

# The Poultry Informed Professional®



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## The Early Brooding Period: Issues and a New Technology Solution

Donna Hill, DVM, MAM, Dipl. ACPV

HatchTech Incubation Technology

The brooding phase is a critical part of the modern fast growing broilers life. In some production systems it constitutes as much as a third of the growing period and is without doubt the most demanding from a house management point of view. In this issue of the PIP a world renowned expert, Donna Hill, addresses the management difficulties of, and the possible solutions to, the challenges of the brooding period.

### Contents

The Early Brooding Period: Issues and a New Technology Solution	1-5
Advertisement for Department Head search, University of Georgia	6
Excerpts. "Broiler Hatchery" "Chicken and Eggs" and "Turkey Hatchery"	7
Broiler performance data (Company) Current & previous	8
Meetings, Seminars and Conventions	9
Special Announcement— Dr. John Glisson's retirement	10

Broiler Live Production Cost	Average Company
Feed Cost/ton w/o color (\$)	343.99
Feed cost /lb meat (c)	31.79
Days to 4.6 lbs	40
Chick cost / lb (c)	5.14
Vac-Med cost/lb (c)	0.05
WB & ½ parts condemn. Cost/lb	0.19
% mortality	3.85
Sq.Ft. @ placement	0.83
Lbs/sq. ft.	7.35
Downtime (days)	13

Data for week ending June 25th 2011

Brooding is generally the first 10-14 days in the house when the chicks are “started”. Special house and feed conditions are used in this period to ensure that the chicks have an environment suited to their special temperature, management and nutrition needs.

The early brooding period is the first 4 days after hatch. Since the chick is not fully developed at hatch, conditions during this time determine the field performance of the flock. Problems during this time create non-compensatory performance losses.

Chicks are not just small broilers. Chicks differ from broilers in gastrointestinal tract anatomy and physiology therefore their nutrient digestion and absorption is limited at the time when the chicks have low feed consumption and fast development potential. Chicks also have immature thermoregulatory ability and immune system development.

Since the 7-day chick weight is directly correlated to the final body weight of the flock, the goal of the early brooding period is to uniformly meet the 7-day body weight goal. The 7-day chick weight is dependent on the environmental conditions during the early brooding period. Low body temperature at placement creates mortality and low body weights at 7 days.

A good start does not guarantee good performance later on, but a good start is necessary for good overall performance. A good start is measured by body weight and one week mortality.

Since altricial birds have a higher growth rate, genetic selection for the modern broiler means that birds have become more altricial than precocial. Altricial birds require more parental feeding after hatch; have a higher growth rate and a less mature gastrointestinal tract. Altricial chicks require a simple diet that does not require body resources to digest and absorb. This leaves more resources for somatic growth.

### **Gastrointestinal Tract Development**

Birds hatch with an immature gastrointestinal tract. They do not utilize dietary carbohydrates and amino acids well. The chick undergoes rapid physical and functional development of the gastrointestinal tract to effectively digest feed and absorb nutrients. After hatch, the chick must make the transition from an endogenous yolk nutrient based diet to an exogenous carbohydrate based diet. Several days pre and post hatch are critical for development and survival of commercial chicks and poults.

Intestinal growth begins 24 hours after first ingesting food (when nutrients become available). At this time rapid development of the intestinal tract begins. The absorptive surface area increases by increasing the size of the villi. The mass of the small intestine increases by 600% in the first 7 days of the chick’s life. (Noy et al., 2005)

*Villi Changes with Age (Adapted from Viola, Penz, and Ribeiro)*

Days	1	7	14	21
Number Villi per Quadrant	13.0	12.9	11.9	10.9
Villi Height, $\mu\text{m}$	514	1340	1448	1657
Crypt Depth, $\mu\text{m}$	54	86	114	101

*The effect of water restriction on feed consumption, weight gain, feed conversion and intestine weight of chicks at 7 days of age (Ribeiro et al., 2005)*

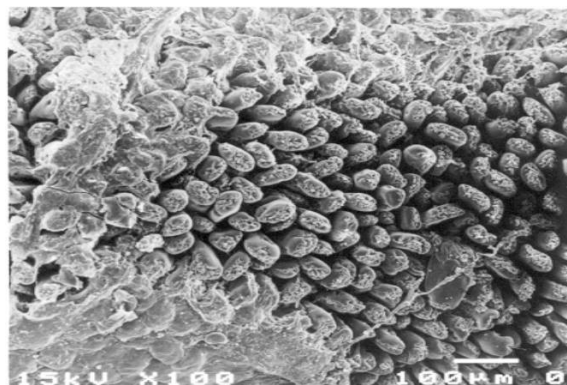
Treatment % Restriction	Feed Consumed (g)	Weight Gain (g)	Feed Conversion (g/g)	Intestine Weight (g)	Villi Height (micrometer)
0	173a	140a	1.24ab	13.03a	1340
10	136b	119b	1.14ab	11.95ab	1137
20	129c	108b	1.20ab	11.47bc	1134
30	117c	91c	1.29a	10.09c	1100
40	110d	77c	1.3a	8.59d	1064

The most important management impact on performance of the baby chick is to ensure that they consume enough food and water.

*Villi with feed and water 24 hours after hatch Maiorka et al. 2003*



*Villi with no feed and water 24 hours after hatch Maiorka et al. 2003*



### **Thermoregulatory System Development**

Chicks undergo a gradual change from poikilotherm to homeotherm. During the first days of life, the chick is still poikilotherm. They are dependent on outside conditions; there is no correction mechanism available to the chick.

When chicks have a low body temperature, they huddle to decrease heat loss. When chicks huddle, they decrease feed and water intake. With high body temperature, chicks move away from the heat source. Water and feed intake decreases because the chicks are not near the feed and water and they eat less to decrease metabolic heat production. When feed and water intake decreases, there is less energy available for development and growth.

The thermal comfort zone is the temperature at which the metabolic rate is minimal and maintained at minimal energy cost. This means that there is the maximum amount of net energy available for development and growth. The rectal temperature of chicks in the thermal comfort zone is 104-105 °F, 40-40.6 °C. . To measure rectal temperature in chicks, any veterinary probe that has a fast response can be used. It is important that

the probe be inserted approximately 2.5 centimeters, or 1 inch, inside the chick. I find that the Microlife T1831 probe works well.

Chicks from young breeder flocks have less thermoregulatory development at hatch than chicks from prime and older breeder flocks (Weytjens et al. 1999). Chicks from young breeder flocks require higher environmental temperatures to maintain them in their thermal comfort zone.

The floor is a crucial influence on the body temperature of the chick. If the floor is too cold, chicks will lose body heat to the floor when they sit down. The air and the floor temperature must be balanced to maintain both standing and sitting chicks in the thermal comfort zone.

When chick rectal temperatures are low at placement, one-week mortality increases, uniformity decreases and 7-day weights are decreased.

### **Immune System Development**

The intestinal tract is the largest lymphoid organ in the body. Development of the intestinal tract impacts the immune system function. Fasting impacts intestinal tract development and releases corticosteroid when delays the immune system development.

The yolk contains maternal immunoglobulin, which is essential to protect the bird against pathogens during the first few days of life. Residual lipids in the yolk are the essential components of cell membranes. Amino acids and energy should be supplied by the feed. The yolk sac contents should not be used to supply amino acids and energy. The yolk contents are not adequate to initiate growth (Nir and Levanon, 1993).

### **Musculoskeletal System Development**

Feed consumption immediately after hatch is necessary to support early muscle development, which will ultimately affect meat yield. Muscle satellite activity in turkeys begins at 25 days of incubation, peaks at hatch, and decreases significantly by 7 days post hatch (Moore et al., 2005). Mozdziak (et al. 2002) showed that feed deprivation 2 days post hatch (energy deprivation) decreases mitotic cell activity in the early phase and decreased meat yield at market age.

### **“Poor Chick Quality”**

When energy is limited, the embryo will use energy for maintenance instead of growth. When energy is limited, the chick will lose weight and restrict growth of critical tissues, i.e. the musculoskeletal system, the gastrointestinal tract, and the immune system. In practical conditions, when availability of feed is limited in this early brooding period, hatchlings that have limited body reserves may not survive this critical period. Those that do survive will exhibit decreased body weight, high feed conversion ratio, decreased disease resistance, and decreased meat yield.

### **New Technology Solution: HatchBrood**

HatchBrood is designed specifically to meet the early brooding needs of the modern yield broiler from all ages of parent stock.

In HatchBrood, all chicks are in their thermal comfort zone. Uniform airflow transfers heat to the chicks that need warmth. Uniform airflow removes heat from chicks that need heat cooling.

Time from hatch to placement is minimized so the gastrointestinal tract development begins at the earliest time possible in all chicks.

All chicks have immediate access to food and water in their thermal comfort zone. This creates uniform

growth and development. There are no non-starters.

Since all chicks, from parent stock of all ages, are in their thermal comfort zone and have feed and water available, energy is not limited. Energy consumed is used to complete the chick development process in all chicks. There are no non-starters. It is not “difficult” to brood chicks from young breeder flocks. At the end of 4 days, they are equipped to perform competitively in the field with chicks from older breeder flocks.

An example of the impact of the impact on brooding young breeder flocks is shown in the following field data. In this field results, the body weight gain in 96 hours is the same in the young and the prime breeder flock. Both groups have a higher body weight gain than the traditional house brooding comparison.

	Young PS HatchBrood	Prime PS Hatchbrood	Prime PS Traditional Brooding
Day 0 Body Weight	36.2	42.2	39.8
96 Hour Body Weight	98.8	104.7	98.6
Total Weight Gain at 96 hours, grams	62.6	62.5	58.8

Chicks with food and water in the thermal comfort zone use the yolk sac for maternal antibody stimulation and development of the immune system.

When chicks are provided with the right environment for efficient development in this very crucial early brooding period, the foundation is built for predictable and least cost field performance.

**References**

Maiorka, A., E. Santin, F. Dahlke, and I.C. Boleili, 2003. Post hatching water and feed deprivation affect the gastrointestinal tract and intestinal mucosa development of broiler chicks. *Journal of Applied Poultry Research* 12(4): 483-492.

Moore, D. T., Ferket, P. R. and Mozdziak, P.E. (2005) Muscle development in the late embryonic and early post-hatch poult, *International Journal of Poultry Science* 4(3): 138-142.

Mozdiak, P.E., T. J. Walsh, and D. W. McCoy, 2002. The effect of early post hatch nutrition on satellite cell mitotic activity. *Comparative Biochemistry and Physiology-B Biochemistry and Molecular Biology* 133(2): 221-226.

Nir, I. and M. Levanon. (1993) Effect of post hatch holding time on performance and residual yolk and liver composition. *Poultry Science* 72: 1994-1997.

Noy, Y., A. Geyra, and D. Sklan, (2001). The effect of early feeding on growth and small intestine development in the post hatch poult. *Poultry Science* 80:912-919.

Viola, T. H., A. M. Penz, Jr., and A. M. L. Ribeiro. The water restriction influence on broiler performance and organ development of broilers from 1 to 21 days of age. *Journal of Applied Research* (submitted for publication).

Weytjens, S., R. Meijerhof, J. Buyuse, and E. Decuypere. Thermoregulation in chicks originating from breeder flocks of two different ages. *Journal of Applied Poultry Research*, 1999, 8:139-145.

## **Search for Head, Department of Population Health**

The College of Veterinary Medicine ([www.vet.uga.edu/](http://www.vet.uga.edu/)) at the University of Georgia invites applications and nominations for Head of the Department of Population Health. The Department is comprised of 4 interdisciplinary and fiscally independent units: the Poultry Diagnostic and Research Center, the Food Animal Medicine Program, the Southeastern Cooperative Wildlife Disease Study, and the Laboratory Animal Medicine Unit. The Head is the Department of Population Health's chief administrative officer with responsibility for the instruction, research and service programs of the Department. Administrative responsibilities include budgetary oversight, promotion and hiring decisions, faculty and staff development, and strong leadership in providing a strategic vision for the Department. The Head is also the departmental representative to the College's Administrative Council reports directly to the Dean. The department consists of 32 faculty members. The department head is expected to contribute to the department's teaching in and out of the classroom. Requirements for the position include the DVM (or equivalent) degree and/or a doctor of philosophy (PhD or equivalent) in a biomedical science or related field. Desirable qualifications include 2 or more years of previous administrative experience and academic program development in instruction, research and service. More information can be found at <http://www.vet.uga.edu/populationhealth/searches.php>. Applications should include a current curriculum vita, a letter summarizing accomplishments and professional goals, and the names of 5 individuals who may be contacted as references. The initial evaluation of applications will begin on July 15, 2011 and continue until a suitable candidate is identified. Applications received by August 15, 2011 are assured full consideration. The University of Georgia is an AA/EOE institution.

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

## Chickens and Eggs

Released July 22, 2011, by NASS, Agricultural Statistics Board, USDA

### April Egg Production Up Slightly

U.S. egg production totaled 7.50 billion during June 2011, up slightly from last year. Production included 6.44 billion table eggs, and 1.07 billion hatching eggs, of which 999 million were broiler-type and 69 million were egg-type. The total number of layers during June 2011 averaged 336 million, down 1 percent from last year. June egg production per 100 layers was 2,230 eggs, up 1 percent from June 2010.

All layers in the U.S. on July 1, 2011, totaled 336 million, down 1 percent from last year. The 336 million layers consisted of 279 million layers producing table or market type eggs, 54.3 million layers producing broiler-type hatching eggs, and 2.83 million layers producing egg-type hatching eggs. Rate of lay per day on July 1, 2011, averaged 74.4 eggs per 100 layers, up 2 percent from July 1, 2010.

### Egg-Type Chicks Hatched Down 7 Percent

Egg-type chicks hatched during June 2011 totaled 39.3 million, down 7 percent from June 2010. Eggs in incubators totaled 34.0 million on July 1, 2011, down 10 percent from a year ago. Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 302 thousand during June 2011, down 5 percent from June 2010.

### Broiler-Type Chicks Hatched Down 2 Percent

Broiler-type chicks hatched during June 2011 totaled 768 million, down 2 percent from June 2010. Eggs in incubators totaled 622 million on July 1, 2011, down 5 percent from a year earlier. Leading breeders placed 7.07 million broiler-type pullet chicks for future domestic hatchery supply flocks during June 2011, down 1 percent from June 2010.

## Broiler Hatchery

Released July 20, 2011, by NASS, Agricultural Statistics Board, USDA

### Broiler-Type Eggs Set In 19 Selected States Down 6 Percent

Commercial hatcheries in the 19-State weekly program set 197 million eggs in incubators during the week ending July 16, 2011. This was down 6 percent from the eggs set the corresponding week a year earlier. Average hatchability for chicks hatched during the week was 84 percent. Average

hatchability is calculated by dividing chicks hatched during the week by eggs set three weeks earlier.

### Broiler-Type Chicks Placed Down 5 Percent

Broiler growers in the 19-State weekly program placed 165 million chicks for meat production during the week ending July 16, 2011. Placements were down 5 percent from the comparable week a year earlier. Cumulative placements from January 2, 2011 through July 16, 2011 were 4.77 billion, down slightly from the same period a year earlier.

## Turkey Hatchery

Released July 15, 2011, by the NASS, Agricultural Statistics Board, USDA

### Eggs in Incubators on July 1 Down 3 Percent from Last Year

Turkey eggs in incubators on July 1, 2011, in the United States totaled 29.1 million, down 3 percent from July 1, 2010. Eggs in incubators were up 3 percent from the June 1, 2011 total of 28.2 million eggs. **Please note that regional estimates have been discontinued:** NASS will no longer publish regional *Turkey Hatchery* estimates. Only estimates at the United States level will be published due to the limited number of hatcheries involved.

### Poults Hatched During June Down 2 Percent from Last Year

Turkey poults hatched during June 2011, in the United States totaled 23.8 million, down 2 percent from June 2010. Poults hatched were down 1 percent from the May 2011 total of 24.1 million poults.

### Net Poults Placed During June Down 2 Percent from Last Year

The 23.4 million net poults placed during June 2011 in the United States were down 2 percent from the number placed during the same month a year earlier. Net placements were down 2 percent from the May 2011 total of 23.9 million.

## Current Month Charts

Broiler Performance Data Live Production Cost	Region					Average Company
	SW	Midwest	Southeast	Mid-Atlantic	S-Central	
Feed Cost/ton w/o color (\$)	337.90	327.73	351.09	343.45	347.11	343.99
Feed cost /lb meat (c)	31.58	29.61	31.83	32.81	32.64	31.79
Days to 4.6 lbs	42	40	41	39	41	40
Chick cost / lb (c)	5.01	4.93	5.27	4.47	5.26	5.14
Vac-Med cost/lb (c)	0.05	0.03	0.06	0.07	0.02	0.05
WB & ½ parts condemn. Cost/lb	0.19	0.20	0.14	0.21	0.20	0.19
% mortality	3.77	3.79	4.01	4.12	3.86	3.85
Sq.Ft. @ placement	0.79	0.81	0.85	0.89	0.84	0.83
Lbs/sq. ft.	7.636	7.41	6.91	7.80	7.51	7.35
Downtime (days)	14	11	14	16	12	13

Broiler Whole Bird Condemnation	Region					Average Company
	SW	Midwest	Southeast	Mid-Atlantic	S-Central	
% Septox	0.122	0.160	0.062	0.110	0.069	0.099
% Airsac	0.058	0.039	0.054	0.057	0.042	0.049
% I.P.	0.010	0.009	0.005	0.014	0.021	0.013
% Leukosis	0.000	0.000	0.000	0.015	0.001	0.003
% Bruises	0.001	0.001	0.001	0.001	0.001	0.001
% Other	0.005	0.001	0.008	0.007	0.006	0.007
% Total	0.196	0.211	0.130	0.204	0.141	0.172
% ½ parts condemns	0.207	0.293	0.192	0.253	0.324	0.259

Data for week ending June 25th 2011

## Previous Month Charts

Broiler Performance Data Live Production Cost	Region					Average Company
	SW	Midwest	Southeast	Mid-Atlantic	S-Central	
Feed Cost/ton w/o color (\$)	328.16	308.89	339.16	339.83	339.4	335.47
Feed cost /lb meat (c)	30.31	28.08	30.44	32.12	32.10	30.89
Days to 4.6 lbs	41	40	40	39	40	40
Chick cost / lb (c)	5.04	4.91	5.22	4.56	5.13	5.08
Vac-Med cost/lb (c)	0.06	0.03	0.05	0.06	0.02	0.05
WB & ½ parts condemn. Cost/lb	0.18	0.16	0.15	0.25	0.21	0.21
% mortality	3.51	3.91	3.75	3.98	4.33	3.82
Sq.Ft. @ placement	0.77	0.80	0.83	0.88	0.82	0.82
Lbs/sq. ft.	7.81	7.52	7.05	7.77	7.71	7.46
Downtime (days)	14	11	15	19	13	15

Broiler Whole Bird Condemnation	Region					Average Company
	SW	Midwest	Southeast	Mid-Atlantic	S-Central	
% Septox	0.118	0.156	0.068	0.121	0.075	0.107
% Airsac	0.058	0.034	0.037	0.117	0.041	0.061
% I.P.	0.010	0.009	0.008	0.057	0.026	0.028
% Leukosis	0.000	0.001	0.001	0.013	0.001	0.004
% Bruises	0.001	0.001	0.001	0.002	0.002	0.001
% Other	0.007	0.002	0.011	0.008	0.008	0.009
% Total	0.195	0.203	0.125	0.317	0.152	0.211
% ½ parts condemns	0.219	0.202	0.210	0.247	0.345	0.262

Data for week ending May 20th 2011

# Meetings, Seminars and Conventions

**2011  
July**

**July 31-August 4, 2011. 45<sup>th</sup> Congress of the International Society for Applied Ethology.** Returning to the United States in 2011 for only the 3rd time in its 45-year history. Indianapolis, IN. For more info, please visit <http://www.ars.usda.gov/meetings/isac2011/>

**2011  
August**

**August 9-11, 2011. Professional Animal Auditor Poultry Certification Class (Poultry Welfare course).** To be held in a new location, Fayetteville, Arkansas, and will be hosted by the University of Arkansas. More info: <http://www.animalauditor.org/events/poultry%20training/index.html>

**August 14-18, 2011. XVII Congress & Exhibition of the World Veterinary Poultry Association** Cancun, Mexico. More info: [www.congressmexico.com](http://www.congressmexico.com)

**2011  
September**

**September 6-9, 2011. XXII Latin American Poultry Congress.** To be held at La Rural in Buenos Aires, Argentina. For more information, please visit <http://www.avicultura2011.com/en>

**September 7-9, 2011. 30th Poultry Science Symposium on Alternative Systems for Poultry – Health, Welfare and Productivity.** To be held at the University of Strathclyde, John Anderson Campus, Glasgow, UK. For more info, go to <http://www.wpsa-uk.com/newSite/meetings/30thPoultryScienceSymposium.html>

**September 18-22, 2011. IEC's Annual Marketing and Production Conference.** The International Egg Commis-

sion will hold this event in Washington D.C. this year. Further details to be announced.

**September 21-22, 2011. 2011 Northeastern Conference on Avian Diseases / Pennsylvania Poultry Sales and Service Meeting.** To be held in the Eden Resort/Hotel in Lancaster, PA. Now accepting titles for the Scientific Session (deadline Aug 1, 2011) - send to [pierson@vt.edu](mailto:pierson@vt.edu). Registration and additional materials will be available mid-summer.

**September 29-October 5, 2011. USAHA Annual Meeting.** The U.S. Animal Health Association will be holding this event in Buffalo Adam's Mark Hotel in Buffalo, NY. More info: <http://www.usaha.org/meetings/>

**2011  
October**

**October 10-14, 2011. 30th World Veterinary Congress 2011.** To be held at the Congress Safari, Cape Town, South Africa. For more information, please visit <http://www.worldvetcongress2011.com/>

**October 11-13, 2011. 46<sup>th</sup> National Meeting on Poultry Health and Processing.** To be held at the Clarion Resort Fountainbleau Hotel in Ocean City, MD. For program details and registration info, please contact Delmarva Poultry Industry, Inc. at 302-856-9037 or [dpi@dpichicken.com](mailto:dpi@dpichicken.com). Website: [www.dpichicken.org](http://www.dpichicken.org)

**October 31—November 4, 2011. 18th European Symposium on Poultry Nutrition.** Located in Çeşme - İzmir - Turkey and organized by the Turkish branch of the WPSA. Please visit <http://www.espn2011.org/> for more info.

**2012  
January**

**January 24-26, 2012. International Poultry/Feed Expo.** Located at the Georgia World Congress Center in Atlanta, GA. Please visit <http://www.ipe11.org/> for more info.



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.

## Reminder

All previous issues of the Poultry informed Professional are archived on our website [www.avian.uga.edu](http://www.avian.uga.edu) under the Online Documents and The Poultry Informed Professional links.

# Special Announcement

**Dr. John Glisson will be retiring from the Poultry Diagnostic and Research Center in September, 2011. For his many years of dedication and service, the Georgia Poultry Federation awarded him with a plaque to illustrate their appreciation.**

**Georgia Poultry Federation**

*To*

**John Glisson**

*with*

*Appreciation and Commendation*

*for*

*Outstanding Service*

*Best Wishes*

*on a well deserved retirement.*

*July 22, 2011*

