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Issue 59 March 2002

The Poultry Informed Professional

1785

Published by the Department of Avian Medicine, University of Georgia
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Management for Control of Ovarian Development in Broiler Breeders

The following article by F.E. Robinson, Professor of Poultry Science, University of Alberta, Edmonton, Alberta, Canada, appeared in the January 1999 issue of ROSSTECH, Ross Breeders technical information bulletin for the Broiler Industry.

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Broiler Performance Data (Region)
Live Production Cost

	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color ($)	127.22	118.22	131.90	131.49	131.37
Feed cost/lb meat (¢)	11.93	11.07	12.26	12.93	12.16
Days to 4.6 lbs	44	44	43	44	43
Chick cost/lb (¢)	3.98	3.85	4.01	3.56	3.92
Vac-Med cost/lb (¢)	0.06	0.02	0.09	0.04	0.06
WB & 1/2 parts condemn. cost/lb	0.23	0.19	0.20	0.21	0.18
% mortality	5.03	4.90	4.33	4.90	4.31
Sq. Ft. @ placement	0.75	0.75	0.79	0.78	0.80
Lbs./Sq. Ft.	6.71	7.04	6.71	7.29	6.72
Down time (days)	14	12	15	19	15

Data for week ending 02/09/02

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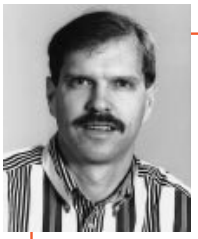

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F.E. Robinson received a B.Sc. from the University of Saskatchewan, a M.Sc. from Virginia Tech and a Ph.D. from the University of Guelph. Since 1986,he and his collaborators have been studying reproductive efficiency of broiler breeders at the University of Alberta. His research encompasses both basic and applied studies aimed at fine-tuning feed allocation and light management, particularly in the time period from photostimulation to peak egg production.

INTRODUCTION

Current broiler breeders must pass on the genetics of efficient growth to their offspring, but just as important, they must produce high numbers of offspring. These two objectives of a breeder hen program can be translated to mean "carry the genes for growth rate and feed efficiency, but *also* reproduce like an egg-type hen". Fulfilling these objectives is, in a sense, management of specific components of the female reproductive process, and the critical point appears to be ovarian form and function. Pullets have a finite number of ovarian follicles. This number, thought to be in the thousands, is established well before a chick hatches. At this time, the follicle pool is held in a suspended state until just prior to sexual maturity. After that point, a hen can run into serious problems with egg production efficiency and mortality if she has too many follicles or too few. *The "ideal" number of large follicles a hen needs for maximizing her genetic potential for egg production varies between strains*. Definition of the exact number is the subject of ongoing research.

This bulletin covers the basic principles of how egg production occurs in broiler breeders, with an emphasis on the establishment and maintenance of the optimal follicular structure. A glossary of key terms is included at the end.

THE REPRODUCTIVE SYSTEM

The obvious components of the reproductive system are the ovary and oviduct, while less obvious organs include the brain, liver and skeletal system (see Figure 1). The finely tuned reproductive system needs each of these organs to work as part of a team in the production of hatching eggs. This "team effort" or communication between organs is essential to avoid problems that can occur when environmental factors (particularly lighting) influence the relationship. *Management of ovarian form and function directly influences reproductive efficiency and the incidence of pathological conditions in broiler breeder hens*.

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.341	0.296	0.216	0.310	0.189
% Airsac	0.126	0.087	0.242	0.134	0.077
% I.P.	0.053	0.030	0.060	0.048	0.105
% Leukosis	0.005	0.004	0.002	0.011	0.006
% Bruise	0.011	0.005	0.011	0.009	0.011
% Other	0.037	0.004	0.021	0.006	0.014
% Total	0.573	0.425	0.552	0.518	0.401
% 1/2 parts condemnations	0.440	0.609	0.361	0.441	0.417

Data for week ending 02/09/02

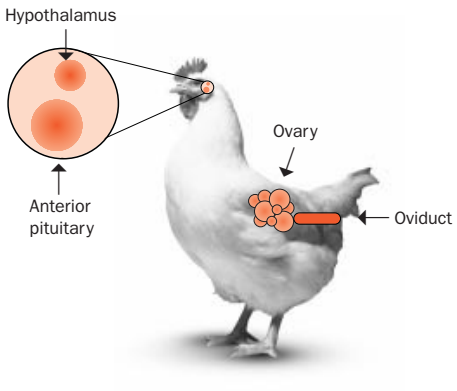
Broiler Performance Data (Company) Live Production Cost

	Average Co.	Top 25%
Feed cost/ton w/o color ($)	129.97	122.35
Feed cost/lb meat (¢)	12.20	11.36
Days to 4.6 lbs	44	44
Chick cost/lb (¢)	3.98	3.41
Vac-Med cost/lb (¢)	0.06	0.03
WB & 1/2 parts condemn. cost/lb	0.20	0.11
% mortality	4.55	2.77
Sq. Ft. @ placement	0.77	0.74
Lbs./Sq. Ft.	6.80	7.05
Down time (days)	15	17

Data for week ending 02/09/02

The head contains two critical components of reproductive anatomy. First, the **hypothalamus**, a tiny organ within the brain, acts as the "main switch" for many reproductive processes. This organ is directly stimulated by light energy at photostimulation. Day length perception takes place due to light energy passing through the skull, and stimulating the

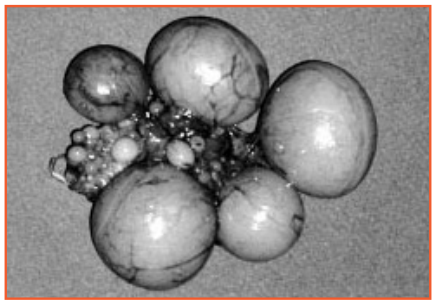
Figure 1 - Reproductive Anatomy



hypothalamus. Then the "mature" (reproductively functional) hypothalamus secretes a specific hormone that travels a short distance in the skull to the **anterior pituitary** (adenohypophysis), the second component of the reproductive system in the brain. The anterior pituitary produces and releases hormones known as Luteinizing hormone [LH] and Follicle Stimulating hormone [FSH] that travel to target tissues in the ovary. These hormones (gonadotrophins) stimulate steroid hormone release from specialized cells in the **ovary**.

The ovary of an immature pullet has only small undifferientiated follicles that are not visible to the naked eye. However, at puberty, these follicles increase in size to form an array of small follicles (known as the ovarian **stroma**) as well as a hierarchy of large follicles that vary in size (Figure 2). The small follicles produce estrogen after hypothalamic maturation takes place. The large yellow follicles are usually defined as being greater than 1 cm diameter (0.4 inch). The number of these follicles varies with strain, lighting program, nutrient intake and breeder age. Progesterone is released from the largest follicle (or the two largest follicles in cases of double-yolked eggs). Release of progesterone will trigger the ovulation process. Follicles are said to be "mature" when they are capable of producing progesterone only a few hours prior to ovulation.

Figure 2 - The ovary with small and large follicles



The **liver** is a key organ in egg production, as it produces lipoproteins that contribute to egg yolk. This yolk synthesis takes place due to messages sent by estrogen. In some instances, the liver becomes so good at producing and storing lipids that it becomes very pale and fatty. Such livers are prone to damage and subsequent hemmorrhage (fatty liver hemmorrhaging syndrome).

The **skeletal** system is intimately involved in calcium storage for egg shell production. Calcium mobilization and storage is also under the influence of estrogen hormones. Proper buildup of calcium stores is essential to the maintenance of bone integrity and acceptable shell quality.

The hormones mentioned above interact to result in egg production and are summarized in Figure 3 and Table 1.

Figure 3 - Schematic representation of hormone interactions

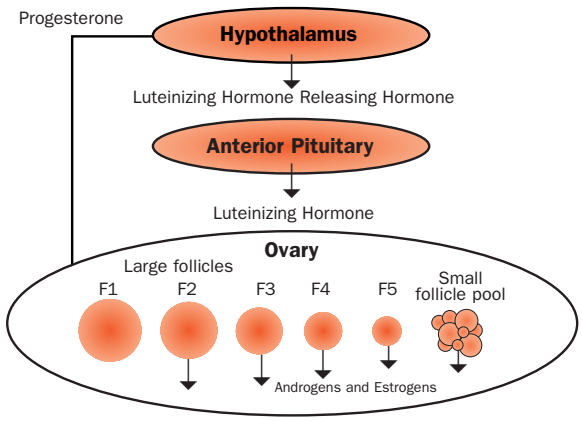


Table 1. Hormone production and function.

Organ	Hormone	Target Organ	Function
Hypothalamus	Luteinizing Hormone Releasing Hormone (LH-RH)	Anterior Pituitary	Stimulates gonadotrophin (LH and FSH) hormone production.
Anterior Pituitary	Luteinizing Hormone (LH)	Ovary	Stimulates ovarian hormone production
	Follicle Stimulating Hormone (FSH)	Ovary	May stimulate early follicle development
Immature Ovarian Follicles	Estrogen	Liver Oviduct Skeletal system Comb Plumage Pubic symphysis	Stimulates lipogenesis Stimulates oviduct growth Promotes development of medullary bone Causes growth and reddening May initiate a "pre-nuptial" molt Relaxes pelvis for egg passage
Mature (F1) Ovarian Follicle	Progesterone	Hypothalamus	Feeds back positively on hypothalamus to initiate ovulation

THE OVULATORY CYCLE

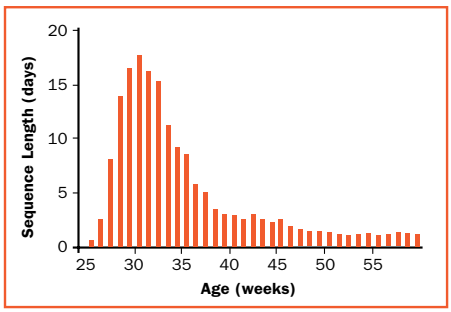
Yolk is deposited into follicles as they proceed through the hierarchy to become mature (F1 position). Two requirements must be met for this follicle to ovulate, or leave the ovary to travel through the oviduct. First, the follicle must signal the hypothalamus that it is mature through the release of progesterone. Second, the hypothalamus must receive the signal from the mature follicle at a specific time of the day. There is only a 6 to 8 hour period of the day in which the hypothalamus responds to a progesterone signal. This period is known as the "open period for LH release".

The laying of an egg is known as oviposition. Ovipositions occur in sequences. Sequences are consecutive days of laying that are separated by a "pause" of 40 to 44 (or more) hours duration. Follicular maturation typically takes longer than 24 hours, and so the ovulatory cycle is set back slightly each day. This affects the time of egg laying as shown in Table 2. Hens that have slow rates of follicular maturation (26-28 hours) lay short (2 -3 day) sequences. On the other hand, hens that lay very long sequences typically have maturation rates of 24 hours, or sometimes less. Sequence length changes through the egg production year. The longest sequences are seen at the time of peak production at about 30 to 35 weeks of age (Figure 4). All hens lay one characteristically long sequence of eggs. This sequence is known as the "**prime sequence**" and in broiler breeders is usually about 20 eggs in length.

Table 2 - Times of oviposition for individual hens laying 2 to 7 egg sequences.

Sequence Length	Time of Oviposition						
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
2 eggs	9:28	13:30					
3 eggs	8:08	11:26	14:40				
4 eggs	8:20	9:45	13:45	15:37			
5 eggs	7:56	9:03	10:45	13:11	15:05		
6 eggs	7:20	7:59	9:04	10:11	12:56	15:40	
7 eggs	7:47	8:15	9:20	9:40	11:36	13:09	15:24

Figure 4. Typical weekly sequence length for a flock of feed restricted broiler breeders.



EFFECTS OF FEED ALLOCATIONS

The primary mechanism in which feed restriction benefits reproductive efficiency in broiler breeder females is the control of follicle development. It is very clear that overweight breeder pullets have excessive follicle

development, and that this increased development can be detrimental to achieving high egg production (Table 3). Examples of ovarian morphology from feed restricted and full-fed broiler breeders are shown in Figure 5. *When hens have too many large follicles, a problem known as Erratic Oviposition and Defective Egg Syndrome (EODES) is seen.* This condition is accompanied by a high incidence of: double-yolked eggs (more than one functional F1 follicle) which can cause a prolapse of the oviduct; the laying of more than one egg per day (with or without good quality shells); abdominal laying that often results in "egg yolk peritonitis"; and the laying out of the normal laying time of the day (erratic oviposition). Poor fertility is thought to arise from birds being too big to breed effectively, sperm transport problems in the oviduct, and a reduced duration of fertility. Embryo viability may be reduced as a consequence of more first of sequence eggs with lesser embryo viability and shell quality (leads to excessive egg weight loss).

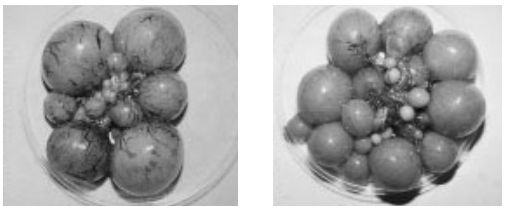
To illustrate the effects of full-feeding broiler breeders during rearing, and or during the breeding period, see Table 3. Results of this trial show that over feeding breeders had a major impact on egg production and the incidence of erratic laying. This can also lead to hen mortality from reproductive problems. Furthermore, the increased number of defective eggs (shell quality problems and double yolks) indicates that control of follicular recruitment is very important.

Table 3. Effects of feed allocation during rearing and lay on body weight and reproductive efficiency indicators in broiler breeders[1]

Parameter	Feed Allocation Treatment			
	RR Rearing: Restricted Breeding: Restricted	RF Rearing: Restricted Breeding: Full-Fed	FR Rearing: Full-Fed Breeding: Restricted	FF Rearing: Full-Fed Breeding: Full-Fed
Body weight at SM[1] (kg)	2.65^{d3} (5.84 lb)	3.58^{c} (7.89lb)	4.46^{b} (9.83lb)	4.65^{a} (10.25lb)
Age at SM[2] (days)	24.9^{a}	24.6^{a}	22.5^{b}	22.4^{b}
Large follicles at SM	7.8^{b}	10.7^{a}	11.1^{a}	12.2^{a}
Total eggs to 64 wk	177^{a}	133^{b}	163^{a}	122^{b}
Double yolk eggs (wk 19-29)	2.3^{b}	12.6^{a}	13.5^{a}	18.1^{a}
Defective shell eggs (wk 19-29)	4.5^{c}	20.0^{b}	22.7^{b}	32.6^{a}
Incidence of erratic lay (%, wk 19-29)	13.3^{c}	24.5^{b}	28.7^{b}	40.8^{a}
Fertility (%, wk 31-57)	91.9^{a}	82.0^{b}	82.3^{b}	78.0^{b}
Hatchability (%, wk 31-57)	86.4^{a}	68.5^{bc}	75.4^{b}	65.0^{c}

[1] Source: Yu *et al.*, 1992a,b.
[2] Sexual Maturity
[3] Means in a row with different superscripts are statistically significant ($P \leq 0.05$).

Figure 5 Ovarian morphology of feed restricted and full-fed broiler breeder hens.



Ovary of a feed restricted hen

Ovary of a full-fed hen

In moderately overweight hens, egg production can still be reduced, although it appears that the rate of feed increases coming into lay can also impact follicle development. In a recent study, a faster than normal feed allocation was tested with a slower increase in feed allocation. It was observed that the fast fed hens reached sexual maturity at the same age and body weight as did the slow fed hens. However, the slow fed hens reached sexual maturity with 1 less large follicle than the fast-fed hens did (7.9 versus 8.9). The slow fed hens also laid 11 more eggs than the fast fed hens did (189 versus 200 eggs to 64 weeks of age). *These data demonstrated the benefits of a more gradual aproach to allocating feed increases to breeders coming into lay.*

FLOCK UNIFORMITY

Obtaining estimates of flock uniformity in body weights is a key component of a breeder management program. However, it is not the uniformity in body weight that makes the difference, as much as it is the uniformity in "body condition" or "reproductive maturation". We measure body weight uniformity because it is relatively easy to measure, and because body weight is related to both body condition and reproductive maturation. Why is so much emphasis placed on flock uniformity? There are very good reasons to place emphasis on uniformity of body weight. Smaller pullets will have lower maintenance requirements than do larger pullets. If there is a great deal of variability in body weight, and all birds have equal opportunity to eat, the small birds will over-consume feed relative to their requirements for maintenance, growth and egg production. In the long-term, this overconsumption may harm these birds in terms of egg production rate and livability. The data shown in Table 4 are from five groups of broiler breeders varying in 20-week body weight.

Table 4. Influence of 20-week body weight on reproductive efficiency and calculated maintenance requirements in broiler breeders[1].

Parameter	20-Week Body Weight Group (% of Target Body Weight)				
	96%	98%	100%	102%	105%
Body weight at 20 wk (kg)	2.02^{e2} (4.85lb)	2.07^{d} (4.56lb)	2.11^{c} (4.65lb)	2.15^{b} (4.73lb)	2.22^{a} (4.89lb)
Number of eggs to 58 wk	170.5	174.6	175.5	175.0	180.0
Number of settable eggs to 58 wk	145.5	155.5	156.1	163.7	166.4
Fertility (%, wk 28-58)	79.9^{b}	82.7^{ab}	83.0^{ab}	82.9^{ab}	83.7^{a}
Hatchability (%, wk 28-58)	71.2	72.1	76.9	75.5	79.1
Hatchability of fertile eggs (%, wk 28-58)	88.5	87.2	92.1	90.5	94.2
Number of chicks per hen to 58 wk	94.5^{d}	103.2^{c}	117.6^{ab}	110.8^{bc}	120.0^{a}
Maintenance requirements at 20 wk (kcal)	145.5^{e}	148.8^{d}	152.1^{c}	155.0^{b}	159.8^{a}

[1] Source: Robinson *et al.*, 1995.
[2] Means in a row with different superscripts are statistically significant ($P \leq 0.05$).

There is also good evidence to place emphasis on uniformity of reproductive condition. *The most critical time for having flocks highly uniform in reproductive condition is at the time of photostimulation*. Data collected from a study in which pullets were photostimulated at 17, 18.5, 20, 21.5 or 23 weeks is presented in Table 5. This trial shows that the uniformity in age at first egg and body weight at first egg is greater, lower coefficients of variation (CVs), when birds are delayed in lighting. Evidently, when lighting is delayed more birds in the flock are adequately "reproductively mature" to respond to photostimulation. With early lighting, non-uniform flocks will have a very staggered entry into lay. This leads to further complications. While all birds will receive the same feed allocation, birds that are laying will have higher nutrient requirements (for egg formation) than non-laying birds. Non-laying birds will over consume relative to their requirements and begin to lay with excessive weight and body fat. Therefore, *high standards of flock uniformity are essential to achieving high rates of egg production*.

Table 5. The effects of varying age at photostimulation on reproductive development rate, and flock uniformity in age and body weight at sexual maturity[1].

Parameter	Age at Photostimulation				
	17wk	18.5w	20wk	21.5wk	23wk
Days from lighting to first egg	50.6^{a2}	42.3^{b}	34.2^{c}	27.9^{d}	24.2^{d}
Total egg production to 58 wk	160.6	155.2	162.8	162.0	158.0
C.V. body weight at first egg	9.6	7.9	7.7	7.1	5.8
C.V. age at first egg	6.4	4.3	3.9	3.1	2.6

[1] Source: Robinson *et al.*, 1996.
[2] Means in a row with different superscripts are statistically significant ($P \leq 0.05$) .

STRAIN VARIATION

There is not a single "ideal" program for managing follicular development in all strains of broiler breeders. Ongoing research has clearly shown that strains differ in set points for follicle number at sexual maturity, peak rate of lay and persistency of lay. Some strains are thought to respond better than others to early lighting. Some strains are more resistant to the effects of over-feeding than others. Some strains may be better suited to different lighting systems than others. Therefore, it is extremely important to follow the recommended body weight targets provided by the supplier of parent stock.

SUMMARY AND APPLICATIONS

- ✔ Avoid photostimulating underweight pullets too early
- ✔ Avoid sudden large increases in feed allocation during sexual maturation
- ✔ Avoid photo-effects that may be perceived as anti-reproduction by the bird (shortening days)
- ✔ Strive for high flock uniformity in reproductive condition (and body weight)
- ✔ Follow body weight and lighting recommendations for each breeder strain

GLOSSARY OF TERMS USED

Follicle — A potential egg yolk in a small or growing state on the ovary. Ideally large yolky follicles (greater than 1 cm) are arranged in a hierarchy of increasing size.

Hypothalamus — A tiny master switch in the brain controlling many body processes including reproduction.

Open Period for LH Release — A period of 6-8 hours in which LH can be released. Is thought to mirror the 6-8 hour period of normal egg laying.

Ovary — The single (left side) female oocyte producing organ which releases yolks into the oviduct.

Oviduct — The single (left side) tubular organ which receives egg yolks. The site of fertilization and deposition of albumen, shell membranes and shell.

Oviposition — The process of an egg exiting the oviduct (laying).

Ovulation — The process of a follicle being released from the ovary into the oviduct.

Ovulatory Cycle — A 24-28 hour cycle characterized by pre-ovulatory hormone production from the mature F1 follicle, ovulation, oviductal deposition of albumen, shell membranes and shell, followed by oviposition.

Prime Sequence — The longest sequence that a hen exhibits. This sequence typically is seen at the time of peak egg production.

Sequence — A period of successive days of egg laying, separated by a pause (non-laying) day. Eggs within a sequence are normally laid later each day.

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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

Broiler Eggs Set In 15 Selected States Up 2 Percent

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 15-State weekly program set 187 million eggs in incubators during the week ending February 23, 2002. This was up 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 Up 5 Percent

Broiler growers in the 15-State weekly program placed 150 million chicks for meat production during the week ending February 23, 2002. Placements were up 5 percent from the comparable week in 2001. Cumulative placements from December 30, 2001 through February 23, 2002 were 1.19 billion, up 4 percent from 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 Oklahoma. Data collection and weekly estimates began with the week ending April 7, 2001.

Commercial hatcheries for the 19 States set a total of 210 million eggs in incubators during the week ending February 23, 2002. Broiler growers in the 19 States placed 171 million chicks for meat production during the week ending February 23, 2002. Cumulative placements from December 30, 2001 through February 23, 2002 in the 19 States totaled 1.34 billion.

January Egg Production Up 2 Percent

U.S. egg production totaled 7.25 billion during January 2002, up 2 percent from last year. Production included 6.16 billion table eggs and 1.09 billion hatching eggs, of which 1.03 billion were broiler-type and 63.0 million were egg-type. The total number of layers during January 2002 averaged 338 million, up 1 percent from the total average number of layers during January 2001. January egg production per 100 layers was 2,143 eggs, up one percent from the 2,128 eggs in January 2001.

All layers in the U.S. on February 1, 2002, totaled 338 million, up 1 percent from a year ago. The 338 million layers consisted of 278 million layers producing table or commercial type eggs, 57.2 million layers producing broiler-type hatching eggs, and 2.64 million layers producing egg-type hatching eggs. Rate of lay per day on February 1, 2002, averaged 68.4 eggs per 100 layers, down 1 percent from the 69.2 eggs a year ago.

Laying flocks in the 30 major egg producing States produced 6.80 billion eggs during January 2002, up 2 percent from a year ago. The average number of layers during January, at 317 million, was up 2 percent from a year earlier.

Egg-Type Chicks Hatched Down 6 Percent

Egg-type chicks hatched during January totaled 35.5 million, down 6 percent from January 2001. Eggs in incubators totaled 32.0 million on February 1, 2002, down 9 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 228,000 during January 2002, down 10 percent from January 2001.

Broiler Hatch Up 6 Percent

The January 2002 hatch of broiler-type chicks, at 776 million, was up 6 percent from January of the previous year. There were 638 million eggs in incubators on February 1, 2002, up 4 percent from a year earlier.

Leading breeders placed 6.66 million broiler-type pullet chicks for future domestic hatchery supply flocks during January 2002, down slightly from January 2001.

Turkey Eggs in Incubators on February 1 Up Slightly From Last Year

Turkey eggs in incubators on February 1, 2002, in the United States totaled 32.1 million, up slightly from February 1 a year ago. Eggs in incubators were marginally lower than the January 1 total of 32.1 million. Regional changes from the previous year were: East North Central, unchanged; West North Central, up 4 percent; North and South Atlantic, up 1 percent; South Central, up 5 percent; and West, down 16 percent.

Poults Placed During January Up 2 Percent From Last Year

The 26.1 million poults placed during January 2002 in the United States were up 2 percent from the number placed during the same month a year ago. Placements were up 6 percent from the December 2001 total of 24.6 million. Regional changes from the previous year were: East North Central, up 8 percent; West North Central, up 3 percent; North and South Atlantic, up 6 percent; South Central, up 10 percent; and West, down 34 percent.

Broiler Exports Expected Higher

According to the most recent Economic Research Service (ERS) reports, broiler exports in 2002 are expected to total about 6.35 billion pounds, up 3 percent from a year ago. The slowing world economy and the continuing strength of the dollar are expected to substantially moderate the growth in broiler exports. Stronger than expected exports in fourth-quarter 2001 likely pushed exports for the year to 6.18 billion pounds, up 15 percent from 2000. The Bureau of the Census will release December 2001 trade data on February 21.

Expanding shipments to Russia were the largest factor in 2001, although part of the increase in direct shipments to Russia was due to falling transshipments through both Latvia and Estonia. Direct shipments to Russia likely totaled about 2.4 billion pounds in 2001 and accounted for over one-third of all broiler exports. Other countries showing considerable growth were Korea, Mexico, and a number of Central American and Caribbean countries.

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	0.270	0.244
% Airsac	0.127	0.053
% I.P.	0.066	0.031
% Leukosis	0.066	0.003
% Bruise	0.010	0.009
% Other	0.013	0.004
% Total	0.494	0.353
% 1/2 parts condemnations	0.438	0.176

Data for week ending 02/09/02

Bayer

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

Meetings, Seminars and Conventions

2002 March

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., Fresco, 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 8-9: ***Broiler Health Management School,*** Ohio State University, Columbus, Ohio. Contact: Dr. Teresa Morishita, Department of Veterinary Preventive Medicine, Ohio State University, 1900 Coffey Road, Columbus, Ohio 43210. Phone: 614-292-9453.

May 8-9: ***Poultry Processors Workshop,*** Sheraton Colony Square Hotel, Atlanta, GA. Contact: U.S. Poultry & Egg Association, 1530 Cooledge Road, Tucker,GA 30084-7303. Phone: 770-493-9401

May 18: ***GPF Night of Knights,*** Cobb Galleria, Atlanta, Ga. Contact: Georgia Poultry Federation, P.O. Box 763, Gainsville, 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 6-9: ***GVMA Convention,*** Hilton Head Marriott Beach & Golf Resort, Hilton Head, South Carolina. Phone: 678-309-9800.

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

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 Lantina,*** 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

Meetings, Seminars and Conventions

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 posted on the web site of the American Association of Avian Pathologists. Website: http://www.avian.uga.edu/~wvpa/