



# The Poultry Informed Professional

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## OSTEOPOROSIS, CAGE LAYER FATIGUE AND POOR SHELL QUALITY: PREVENTION RATHER THAN CURE

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Osteoporosis, cage layer fatigue and poor shell quality have a common cause, i.e., insufficient available calcium for the support of bone metabolism or egg shell deposition. Osteoporosis is a condition in which the structural components of bones become abnormally thin. Osteoporosis can result in excessive bone breakage when spent cage layer flocks are caught and processed. Hens with cage layer fatigue have trouble standing and typically crouch or lie at the back of the cage. Severely affected hens may die due to inability to reach food or water. The condition arises from bone weakness in high-producing hens leading to fractures of thoracic vertebrae. The fractures impair function of the lower spinal cord, causing leg paralysis. Poor shell quality occurs most commonly in older flocks and is caused primarily by insufficient shell material being deposited on eggs. Excessive shell weakness leads to

Broiler Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color (\$)	125.90	117.07	131.69	129.16	130.06
Feed cost/lb meat (¢)	11.87	10.91	12.17	12.66	12.08
Days to 4.6 lbs	45	43	43	44	43
Chick cost/lb (¢)	4.08	3.84	3.95	3.44	3.78
Vac-Med cost/lb (¢)	0.07	0.02	0.09	0.04	0.06
WB & 1/2 parts condemn. cost/lb	0.20	0.18	0.13	0.19	0.17
% mortality	4.73	4.42	3.89	4.59	4.27
Sq. Ft. @ placement	0.74	0.75	0.78	0.78	0.80
Lbs./Sq. Ft.	6.81	7.13	6.69	7.38	6.74
Down time (days)	13	12	13	14	14

Data for week ending 05/11/02

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loss of income due to egg cracks and breakage.

The skeleton functions as a calcium reserve into which a hen deposits dietary calcium for storage and from which it takes calcium for use in egg shell formation. During the first cycle of production, a high-producing hen puts over 25 times as much calcium into egg shell as it has in its skeleton at any one time. Since the skeleton has to be maintained, virtually all of the calcium required for egg formation must be obtained by means of daily feed intake.

Egg shell formation occurs mostly at night when hens are not eating. Therefore, calcium cannot simply be transferred from the intestines after being absorbed from food to the uterus to be laid down as egg shell. The hen uses a special type of bone called medullary bone to store calcium for several hours until it is time to form an egg shell (Etches, 1987). Medullary bone occupies empty spaces such as the marrow cavity in the long bones, pelvic girdle, and ribs of a mature hen. It adds little strength to the skeleton. Medullary bone does not occur in immature pullets or in males of any age but develops in pullets as they become sexually mature.

The hen appears to have a neat solution for the timely supply of calcium for egg shell formation. Problems arise, however, when too little calcium is obtained from the diet to support ongoing egg production. This can happen in various ways.

- The calcium content of the ration may not be increased soon enough when pullets begin egg production.
- A heat wave or sub-clinical disease may reduce feed consumption for a few days while egg laying continues, or subordinate hens in crowded, competitive cage environments may eat less than the flock average feed consumption.
- Older hens may have reduced ability to absorb dietary calcium that cannot be compensated by increased calcium percentage in the ration.
- A dietary deficiency of phosphorous can prevent adequate deposition of calcium into medullary bone.

Inadequate calcium supply creates a conflict between structural bone maintenance and egg shell formation. The result is largely a one-way street with calcium being transferred from structural bone to medullary bone from which it is subsequently released for egg shell formation. Osteoporosis develops.

Hens have little ability to reverse osteoporosis while they remain in lay (Whitehead and Wilson, 1992). Successive events of calcium deficiency add to the severity of osteoporosis and increase likelihood of fragile bones or cage layer fatigue. Given the limited amount of skeletal calcium relative to the daily calcium demand of an egg laying hen, it does not take much of a dietary calcium deficiency to exhaust the skeletal calcium which can be made available for shell formation. A hen obtaining too little calcium from dietary and skeletal sources will produce poor quality egg shells if she remains in production.

### Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.282	0.247	0.124	0.256	0.147
% Airsac	0.127	0.096	0.111	0.133	0.081
% I.P.	0.041	0.029	0.027	0.044	0.09
% Leukosis	0.002	0.001	0.002	0.010	0.002
% Bruise	0.006	0.003	0.007	0.007	0.007
% Other	0.024	0.004	0.009	0.006	0.012
% Total	0.480	0.379	0.280	0.456	0.345
% 1/2 parts condemnations	0.379	0.542	0.358	0.404	0.454

Data for week ending 05/11/02

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

	Average Co.	Top 25%
Feed cost/ton w/o color (\$)	128.58	122.00
Feed cost/lb meat (¢)	12.09	11.32
Days to 4.6 lbs	44	44
Chick cost/lb (¢)	3.91	3.54
Vac-Med cost/lb (¢)	0.06	0.05
WB & 1/2 parts condemn. cost/lb	0.18	0.13
% mortality	4.39	3.63
Sq. Ft. @ placement	0.78	0.74
Lbs./Sq. Ft.	0.77	0.74
Down time (days)	14	13

Data for week ending 05/11/02

Pullets must be prepared to handle the calcium demand associated with high egg output.

- Optimum skeletal frame size should be achieved before a pullet flock is brought into production because the amount of bone material determines the capacity of a hen to store and release calcium for shell formation. Since skeleton size is closely associated with body weight it is usually sufficient to weigh pullets during the growing period to determine how close they are to target body weights. Photostimulation should be delayed for a flock which is slow to achieve its final target body weight.
- Pullet flocks should be grown in the best environments possible to maximize flock uniformity. A non-uniform flock will have too many overweight or underweight pullets when brought into production. Overweight pullets may mature before calcium is increased in the ration. Underweight pullets will have undersized skeletons. Pullets in either weight extreme have increased risk of osteoporosis, cage layer fatigue or poor shell quality.
- The level of calcium in the ration should be increased as soon as sexual maturation begins because growth of medullary bone also begins at this time. Flock supervisors should be alert for the enlargement and reddening of the comb that indicates the start of sexual maturation. Some producers feed a prelay diet until a flock reaches five percent production. Prelay rations have enough calcium to support medullary bone development but not enough to support a high rate of egg production. It should be understood that this practice puts at risk the earliest producing birds in the flock.

Once in lay, a flock should be managed to avoid problems that could affect calcium metabolism. The program of feed formation, milling and delivery should provide for calcium and phosphorous requirements without fail. The thermal environment in the layer house should be uniform so that the nutritional needs of all hens can be targeted as accurately as possible. Biosecurity and proper disease management should be applied to minimize effects of illness on the nutritional status of birds.

In summary, commercial layers should be managed to prevent osteoporosis and poor shell quality because these problems do not lend themselves to correction once they occur.

*References:*

- Etches, R.J., 1987. Calcium logistics in the laying hen. *Journal of Nutrition* 117:619-628.  
Whitehead, C.C., and S. Wilson, 1992. Characteristics of osteopenia in hens. Chapter 14 in "Bone Biology and Skeletal Disorders in Poultry."  
Whitehead, C.C., (editor). Abingdon, Carfax Publ. Co. pp. 265-280

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

## READERS COMMENTS

*I have been using Fenbendazole - Panacur - Intervet (Hoeschst) as a poultry wormer for a while now with good results. My dosage rates are as follows:*

<i>Panacur (fenbedazole) 4% powder</i>	<i>2.5 kg per ton feed for one day.</i>
<i>Panacur BS (fenbendazole) 5% suspension</i>	<i>1 ml per 5 kg body weight</i>
<i>Given in the water to be consumed in one day.</i>	

*What I have found is a marked increase in resistance to Piperazine and have had to dose at the following rate:*

<i>Piperazine</i>	<i>No. of birds in the house X bird weight X 0.1 = grams of piperazine</i>
	<i>per day for two days.</i>

*Our problem worm here is Ascaridia galli. We only see it in breeders and then after +- 8 weeks. Severe infestations can cause production drops in broiler breeders and have a negative impact on weight gains in the rearing stage.*

*Dr. Mick Versfeld  
- Intervet, South Africa*

## 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.

## 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](http://www.healthypoultry.com)

### Broiler Whole Bird Condemnation (Company)

	Average Co.	Top 25%
% Septox	0.223	0.200
% Airsac	0.109	0.080
% I.P.	0.055	0.045
% Leukosis	0.004	0.003
% Bruise	0.007	0.008
% Other	0.010	0.003
% Total	0.409	0.339
% 1/2 parts condemnations	0.447	0.279

Data for week ending 05/11/02



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.

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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" Reports

than the average number of layers during April 2001. April egg production per 100 layers was 2,109 eggs, slightly higher than the 2,106 eggs in April 2001.

All layers in the U.S. on May 1, 2002, totaled 335 million, down 1 percent from a year ago. The 335 million layers consisted of 274 million layers producing table or commercial type eggs, 58.2 million layers producing broiler-type hatching eggs, and 2.71 million layers producing egg-type hatching eggs. Rate of lay per day on May 1, 2002, averaged 69.4 eggs per 100 layers, slightly higher than a year ago.

Laying flocks in the 30 major egg producing States produced 6.64 billion eggs during April 2002, down slightly from a year ago. The average number of layers during April, at 314 million, was down 1 percent from a year earlier.

## **Egg-Type Chicks Hatched Down 11 Percent**

Egg-type chicks hatched during April totaled 38.2 million, down 11 percent from April 2001. Eggs in incubators totaled 36.0 million on May 1, 2002, down 2 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 295,000 during April 2002, down 5 percent from April 2001.

## **Broiler Hatch Up 1 Percent**

The April 2002 hatch of broiler-type chicks, at 765 million, was up 1 percent from April of the previous year. There were 650 million eggs in incubators on May 1, 2002, up 1 percent from a year earlier.

Leading breeders placed 6.8 million broiler-type pullet chicks for future domestic hatchery supply flocks during April 2002, up 7 percent from April 2001.

## **Turkey Eggs in Incubators on May 1 Down 1 Percent**

Turkey eggs in incubators on May 1, 2002, in the United States totaled 32.2 million, down 1 percent from May 1 a year ago. Eggs in incubators were 2 percent below the April 1 total of 32.7 million. Regional changes from the previous year were: East North Central, up 5 percent; West North Central, up 5 percent; North and South Atlantic, down 9 percent; South Central, down 2 percent; and West, down 10 percent.

## **Poults Placed During April Up 1 Percent From Last Year**

The 26.0 million poults placed during April 2002 in the United States were up 1 percent from the number placed during the same month a year ago. Placements were also up 1 percent from the March 2002 total of 25.7 million. Regional changes from the previous year were: East North Central, up 5 percent; West North Central, up 9 percent; North and South Atlantic, down 3 percent; South Central, down 8 percent; and West, down 14 percent.

### **Broiler Production and Exports Higher in 2003**

According to the most recent Economic Research Service (ERS) reports, broiler production in 2003 is forecast at 33 billion pounds, 2.5 percent higher than expected in 2002. Bird numbers are expected to rise very modestly and average bird weights are projected to continue to rise by approximately 1 percent. Exports in 2003 are expected to total about 5.85 billion pounds, a 7.5- percent increase over 2002, as the forecast for 2003 assumes a return to normal trade patterns. Because of the unusually low exports in the first half of 2002 due to the Russian ban, most of the year-over-year increase in exports will come in the first two quarters of 2003. Wholesale broiler prices in 2003 are expected to be about 2-percent higher than in the current year.

The 2002 forecast for broiler exports was lowered from 6.1 billion pounds to 5.44 billion. There are two factors behind this reduction. First, the export figures were lowered to reflect the fact that broiler feet are no longer being included in the export estimate (see following section). In 2001, exports of broiler feet amounted to 623 million pounds. Second, a further reduction was taken to reflect lower shipments to Russia. While the ban on shipments is officially over, a number of problems have prevented shipments from approaching their earlier levels.

### **Broiler Supply and Utilization Adjusted for Paw Exports**

The U.S. broiler supply and utilization table has been adjusted to reflect the exclusion of broiler feet from the export estimates back to 1997. Because broiler feet are not included in the estimates of Federally inspected broiler production, the inclusion of broiler feet in export estimates resulted in lower estimates of the amount of broiler meat consumed domestically. The exports of broiler feet will still be included in estimates of the total quantity and value of poultry exports, but they will not be included in the domestic supply and utilization estimates. The revised figures from 1997 to 2001 for broiler exports and domestic consumption are included in the accompanying quarterly supply and utilization table. Domestic per capita broiler consumption in 2001 is now estimated at 76.5 pounds on a retail-weight basis, about the same as before the export and population changes.

### **Turkey Production and Consumption Little Changed in 2003**

Turkey production in 2003 is forecast at nearly 5.7 billion pounds, only about 1 percent higher than the estimate for 2002. Turkey exports are forecast to increase to 490 million pounds, with some increase in shipments to Russia and higher exports to Mexico. The increase in production just about matches the growth in population, leaving per capita consumption at 17.4 pounds the same as in 2002. Wholesale turkey prices are forecast to remain close to their 2002 levels.

# Meetings, Seminars and Conventions

## 2002 June

**June 6-8: VIV Poultry Yutav 2002**, Tuyap Fair Convention and Congress Centre, Istanbul, Turkey. Contact: Jaarbeurs Exhibitions & Media. Phone +31 30 295 56 62; Fax: +31 30 295 57 09; E-mail: vivyutav@jaarbeursutrecht.nl. Website: www.viv.net

**June 6-9: GVMA Convention**, Hilton Head Marriott Beach & Golf Resort, Hilton Head, South Carolina. Phone: 678-309-9800. <http://www.gvma.org>

**June 7: Alabama Poultry & Egg Association's Annual Golf Tournament**, Bent Brook Country Club, Birmingham, AL. Contact: Wanda Linker, P.O. Box 240, Montgomery, AL 36101-0240. Phone: 334-265-2732; Fax: 334-265-0008.

**June 7-8: Poultry Festival**, Arlington Hotel, Hot Springs, Arkansas. Contact: Judy Kimbrell, Arkansas Poultry Federation, P.O. Box 1446, Little Rock, AR 72203. Phone: 501-375-8131; Fax: 501-375-5519

**June 8: Alabama Poultry & Egg Association's "Evening of Fun"**, Birmingham-Jefferson Convention Center, Birmingham, AL. Contact: Wanda Linker, P.O. Box 240, Montgomery, AL 36101-0240. Phone: 334-265-2732; Fax: 334-265-0008.

**June 13-16: National Chicken Council's Summer Board of Directors Meeting**, The Westin Resort, Hilton Head Island, SC. National Chicken Council, 1015 15th St. N.W., Ste. 930, Washington, D.C. 20005-2605. Phone: 202-296-2622.

**June 17-20: Feed Ingredient Institute**, Holiday Inn O'Hare, Rosemont, IL. Amer. Feed Ind. Assoc., 1501 Wilson Blvd. Ste. 1100, Arlington, VA 22209. Phone: 703-524-0810; Fax: 703-524-1921; Email: [alfia@afia.org](mailto:alfia@afia.org)

**June 18-19: National Turkey Federation's Leadership Conference**, Washington D.C. Contact: NTF, St. 400, 1225 New York Ave. NW, Washington, D.C. 20005. Phone: 202-898-0100; Fax: 202-898-0203.

**June 21-22: Delmarva Chicken Festival**, Seaford, Delaware. Contact: Connie Parvis, Delvarva Poultry Industry, Inc. Phone: 800-878-2449 or Email: [dpi@dpichicken.com](mailto:dpi@dpichicken.com).

## 2002 July

**July 16-17: Hatchery-Breeder Clinic**, Sheraton Birmingham Hotel, Birmingham, AL. Contact: U.S. Poultry & Egg Assoc., 1530 Cooleedge Road, Tucker, GA 30084-7303. Phone: 770-493-9401; Fax: 770-493-9257. Email: [seminar@poultryegg.org](mailto:seminar@poultryegg.org)

**July 17: Wilson Egg Producers Annual Golf Outing**, Contact: Scott Hartwig, N9416 Tamarack Road, Whitewater, WI 53190. Phone: 262-495-6220; Fax: 262-495-6224 or Email: [scottth@sreggfarm.com](mailto:scottth@sreggfarm.com)

**July 17-20: Carolina Feed Industry Association's 2002 Summit Convention**, Kingston Plantation, Myrtle Beach, SC. Contact: Owen Robertson, 2116 N. Shoreline Dr., Sanford, NC 27330. Phone: 919-776-3054

## 2002 August

**Aug 2-3: Tennessee Egg & Poultry Association's Joint Annual Meeting and Fund Raiser**, Hilton Suites Nashville, (downtown Nashville), TN. Contact: TN Egg & Poultry Assoc., 926 Scepter Dr., Murfreesboro, TN 37129. Phone: 615-890-1272; Fax: 615-890-1272

**Aug 11: Poultry Science Assoc. 2002**, University of Delaware, Newark, DE. Contact PSA, 1111 N. Dunlap Ave., Savoy, IL 61874. Phone: 217-356-3182; Fax: 217-398-4119.

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

**Aug 26-Feb. 23, 2003: International Course on Poultry Husbandry**, IPC Livestock Barneveld College, Barneveld, The Netherlands. Contact: IPC Plant. Dier, Phone: +31 342 414881; Fax: +31 342 492813; Email: [barneveld@ipc-training.nl](mailto:barneveld@ipc-training.nl)

## 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](mailto:Bremen@cpb.de).

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

**Sept. 11: Alabama Processors Workshop**, Alabama Poultry & Egg Assoc., Birmingham Marriot, Birmingham, AL. Contact: Wanda Linker, P.O. Box 240, Montgomery, AL 36101-0240. Phone: 334-265-2732; Fax: 334-265-0008.

**Sept. 15: 9th Annual PEPA Western Hoedown**, Double T Ranch, Stevinson, CA. Pacific Egg & Poultry Assoc., Debbie Murdock, 1521 "I" St., Sacramento, CA 95814. Phone: 916-441-0801; Fax: 916-446-1063.

**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](mailto: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](mailto:viv.feed@jaarbeursutrecht.nl)

**Sept. 27-28: Louisiana Poultry Federation's 45th Annual Convention**, Sheraton Shreveport Hotel, Contact: LA Poultry Federation, 224 Knapp Hall LSU, P.O. Box 25100, Baton Route, LA 70894-5100. Phone: 225-578-6702; Fax: 225-578-4857.

## 2002 October

**Oct. 1-2: Alabama Broiler Workshop**, Alabama Poultry & Egg Assoc., Auburn University Hotel & Dixon Conference Center, Auburn University, AL. Contact: Wanda Linker, P.O. Box 240, Montgomery, AL 36101-0240. Phone: 334-265-2732; Fax: 334-265-0008.

**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](mailto: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**, Limassol, Cyprus. 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](mailto:mareks-airg@targetconf.com)

**Oct. 8: Delmarva Poultry Industry, Inc.**, Annual Membership Meeting, Delmar, Maryland. Contact: Lori Morrow. Phone 302-856-9037.

**Oct. 8-10: Poultry Service Industry Workshop**, The Banff Centre, Banff, Alberta, Canada. Contact: Karen Mann, Safe Food Assurance Systems Branch, 3rd Floor, O.S. Longman Building, 6909-116 St., Edmonton, Alberta, T6H 4P2, Canada. Packages ready in July 2002. Phone: 780-427-6629; Fax: 780-427-1437. Email: [karen.mann@gov.ab.ca](mailto:karen.mann@gov.ab.ca)

**Oct. 9-11: National Meeting on Poultry Health & Processing**, Clarion Resort 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.

**Oct. 16-20: National Chicken Council's 48th Annual Conference & Fall Board of Directors Meeting**, JW Marriott Hotel, Washington, D.C. National Chicken Council, 1015 15th St. NW, Ste. 930, Washington, D.C. 20005-2605. Phone: 202-296-2622.