development (breed dependent) at the time of lay with storage length and temperature.

**Broiler Performance Data (Company)
Live Production Cost**

	Average Co.	Top 25%
Feed cost/ton w/o color (\$)	130.43	124.08
Feed cost/lb meat (¢)	12.33	11.73
Days to 4.6 lbs	44	43
Chick cost/lb (¢)	3.95	3.21
Vac-Med cost/lb (¢)	0.05	0.04
WB & 1/2 parts condemn. cost/lb	0.22	0.16
% mortality	4.24	3.91
Sq. Ft. @ placement	0.77	0.76
Lbs./Sq. Ft.	6.85	7.43
Down time (days)	17	18

Data for week ending 01/12/02

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.366	0.319	0.220	0.342	0.232
% Airsac	0.133	0.125	0.105	0.137	0.091
% I.P.	0.055	0.035	0.144	0.062	0.050
% Leukosis	0.006	0.003	0.004	0.010	0.003
% Bruise	0.009	0.005	0.012	0.011	0.012
% Other	0.030	0.006	0.013	0.008	0.015
% Total	0.598	0.494	0.499	0.571	0.502
% 1/2 parts condemnations	0.471	0.546	0.439	0.422	0.373

Data for week ending 01/12/02

Putting Knowledge to Work

Incubation temperature:

- For optimum hatchability a consistent setter temperature between 99.5 to 100 F is necessary and influenced by machine size, incubator type (single or multi-stage), design, tray position, ventilation rate and space between eggs.
- Temperature fluctuations during incubation should be kept to 0.5 F.
- The challenge during this phase is to prevent variations within the machine that would result in advancement or delay in embryo development. Depending on breed and stage of development, variations might not be proportional causing reduced hatchability and chick quality and performance problems.

Incubation carbon dioxide concentration:

- In multistage incubators carbon dioxide concentration of 0.1 to 0.4% is optimal while an acceptable range for the hatcher is 0.5 to 0.8%.
- Be advised that there is a general lack of information in this area, but hatchery managers should generally seek to control carbon dioxide concentrations through ventilation rates so as not to negatively impact embryo livability.

Spread of hatch time:

- Hatchability will decrease artificially in an industrial setting anytime the hatching process is delayed or prolonged, because the production schedule dictates when chicks are removed and processed from the hatchers. All late hatching chicks are not included in the percentage hatchability, and obviously this low hatch number decreases flock performance.
- The difference in time between the first and last eggs that hatch is influenced by the uniformity of breeder hen weight (directly related to variation in egg size/weight), flock age, storage time and conditions, and variation in incubator conditions.
- A delay in feed and water consumption by early hatching chicks causes a delay in yolk sac utilization, stunting of GI tract development, delay in maturation of the enzyme systems that control metabolism and delay in development of the immune system.
- Delaying placement of chicks after hatch causes a delay in feed and water consumption and is especially detrimental to chicks from small eggs as they have less residual yolk.

This summary outlines the interactions between fertile eggs (size, storage time and conditions, etc.) and incubation conditions (temperature, humidity, ventilation rate and carbon dioxide), suggesting complex relationships that are inter-independent. These authors give us good reason to alter our chick quality and production goals. To achieve the best situations where the hatch process is prolonged, adding incubation time must be evaluated on the basis of how many chicks are lost as pips verses the damage to the chicks that have already hatched (chick quality and broiler performance loses).*

Reference:

Deceuypere, E., K. Tona, V. Bruggerman and F. Bamelis, 2001. *The day-old chick: a crucial hinge between breeders and broilers.* *World's Poultry Science Journal* 57: 127-138.

* Consult with your poultry company representative before making management changes.*

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	0.295	0.257
% Airsac	0.130	0.148
% I.P.	0.078	0.045
% Leukosis	0.007	0.003
% Bruise	0.011	0.008
% Other	0.014	0.006
% Total	0.535	0.467
% 1/2 parts condemnations	0.449	0.258

Data for week ending 01/12/02



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.

The Poultry Informed Professional Newsletter is published with support from Bayer Corporation

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" and "Outlook" Reports

Oklahoma. Data collection and weekly estimates began with the week ending April 7, 2001

Commercial hatcheries for the 19 States set a total of 205 million eggs in incubators during the week ending January 26, 2002. Broiler growers in the 19 States placed 167 million chicks for meat production during the week ending January 26, 2002.

Turkey Eggs in Incubators on January 1 Up 2 Percent From Last Year

Turkey eggs in incubators on January 1, 2002, in the United States totaled 32.2 million, up 2 percent from January 1 a year ago. Eggs in incubators were up 6 percent from the December 1 total of 30.2 million. Regional changes from the previous year were: East North Central, unchanged; West North Central, up 12 percent; North and South Atlantic, down slightly; South Central, down 3 percent; and West, down 18 percent.

Poults Placed During December Up 7 Percent From Last Year

The 24.9 million poults placed during December 2001 in the United States were up 7 percent from the number placed during the same month a year ago. Placements were up 3 percent from the November 2001 total of 24.2 million. Regional changes from the previous year were: East North Central, up 12 percent; West North Central, up 12 percent; North and South Atlantic, up 5 percent; South Central, up 5 percent; and West, down 12 percent.

December Egg Production Up 2 Percent

According to the most recent Economic Research Service (ERS) reports, U.S. egg production totaled 7.40 billion during December 2001, up 2 percent from last year. Production included 6.33 billion table eggs and 1.07 billion hatching eggs, of which 1.01 billion were broiler-type and 62.0 million were egg-type. The total number of layers during December 2001 averaged 339 million, up 2 percent from the total average number of layers during December 2000. December egg production per 100 layers was 2,187 eggs, slightly below the 2,193 eggs in December 2000.

All layers in the U.S. on January 1, 2002, totaled 339 million, up 2 percent from a year ago. The 339 million layers consisted of 280 million layers producing table or commercial type eggs, 56.3 million layers producing broiler-type hatching eggs, and 2.59 million layers producing egg-type hatching eggs. Rate of lay per day on January 1, 2002, averaged 69.8 eggs per 100 layers, down 1 percent from the 70.4 eggs a year ago.

Laying flocks in the 30 major egg producing States produced 6.95 billion eggs during December 2001, up 2 percent from a year ago. The average number of layers during December, at 317 million, was up 2 percent from a year earlier.

Egg-Type Chicks Hatched Down 9 Percent

Egg-type chicks hatched during December totaled 31.5 million, down 9 percent from December 2000. Eggs in incubators totaled 31.5 million on January 1, 2002, down 7 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 206 during December 2001, down 16 percent from December 2000.

Broiler Hatch Up 4 Percent

The December 2001 hatch of broiler-type chicks, at 769 million, was up 4 percent from December of the previous year. There were 638 million eggs in incubators on January 1, 2002, up 5 percent from a year earlier.

Leading breeders placed 6.58 million broiler-type pullet chicks for future domestic hatchery supply flocks during December 2001, up 2 percent from December 2000.

Broiler Eggs Set In 15 Selected States Up 3 Percent

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 15-State weekly program set 184 million eggs in incubators during the week ending January 26, 2002. This was up 3 percent from the eggs set the corresponding week a year earlier. Average hatchability for chicks hatched during the week was 82 percent. Average hatchability is calculated by dividing chicks hatched during the week by eggs set three weeks earlier.

Broiler Chicks Placed Up 3 Percent

Broiler growers in the 15-State weekly program placed 148 million chicks for meat production during the week ending January 26, 2002. Placements were up 3 percent from the comparable week in 2001. Cumulative placements from December 30, 2001 through January 26, 2002 were 594 million, up 4 percent the same period a year earlier.

Four Additional States in Weekly Program

Beginning May 16, 2001 four additional States were added to the weekly program for broiler eggs set in incubators and broiler chicks placed for meat production. The four additional States are Kentucky, Louisiana, Missouri, and

Meetings, Seminars and Conventions

2002 February

Feb. 22-23: PF Spring Meeting, Arlington Hotel, Hot Springs, Ark. Contact: Judy Kimbrell, Poultry Federation, P.O. Box 1446, Little Rock, Ark. 72203. Phone 501-375-8131.

Feb. 28-Mar 2: AFIA*ARGO EXPO GUADALAJARA, Jalisco, Mexico Contact: American Feed Industry Association, 1501 Wilson Blvd., Suite 1100, Arlington, Va. 22209. Phone 703-524-0810

2002 March

March 4-5: Watt Poultry Summit on Infectious Bronchitis, Atlanta, Airport Hilton, Atlanta, GA. Contact: Nancy Grossnickle, Watt Publishing Company, Phone: 815-734-5674; Fax: 815-734-5679.

E-mail: grossnickle@wattmm.com

March 5-6: Louisiana Poultry Seminar, Shreveport, LA. Contact: Dr. Theresia Lavergne, Louisiana Poultry Federation, P.O. Box 25100, Baton Rouge, LA 70894-5100. Phone 225-578-2219.

March 6-7: Nebraska Poultry Industries Convention, New World Inn, Columbus, Neb. Details from Nebraska Poultry Industries, Inc., University of Nebraska, A103 Animal Sciences, P.O. Box 830908, Lincoln, NE 68583-0908. Phone: 403-472-2051.

March 6-7: Environmental Management Seminar, DoubleTree Hotel, Nashville, Tenn. contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone: 770-493-9401.

March 7: Listeria Short Course, Nashville, Tenn. Contact: Silliker Laboratories, 900 Maple Road, Homewood, Ill. 60430. Phone 800-829-7879.

March 19-21: MPF Conv., Touchstone Energy Place, RiverCentre, St. Paul, Minn. Contact: Lara Durban, Midwest Poultry Federation, 2380 Wycliff St., St. Paul, Minn. 55114-1257. Phone: 651-646-4553.

March 19- 22: Better Process Control School, University of Georgia, Athens, Ga. Contact: Food Processors Institute, 1350 I St. N.W., Suite 300, Washington, D.C. 20005-3305. Phone 800-235-0983.

March 21-23: VIV Canada 2002, Toronto, Canada. Contact: Royal Dutch Jaarbeurs, PO Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 56 62; Fax: +31 295 57 09.

E-mail: canada@jaarbeursutrecht.nl.

Canadian Swine Exporters Association, PO Box 150, Hickson, Ontario, Noj iLo, Canada. Phone: +1 519 462 2929; Fax: +1 519 462 2417. E-mail: csea@execulink.com

2002 April

April 12-13: Florida Poultry Days, Contemporary Resort, Orlando, FL. Contact: Florida Poultry Federation, 4508 Oak Fair Blvd., Suite 290, Tampa, FL 33610. Phone: 813-628-4551.

April 14-17: 5th International Symposium on Avian Influenza, Georgia, USA. Contact: David E, Swayne, 934 College Station Road, Athens, Georgia 30605 USA.

FAX: +1-706-546-3161. E-mail:

AI.Symposium@seprl.usda.gov Website: <http://seprl.ars.usda.gov/avian.influenza.symposium.htm>

April 23: Delmarva Poultry Booster Banquet, Salisbury, Maryland. Contact: Karen Adams. Phone 302-856-9037

April 24-26: VIV China 2002, China International Exhibition Centre, Beijing, P.R. China. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 5662; Fax: +31 30 295 5709; E-mail: viv.china@jaarbeursutrecht.nl

April 25-28: GPF Annual Meeting, Callaway Gardens, GA. Contact: Georgia Poultry Federation, P.O. Box 763, Gainesville, GA 30503. Phone 770-532-0473.

2002 May

May 1-4: Western Poultry Disease Conference and Asociacion Nacional de Especialistas en Ciencias Avicolas, Marriott Casamagna Resort, Puerto Vallarta, Mexico. Contact: Dr. R.P. Chin, 2789 S. Orange Ave., Fresno, CA 93725, USA. E-mail: rpchin@ucdavis.edu

May 2-3: National Breeders Roundtable, Airport Marriott Hotel, St. Louis, MO. Contact: US Poultry & Egg Association, 1530 Cooledge Road, Tucker, GA 30084-7303. Phone 770-493-9401.

May 6-8: VIV Africa 2002, Ceasars, Johannesburg, South Africa. Contact: Avi Africa. P.O. box 1202, Honeydew 2040, South Africa. Phone: +27 11 794 5453; Fax: +27 11 794 3367; E-mail: aviafrica@mweb.co.za.

May 6-9: Pepa Annual Conv., Harrah's Stateline Hotel, Lake Tahoe, Nev. Contact: Pacific Egg & Poultry Association, 1521 1st., Sacramento, Calif. 95814. Phone 916-441-0801.

May 18: GPF Night of Knights, Cobb Galleria, Atlanta, Ga. Contact: Georgia Poultry Federation, P.O. Box 763, Gainesville, Ga. 30503, Phone 770-532-0473.

May 21-23: Avicola 2002, La Rural, Buenos Aires, Argentina. Contact: K.J. Krause & Associates, 6550 Rock Spring Drive, Suite 500. Bethesda, Md. 20817-1126. Phone 301-493-5705.

May 27-31: X International Seminar in Avian Pathology and Poultry Production (In Spanish), Georgia, USA. Contact: Dr. Pedro Villegas, Department of Avian Medicine, The University of Georgia, Athens, GA 30602-4875, USA. Fax: +1-706-542-5630; E-mail: sem2002@arches.uga.edu

May. 30-June 1: VIV Poultry Yutav 2002, Istanbul, Turkey. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 56 62; Fax: +31 30 295 57 09; E-mail: viv.yutav@jaarbeursutrecht.nl

2002 June

June 21-22: Delmarva Chicken Festival, Seaford, Delaware. Contact: Connie Parvis. Phone 302-856-9037.

2002 August

Aug 19-23: The 7th World Congress of Genetics Applied to Livestock Production, Le Corum Conference Centre of Montpellier, France: Contact: <http://wcgalp.toulouse.inra.fr>

Meetings, Seminars and Conventions

2002 September

Sept. 6-10: 11th European Poultry Conference, Bremen, Germany. Contact: 11th European Poultry Conference, 2002, Congress Partner, Birkenstr 17, D-28195 Bremen, Germany. Phone: +49 421 303130; Fax: +49 421 303133; E-mail: Bremen@cpb.de.

Sept. 11: Delmarva Breeder, Hatchery & Grow-out Conference, Delmar, Maryland. Contact: Bud Malone, University of Delaware Phone 302-856-7303.

Sept. 24-26: VIV América Latina, Sao Paulo, Brazil. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 57 09; Fax: +31 30 295 57 09; Email: viv.america.latina@jaarbeursutrecht.nl

Sept. 24-26: VIV/AFIA Feed, Sao Paulo, Brazil. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 57 09; Fax: +31 30 295 57 09; Email: viv.feed@jaarbeursutrecht.nl

2002 October

Oct. 6-10: 7th WPSA Asian Pacific Federation Conference, Conrad Jupiter's Hotel, Gold coast, Queensland, Australia. In conjunction with 12th Australian Poultry & Feed Convention. Hotel Conrad, Jupiters Casino, Gold Coast, Queensland, Australia. Contact: APFC 2002 Conference Managers, GPO Box 128, Sydney, NSW 2001, Australia. Phone: +61 2 9262 2277; Fax: +61 2 9262 3135; E-mail: apfc2002@tourhosts.com.au; Internet: <http://www/tourhosts.com.au/apfc2002>

Oct. 6-11: 3rd International Workshop on the Molecular Pathogenesis of Marek's Disease and the Avian Immunology Research Group Meeting, Dead Sea, Israel. Contact: MAREKS-AIRG at Target Tours, P.O. Box 29041, Tel Aviv 61290, Israel. Phone: +972 3 5175150; Fax: +972 3 5175155;

E-mail: mareks-airg@targetconf.com
Oct. 8: Delmarva Poultry Industry, Inc., Annual Membership Meeting, Delmar, Maryland. Contact: Lori Morrow.

Phone 302-856-9037.

Oct. 9-11: National Meeting on Poultry Health & Processing, Sheraton Fountainbleau Hotel, Ocean City, Maryland, USA. Contact: Karen Adams, Delmarva Poultry Industry, Inc., 16686 County Seat Highway, Georgetown, DE 19947-4881. Phone: 302-856-9037; Fax: 302-856-1845.

2002 November

Nov 12-15: EuroTier 2002, International Exhibition for Livestock and Poultry Production, Hanover, Germany. Contact: Website: www.eurotier.de

2003 July

July 19-23: XIII Congress of the World Veterinary Poultry Association, Denver, CO, USA. Contact: Details are not currently available but will eventually be posted on the web site of the American Association of Avian Pathologists. Website: <http://www.avian.uga.edu/~wvpa/>