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## MANAGEMENT TECHNIQUES TO IMPROVE MALE MATING ACTIVITY AND COMPENSATE FOR THE AGE-RELATED DECLINE IN BROILER BREEDER FERTILITY: INTRA-SPIKING

Pelayo Casanovas is a member of the Cobb-Vantress, Inc., technical service team. This article appeared in the Cobb-Vantress Technical News, Volume 7, Number 1, Summer 2000.

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Broiler Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color (\$)	127.76	117.59	131.00	130.36	129.22
Feed cost/lb meat (¢)	11.94	11.94	12.19	12.79	12.13
Days to 4.6 lbs	45	44	43	44	43
Chick cost/lb (¢)	3.96	3.92	4.05	3.47	3.80
Vac-Med cost/lb (¢)	0.06	0.02	0.07	0.04	0.05
WB & 1/2 parts condemn. cost/lb	0.18	0.18	0.13	0.17	0.18
% mortality	4.28	5.12	3.67	4.68	3.66
Sq. Ft. @ placement	0.80	0.79	0.81	0.82	0.83
Lbs./Sq. Ft.	6.17	6.64	6.46	7.02	6.56
Down time (days)	11	11	12	14	13

Data for week ending 06/15/02

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## Introduction

This review discusses some issues about the age-related decline in fertility of broiler breeder males and a new management technique called Intra-Spiking. This technique had its origins in several behavioral studies at the University of Georgia (UGA).

An Intra-Spiking program has been developed and experimentally applied for the first time at the Cobb-Vantress grandparent facilities in Arkansas.

### 1. The age-related decline in broiler breeder male fertility

Excellent levels of fertility (above 95%) can be achieved at the beginning of the reproductive period of breeder flocks (30-40 weeks of age), but fertility rapidly declines after 40-45 weeks of age (poor persistence). Beyond 65-70 weeks of age the fertility values are too low from an economical standpoint and the flock is usually sold.

The relatively poor reproductive performance of broiler breeders is normally related to their genetic progress for other productive traits. Besides the strictly negative genetic correlation between meat yield traits and reproduction traits, there are potentially two other genetic-derived problems. High yielding birds may be more difficult to manage and, along with the genetic progress, the management practices need to be

updated frequently. Therefore, these birds need a fine-tuned management program to achieve their maximum reproductive potential.

Both male and female seem to be responsible for the age-related decline in fertility, but it is thought to be mainly a male problem because fertility can be maintained by artificial insemination and increased by the replacement of old males in commercial flocks. Also, in natural mating flocks, a male mates with an average of 8 to 10 females, therefore the impact of the male in the overall fertility of the flock is extremely high. The male contribution to flock fertility depends on two main factors: mating activity and sperm quality.

As males age, there is a reduction in the number of spermatozoa in the ejaculate and a reduction in semen. In addition, aging spermatozoa have reduced fertilizing ability in birds. However, studies where fertile eggs could be obtained by artificial insemination with semen from very old roosters suggest that sperm quality may not be as critical a factor as mating behavior.

In studies at the UGA it was observed that old males *that produce semen* still have good sperm quality and acceptable fertilizing potential beyond 50 weeks of age. However, it also seemed true that a significant

percentage of the males producing semen at 30 weeks of age did not produce semen *at all* at 50 or 60 weeks of age. Nevertheless, it was also observed that male mating activity is probably one of the most relevant factors affecting flock fertility.

Two factors can adversely affect mating activity. High yielding males, even in good physical condition, seem to lose *mating interest* quickly after 40-45 weeks of age. Males in *poor physical condition* (overweight, crippled...) can have both reduced mating efficiency and mating interest. It is therefore critical to have a culling policy for incompetent males.

### 2. Management techniques to compensate for the decline in mating activity

Assuming optimal environmental conditions (including optimal water and feed quality), there are four management practices that can be followed to enhance mating activity:

- Body weight control and feeding program
- Male placement and sex ratio
- Spiking and
- Intra-Spiking

The first two practices are meant to ensure good mating efficiency through male fitness and hen receptivity. The other two practices are mainly meant to compensate for the decline in mating interest (libido).

#### Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.271	0.257	0.144	0.229	0.170
% Airsac	0.108	0.098	0.104	0.098	0.076
% I.P.	0.047	0.027	0.033	0.036	0.111
% Leukosis	0.002	0.001	0.022	0.012	0.002
% Bruise	0.006	0.004	0.008	0.006	0.009
% Other	0.020	0.006	0.010	0.007	0.013
% Total	0.453	0.392	0.301	0.388	0.381
% 1/2 parts condemnations	0.360	0.540	0.334	0.412	0.458

Data for week ending 06/15/02

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

	Average Co.	Top 25%
Feed cost/ton w/o color (\$)	128.76	122.73
Feed cost/lb meat (¢)	12.15	11.37
Days to 4.6 lbs	44	44
Chick cost/lb (¢)	3.92	3.61
Vac-Med cost/lb (¢)	0.05	0.02
WB & 1/2 parts condemn. cost/lb	0.17	0.15
% mortality	4.08	4.16
Sq. Ft. @ placement	0.81	0.77
Lbs./Sq. Ft.	6.48	6.39
Down time (days)	12	13

Data for week ending 06/15/02

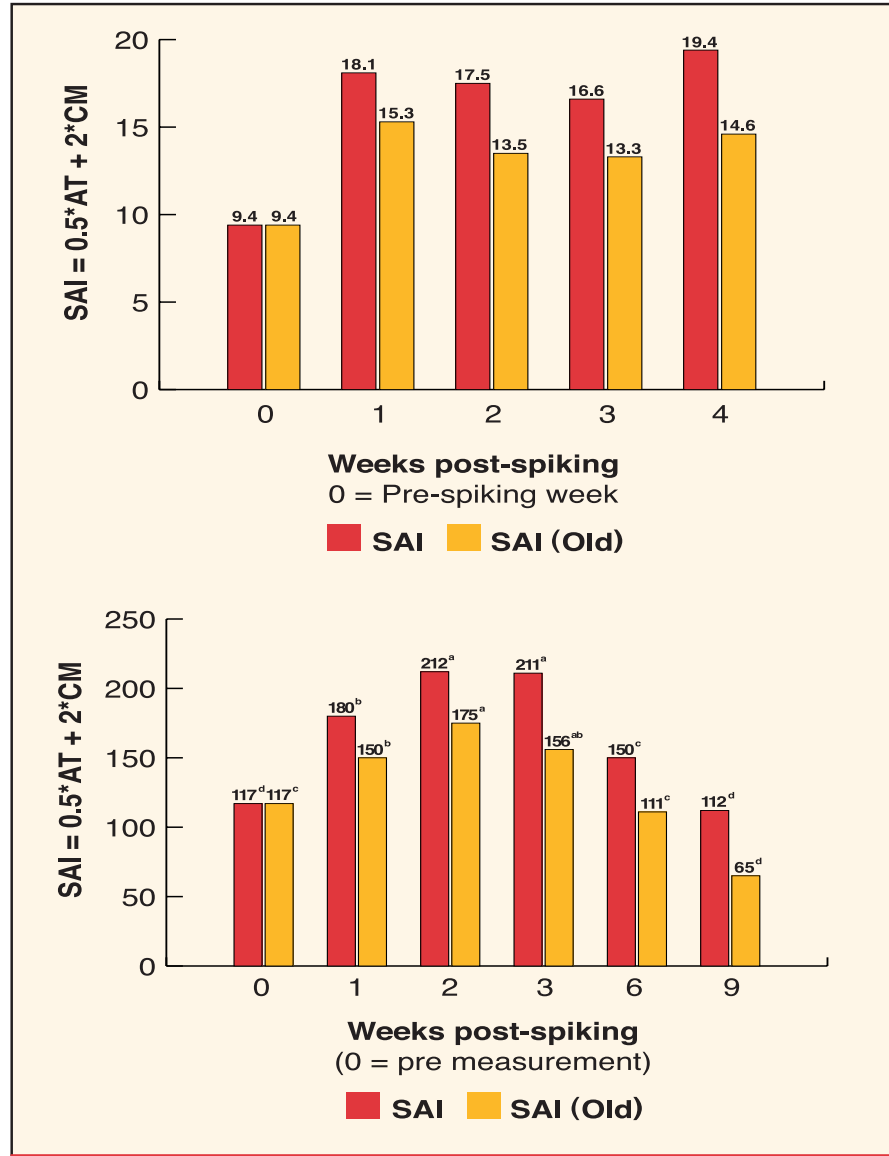
### 2.1. Body weight control and feeding program

A male body weight program (or feeding program) to maximize fertility includes certain key points.

- Always keep a body weight differential between males and females (around 1.5 lbs (680g)). Males have to be heavier and mature slightly before the females to promote their dominance over the females and also to ensure hen receptivity.
- The feeding program has to prevent male body weight loss. After 30 weeks of age this is normally achieved by allowing the males to slightly increase body weight all the time (i.e. 0.03 - 0.05 lbs/wk (15-20g/week)). Body weight losses can lead to cessation of sperm production and mating activity.

- Males should be weighed weekly to ensure that they do not get overweight. Overweight (full fed) males can have as good sperm quality and libido as restricted males but the excess bulk (body weight, hip width and breast angle) does not allow them to mate efficiently. It is assumed that fat males (with high abdominal fat deposits) will have reproductive problems. However, it is the excess breast meat, even in very lean males, which creates an unbalanced and reproductively inefficient male. Excess body weight can also cause foot and leg problems that, in turn, can interfere with mating skill.

Following these criteria, a feeding program for males after 20 weeks of age should include: slight increases of feed before mating begins (20 to 24 weeks) to control the size of the males and reduce aggression against hens (always keeping them heavier than the hens, though), higher increases of feed when mating activity increases to compensate for that extra energy requirement and, finally, slight increases of feed after 30 weeks to prevent body weight loss. Besides frequent weighing, the success of a male feeding program will highly depend on the ability of the grower to



**Figure 1.** The upper chart represents the evolution of the Sexual Activity Index (SAI) prior and after spiking 12 experimental pens containing 60 week-old roosters with 28-week old males. Data shows the average response from different levels of spiking (33%, 25% and 20%). The lower chart represents the evolution of the Sexual Activity Index (SAI) prior and after a 25% spiking of a house of 41-week old Cobb 500 breeder flock with 28-week old Cobb 500 males. AT = Attempts to mate; CM = Complete matings. Red bars represent total SAI and yellow bars represent old males' mating activity only.

exclude the males from the hen feeders. This can be achieved by leaving full combs and the use of longitudinal wires on top of the exclusion grills. It is also important to train the males to eat from their specific feeders by placing them in the house a couple of days before the hens.

### 2.2. Male placement and sex ratio

Normal placements vary from 12-15 cockerels per 100 pullets at the pullet houses to account for mortality and to have extra males for spiking.

An important consideration related to sex ratio and mating activity is that excess initial males (high male to female

ratios) can induce serious aggression problems towards the hens, increase female mortality and reduce hen receptivity. This not only will account for a slower early increase in fertility but also may create a premature and permanent loss of mating interest on the males, which tire of chasing unreceptive hens.

Male-to-male aggression due to excess males can lead to physical damage and, therefore, reduced mating efficiency. This, in turn, can create a requirement for later spiking.

The commonly recommended sex ratio for broiler breeders is 10 males per 100 females. However, it appears to be better to start with lower sex ratios (8 males per 100 females) and, if necessary, use some form of spiking later in the life of the flock.

In an experiment carried out at the GP facilities of Cobb-Vantress, we have observed that there can be significant differences among lines regarding male-to-male aggression and male sexual interference (males preventing other males from mating). Highly aggressive lines or lines whose males have a tendency to interfere, require low male to female ratios. As an example, the Cobb 500 male is a non-aggressive male (low male and female mortality) but with a tendency to sexually interfere. Therefore low initial ratios (8-9%) with the option of spiking at 40 weeks of age will prove a more successful management program than high initial male placement in the hen house (11-12%).

### 2.3. Spiking

Spiking is usually defined as the addition of new males to a 40 to 45 week-old broiler breeder flock to compensate for the age-related decline in fertility. As a general rule, males are added to compensate for mortality and to re-establish the original male to female ratio. Alternatively, 5 to 10% of old males are replaced due to their poor physical condition. Generally, the males that are added or used as replacements are 25 to 28 weeks old, have been grown on a pullet farm and

moved to a stud farm until needed for spiking. There are two main types of spiking programs:

- Spike as needed: fertility is monitored closely and the flock is spiked when fertility values start to decline significantly or reach levels below 90%.
- Spike as a regular practice: all flocks are spiked at approximately 40-45 weeks of age, as a preventive measure, regardless of the fertility level at that moment.

Significant increases in fertility are found two to three weeks post-spiking but a slight decline in fertility is common during the first week post-spiking.

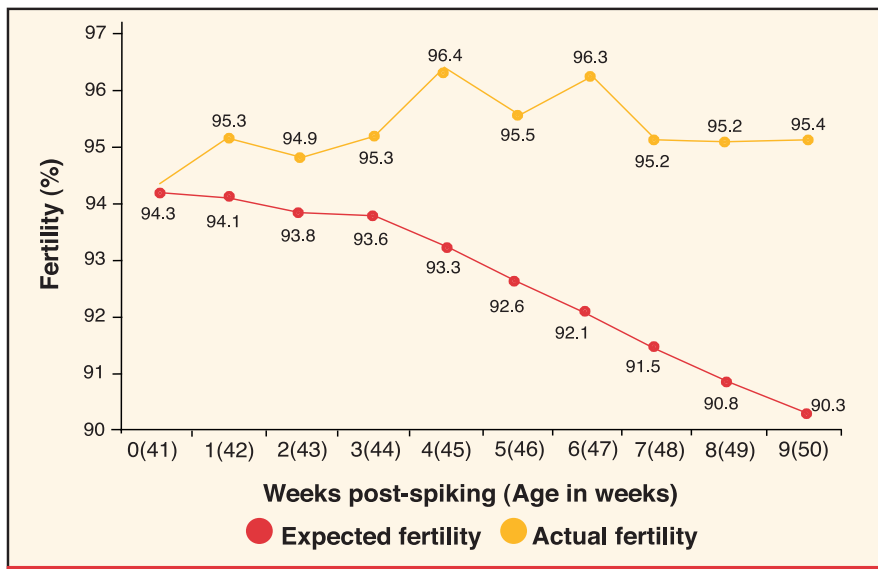
Due to the lack of literature about the consequences on fertility or mating behavior of a spiking program, a series of experiments were set up at the UGA and a field trial at the breeder facilities of an integrated company of Northeast Georgia.

In all the studies, mating activity and fertility were measured prior to and after some kind of spiking program using young males (28 weeks old). The data from the experiment at UGA represents the average from 12 experimental pens with 60-week old

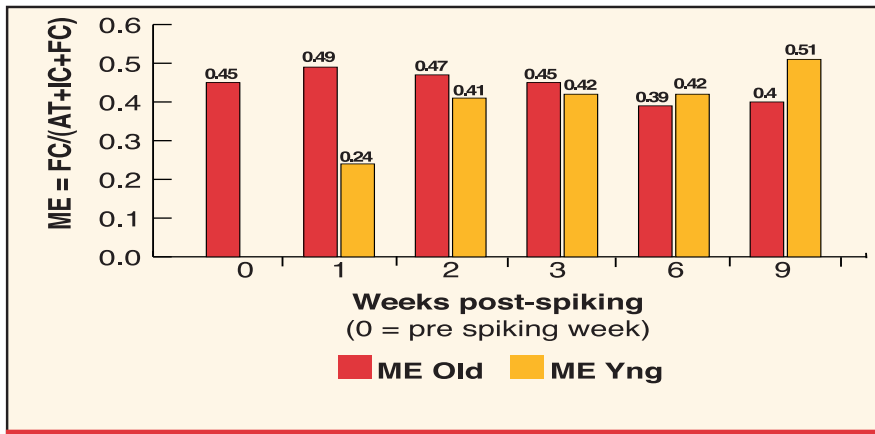
roosters where three different levels of spiking were applied (33%, 25% and 20%). In the field trial, 41-week old Cobb 500 males were spiked with 25% young Cobb 500 males.

Attempts to mate (AT), incomplete matings (IM) and complete matings (CM) were measured and the sexual activity index calculated ( $SAI = 0.5 \cdot AT + 2 \cdot CM$ ) as an estimate of "positive" mating activity (Figure 1).

Both the UGA experiment and the field trial (upper and lower charts of fig.1 respectively), showed the same phenomenon. After spiking, total mating activity (red bars) increased significantly and stayed constantly high for a period of time as long as 4 weeks and slowly started to decline afterwards. At 9 weeks post-spiking mating activity was at pre-spiking level. The most interesting finding, however, is that mating activity from the old males (yellow bars) also increased significantly after adding young males into the flock. In the longest experiment (field trial), this old male stimulus lasted for at least 6 weeks. Furthermore, the old males were actually responsible for 87% of the total mating activity when they



**Figure 2.** Fertility trend after a 25% spiking of a 41week-old Cobb 500 flock with 28 week-old Cobb 500 males (in yellow). The red line presents the expected fertility trend for that flock if it had not been spiked (theoretical data).



**Figure 3.** Mating efficiency in old and young males after spiking. The field trial corresponds to a 25% spiking of a house of 41-week old Cobb 500 breeder flock with 28-week old Cobb 500 males. AT = Attempts to mate; IM = Incomplete matings; CM = Complete matings.

represented only 75% of the males present. This indicates that for the first 4-6 weeks after spiking the young males served merely as a stimulus for the old males and their input to the flock fertility was small. After 6 weeks, however, the young males took over and started to significantly affect the overall mating activity.

In the experiment carried out at the UGA, fertility increased after spiking from 74% to 89% in just 15 days. In the field trial (figure 2) where fertility had not declined so much, fertility increased just 2% at the fourth week post-spiking but it stayed around 95% for at least 9 weeks. When compared with the theoretical trend that that flock would have followed if it had not been spiked, the fertility difference after 9 weeks could have been as high as 5%.

Figure 3 shows the trend of mating efficiency (ME = CM/(AT+IM+CM)) of young and old males prior and after spiking (field trial, 25% spiking). The mating efficiency of the young males was extremely poor during the first week, increased quickly on the second week and reached an optimal level (around 50%) after 9 weeks, apparently corresponding with the moment

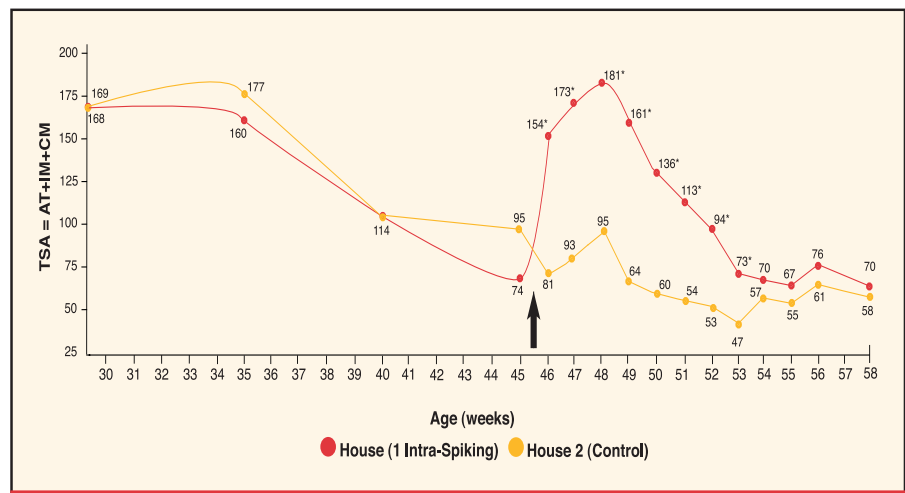
where young males take over most of the mating activity of the flock.

All trials showed that after spiking there was an increase in aggression and sexual interference (males preventing other males from mating). This increase, however, was only significant for the first week post-spiking and went back to normal levels on the second week. In the UGA trial, mortality did not increase significantly, but on the field trial male mortality jumped from 0.92% (prior to spike) to 2.47% (three weeks post-spiking). From the fourth to the sixth weeks post-

spiking, mortality ranged from 1.6% to 1.9%, and after 9 weeks post-spiking it went down to normal levels (1%).

Besides increased male mortality, there are some other problems related to spiking.

- Biosecurity could be breached because adult males, reared in other farms and housed with several ages on a stud farm, would be incorporated into an established flock.
- Spiking programs generally require stud farms that not only represent an extra cost but also are not normally the best conditions to house future breeder males. On stud farms males do not have contact with females, their sexual behavior and mating skills are likely compromised or at least require a learning period in the breeder house before they mate efficiently.
- If roosters are housed under the stud farm conditions after 25 weeks of age, aggression and high mortality will result, reducing the number of males available for spiking purposes.
- If males are too young or have not reached enough size to successfully compete with the old established males their mating efficiency will



**Figure 4.** Evolution of total sexual activity (TSA) prior and after Intra-Spiking (swap) 120 males between the two pens of a house (house 1) at a Cobb GP farm. House 2 remained as control and was not intra-spiked. The arrow indicates the week were the males at house 1 were intra-spiked. Asterisks indicate significant differences between houses on that particular week.

be likely reduced and their contribution to the flock fertility delayed.

The use of roosters that are still in good shape and are removed from a flock that is being sold has been suggested. This system avoids the expenses of maintaining extra roosters in stud farms but has two disadvantages. Lower probability of improving fertility because of the age and variable condition of the males and, of course, serious biosecurity concerns.

### 3. Intra-Spiking

As a solution to the spiking problems (mainly the biosecurity risks) and the observation that spiking with young males produced a stimulatory effect on old male's mating activity, the idea of Intra-Spiking was developed.

"Intra" ("within" in Latin) means that there is no importation of males to the farm. Males from the same age are exchanged between houses of the same farm or between pens of the same house at 40-45 weeks of age, in order to achieve a disruption of the established hierarchy and stimulate mating activity on the original males similar to that created by the young males in regular spiking.

Intra-spiking should have three advantages over regular spiking:

- Almost zero cost of the practice (no extra males need to be housed).

Spiking	SUPPOSED	ACTUAL*
Young	25%	13%
Old	75%	87%
<b>Intra-Spiking</b>		
Old (moved)	25%	35%
Old (original)	75%	65%

\* Average for the first 4 weeks post-spiking.

**Table 1.** Differences in mating activity percentages between spiking and intra-spiking at 25% (all experiments considered).

- No biosecurity risks.
- Quicker and more efficient use of the added males since they have mating experience and a similar conformation as the established males. That should allow them to successfully compete and mate from the beginning.

One possible disadvantage is that in intra-spiking there are no young males to take over after the 6 weeks of stimulation and, therefore, its effects cannot be expected to last as long as a regular spiking.

#### 3.1. Experiment 1. Intra-Spiking on a GP female line farm

##### 3.1.1. Methodology

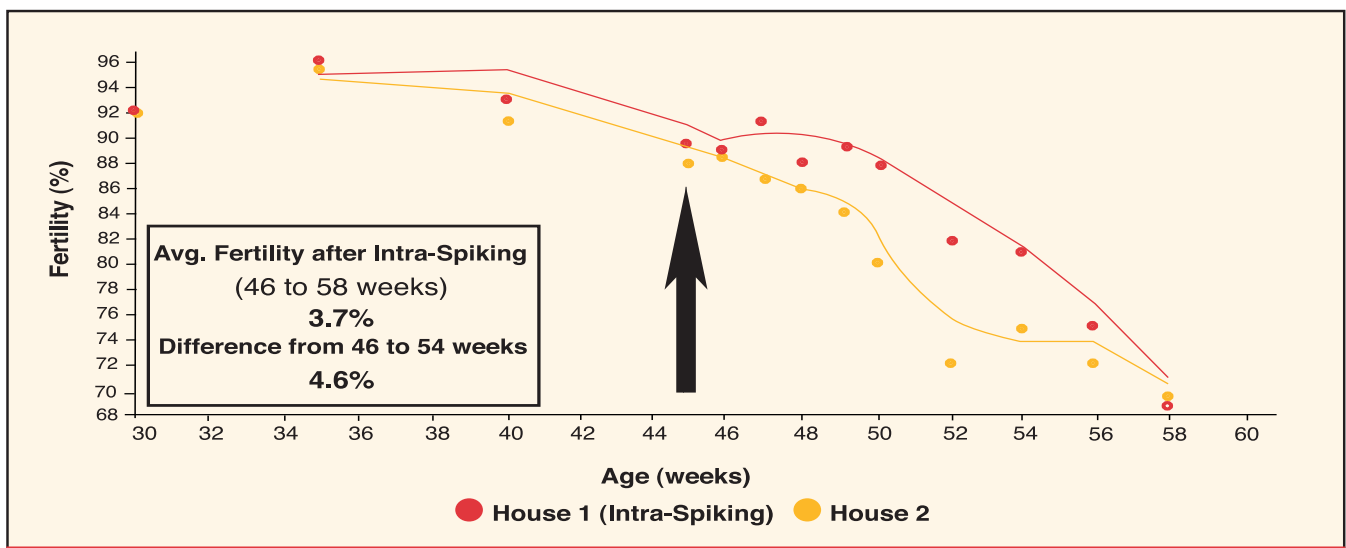
The first experiment on intra-spiking used a Cobb female line grandparent farm. The farm had two houses, each one of them with two pens. Each pen contained approximately 4,000

grandparent hens and 480 roosters (12% male: female ratio, normal in grandparent stock).

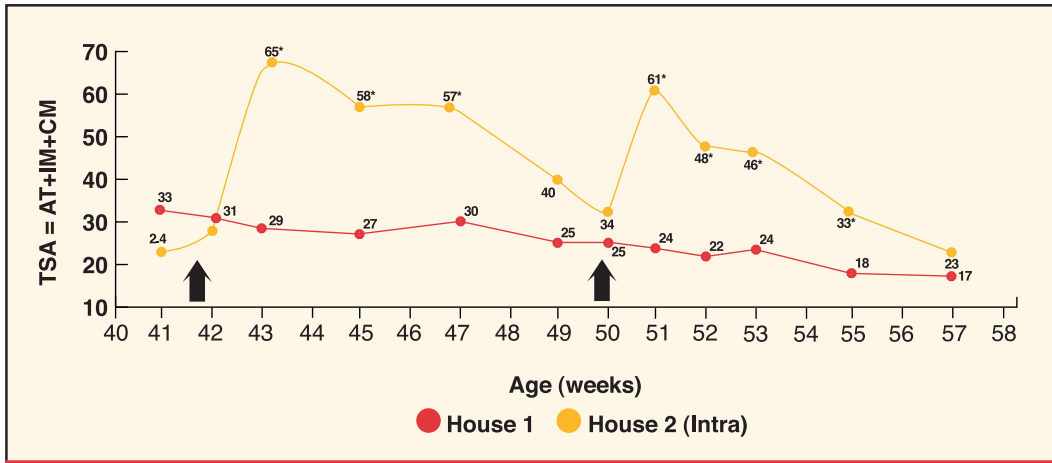
A 25% intra-spiking was performed in house number one at **45 weeks** of age (120 males were moved from the East pen to the West pen and vice versa). House number two was assigned as control and received no treatment at all.

Only healthy males were moved but no other selection criterion was applied. However, body weight of the spiking males was assumed to be similar to that of the original males since it had been controlled prior to intra-spiking and all pens had similar averages.

Fertility and mating behavior were evaluated prior to and after intra-spiking and then monitored on a regular basis until the flocks were sold.



**Figure 5.** Fertility evolution prior and after Intra-Spiking (swap) 120 males between the two pens of a house (house 1) at a Cobb GP farm. House 2 remained as control. The arrow indicates the week where the males at house 1 were intra-spiked.



**Figure 6.** Evolution of total sexual activity (TSA) prior and after Double Intra-Spiking (swap) 120 males between the two pens of a house (house 2) at a Cobb GP male line farm. House 1 remained as control. Arrows indicate the weeks when the males at house 2 were intra-spiked. Asterisks indicate significant differences between houses on that particular week.

- Behavioral observations** were made 2 days a week on the assigned weeks, starting from 4 to 5 p.m. and finishing from 7 to 8 p.m. This time was chosen according to the observations of a UGA experiment, where breeders were videotaped for 15 hours a day, showing that 70 to 75% of the total mating activity takes place on the last four hours of light. Two areas were assigned for observations in each pen, each one corresponding approximately to the length of three nest rows (15 m.) and the width of the scratch area (4 m.). In every area, total attempted matings (AT), incomplete matings (IM), complete matings (CM), hen crouches (HC), male-to-male aggressions (AG) and sexual interferences (SI) were recorded for 20 minutes. Since the spiking males were identified with paint, their mating activity was recorded independently. The total sexual activity index was calculated as  $TSA = AT + IM + CM$ , to evaluate mating interest. Each area served a replicate (4 replicates per house).
- Fertility** was determined by candling eggs on the 10th day of incubation and by posterior breakout analysis of all clear eggs to determine early embryonic mortality. A sample of 462 eggs was collected from each pen in one day on the weeks assigned

(Total 1,848 eggs candled per sample). Each pen served as a replicate.

- Male mortality** was recorded for the original and spiking males separately for the first two weeks after intra-spiking.

### 5.1.2. Results

Intra-spiking produced a significant increase on mating activity on the first three weeks after swapping the males. The total sexual activity index (TSA) was more than double on the third week. Mating activity started to decline on the fourth week but still remained significantly higher than the control group for a total period of 8 weeks. From 55 weeks on, mating activity was not different between houses (Figure 3). This stimulus lasted longer than originally assumed and also translated into a significant increase in completed matings on the intra-spiked flock.

In comparison to a spiking program with young males, the intra-spiking males not only started to mate immediately but also were more stimulated probably by the fact of encountering new hens. In this experiment the spiking (moved) males were showing 10% more mating activity than would be expected (Table 1).

Fertility showed a slight decline on the intra-spiked flock on the first week post-spiking but then a significant increase on the second week (1% more fertility than their pre-spiking level, but 4.5% more

fertility than the control flock).

On the intra-spiked flock, fertility remained significantly higher than the control for a period of 8 weeks, averaging 4.6% more fertility from 46 to 54 weeks of age. After 54 weeks, the differences were no longer significant and the overall improvement in fertility from 46 to 58 weeks was of 3.7%.

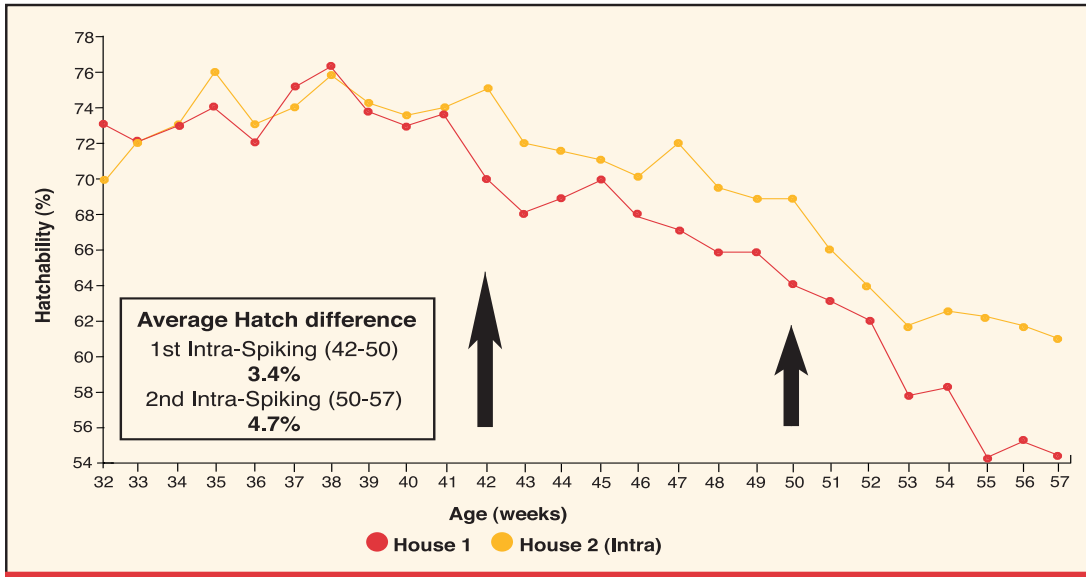
Aggression and sexual interference increased on the first two weeks post intra-spiking, declining to control levels thereafter. None of the moved males died and mortality did not increase on the original males.

## 3.2. Experiment 2. Double Intra-Spiking on a GP male line\* farm

### 3.2.1. Methodology

On the male line farm, also with two houses and two pens per house, a 25% intra-spiking was performed in house number two at 42 weeks of age and a second 25% intra-spiking was performed at 50 weeks in the same house (**Double Intra-Spiking**). Moved males were spray-painted at 40 weeks and none of those males were moved again at 50 weeks in order to further break the established hierarchies. House number one was assigned as control.

Fertility, mating behavior and male mortality were measured from 41 to 57 weeks of age. The procedures used were similar to those of the first experiment.



**Figure 7.** Evolution of hatchability prior and after Double Intra-Spiking (swap) 120 males between the two pens of a house (house 2) at a Cobb GP male line farm. House 1 remained as control. Arrows indicate the weeks when the males at house 2 were intra-spiked.

In this case hatchability data was also obtained and it followed a similar pattern as fertility.

\* This male belongs to the same genetic line as the Cobb 500 male.

### 3.2.2. Results

The mating activity response to intra-spiking on the male lines was as high as on the female lines, being more than double the week after intra-spiking. Mating activity remained significantly higher for a period of 7 weeks (Figure 6). At 50 weeks of age, on the second intra-spiking, males reacted almost as well as the first stimulus getting close to double their mating activity. However, this second stimulus only seemed to last for 5 or 6 weeks at a significantly higher level (Figure 6).

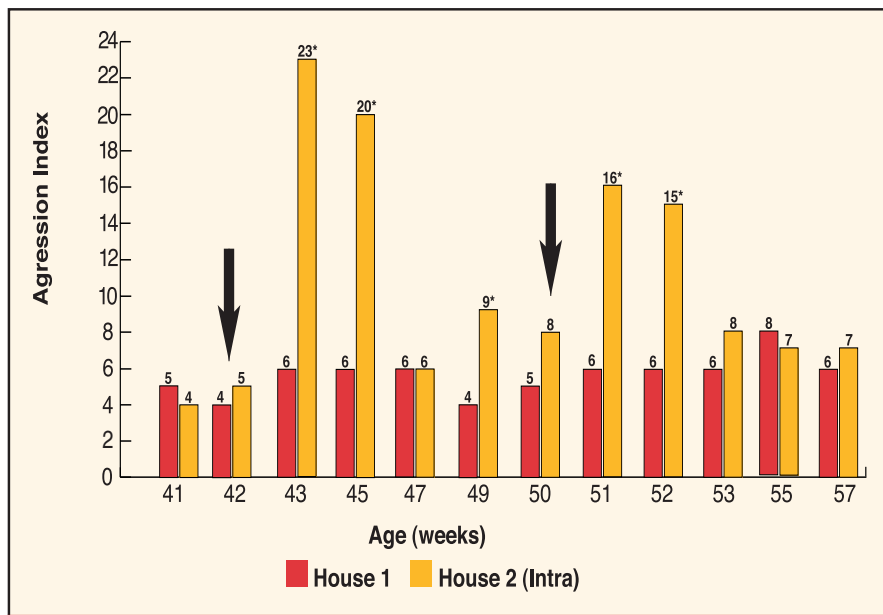
Hatchability was very similar in both houses before 41 weeks. After intra-spiking, hatchability on the experimental house quickly started to separate from the control house. From 42 to 50 weeks of age (first intra-spiking period) hatchability was in average 3.4% better in house number 2. From 50 to 57 weeks of age (second intra-spiking), the hatchability on the control group declined at an even faster rate and the average difference obtained for the period was of 4.7% (Figure 7).

Intra-spiking clearly helped to maintain an overall better hatchability (4.1%) for a period of 15 weeks.

Aggression was high and significant for the two weeks following each intra-spiking (Figure 8). At 43 weeks of age, this aggression did not translate in any male mortality increase. At 51 weeks, however, male mortality

significantly increased (1.2% higher) as a consequence of intra-spiking.

Part of this increase could be due to the handling of the animals since at that age they seemed to show more signs of stress. The average male mortality for the period from 41 to 57 weeks of age was 0.34% higher on the double intra-spiked flock.



**Figure 8.** Evolution of aggression prior and after Double Intra-Spiking (swap) 120 males between the two pens of a house (house 2) at a Cobb GP male line farm. House 1 remained as control. Arrows indicate the weeks were the males at house 2 were intra-spiked. Asterisks indicate significant differences between houses on those particular weeks.

### 5.3. Conclusions

- Intra-spiking proved to be as effective or more effective than regular spiking in increasing mating activity of old males.
- The procedure made more efficient use of the moved males since they were also stimulated and immediately contributed to the increase in mating activity.
- Fertility and hatchability were from 3.4% to 4.7% better with intra-spiking. As a general rule, it seems that a single intra-spiking will produce a significant effect on mating activity and fertility for a period of 8 weeks, and that double intra-spiking can almost double the effects. The effect of regular spiking may be longer since the young males seem to take over after 9-10 weeks. However, during the first 8-week period, the fertility increases showed by intra-spiking were very similar to those created by the addition of young males.
- Aggression and sexual interference increased on the first two weeks post intra-spiking but, as opposed to regular spiking, there was no significant increase in mortality from either original or spiked males. Only in double intra-spiking, 50-week old males showed an increase in mortality more likely due to handling than aggression.

In summary, a double intra-spiking program at 40 and 48 weeks of age seems a very good option to obtain a high and persistent mating activity stimulus and maintain significantly higher levels of hatchability for about 15 weeks.

### 6. Acknowledgement

I want to thank Dr. Jeanna L. Wilson for sharing with me her extensive knowledge on broiler breeder management during my two years at The University of Georgia. Her contribution in developing the idea of Intra-spiking was essential.

### References

- Barbato, G.F.**, 1998. Genetic correlation of reproductive traits to features of economic importance: What do you give up? In: Biopore Inc. seminar "Managing poultry reproduction to satisfy market demands". Poultry Science Association Meeting. State College. Pennsylvania.
- Brake, J., S.D. Peak, and J.J. Bruzual**, 1998. The relationship between male:female ratio and fertility in broiler breeders. Proceedings of the Poultry Science Association meeting. Pennsylvania. Abstr. 249.
- Bramwell, R.K, C.D. McDaniel, J.L. Wilson, and B. Howarth**, 1996. Age effect of male and female broiler breeders on sperm penetration of the perivitelline layer overlying the germinal disc. Poultry Science. 75:755-762.
- Casanovas, P.**, 1999. Methods of alleviating the age-related decline in the fertility of broiler breeder males. Master's thesis. The University of Georgia.
- Cheng, K.M., J.T. Burns, and R.N. Shoffner**, 1985. Mating behaviour and fertility in domestic chickens I. Inbreeding. Applied Animal Behaviour Science. 13:371-381.
- Craig, J.V., B. Al-Rawi, and D.D. Kratzer**, 1977. Social status and sex ratio effects on mating frequency of cockerels. Poultry Science. 56:767-772.
- De Revers, Michel, and Jean-Pierre Brillard**, 1986. Variations in the sperm production, the sperm output and the number of sperm to be inseminated in aging broiler breeders. World's Poultry Science Journal. 42:98 (Abstr.).
- Duncan, J.H., P.M. Hocking, and E. Seawright**, 1990. Sexual behavior and fertility in broiler breeder domestic fowl. Applied Animal Behaviour Science. 26:201-213.
- Goerzen, P.R., W.L. Julsrud, and F.E. Robinson**, 1996. Duration of fertility in *ad libitum* and feed-restricted caged broiler breeders. Poultry Science. 75:962-965.
- Guhl, A.M., N.E. Collias, and W.C. Allee**, 1945. Mating behaviour and the social hierarchy in small flocks of White Leghorns. Physiologic Zoology. 18:365-390.
- Hammerstedt, R.H.**, 1998. Summary challenges for the future In: Biopore Inc. seminar "Managing poultry reproduction to satisfy market demands". Poultry Science Association Meeting. State College. Pennsylvania.
- Johnson, A.L.**, 1996. Reproduction in the male. In: Avian physiology 4th ed.. Ch.19:432-451. (Sturkie, P. et al. Editors). Springer-Verlag, Berlin.
- Lake, P.E.**, 1984. The male in reproduction. Physiology and biochemistry of the domestic fowl. Vol.5:381-405.
- McDaniel, G.R., and J.V. Craig**, 1959. Behavior traits, semen measurements and fertility of white Leghorn males. Poultry Science. 38:1005-1014.
- Robinson, F.E., and J.L. Wilson**, 1996. Reproductive failure in overweight male and female broiler breeders. Animal Feed Science Technology. 58:143-150.
- Sexton, T.J.**, 1983. Maximizing the utilization of the male breeder: a review. Poultry Science. 62:1700-1710.
- Wilson, J.L.**, 1999. Managing roosters for hatchability. Poultry Digest. Vol.58. Num. 5:22-23.
- Wood-Gush, D.G.M.**, 1954. The courtship of the Brown Leghorn cock. British Journal of Animal Behaviour. 2:95-102.



### ABOUT THE AUTHOR

Pelayo Casanovas, a member of the Cobb-Vantress technical service team, received an Agricultural Engineering degree from the Universities of Barcelona and Lleida (Spain) and a M.S. degree in Poultry Science from the University of Georgia, where his research emphasis was on management practices to improve broiler breeder male fertility.

## 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	0.222	0.234
% Airsac	0.097	0.088
% I.P.	0.057	0.061
% Leukosis	0.005	0.002
% Bruise	0.007	0.011
% Other	0.010	0.003
% Total	0.399	0.399
% 1/2 parts condemnations	0.422	0.456

Data for week ending 06/15/02



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

lower than the average number of layers during May 2001. May egg production per 100 layers was 2,172 eggs, up 1 percent from the 2,160 eggs in May 2001.

All layers in the U.S. on June 1, 2002, totaled 334 million, slightly higher from a year ago. The 334 million layers consisted of 273 million layers producing table or commercial type eggs, 58.3 million layers producing broiler-type hatching eggs, and 2.66 million layers producing egg-type hatching eggs. Rate of lay per day on June 1, 2002, averaged 70.5 eggs per 100 layers, up 1 percent from a year ago.

Laying flocks in the 30 major egg producing States produced 6.82 billion eggs during May 2002, up slightly from a year ago. The average number of layers during May, at 313 million, was down slightly from a year earlier.

### **Egg-Type Chicks Hatched Down 9 Percent**

Egg-type chicks hatched during May totaled 38.9 million, down 9 percent from May 2001. Eggs in incubators totaled 33.3 million on June 1, 2002, down 12 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 319,000 during May 2002, up 1 percent from May 2001.

### **Broiler Hatch Up 2 Percent**

The May 2002 hatch of broiler-type chicks, at 798 million, was up 2 percent from May of the previous year. There were 659 million eggs in incubators on June 1, 2002, up 1 percent from a year earlier.

Leading breeders placed 7.6 million broiler-type pullet chicks for future domestic hatchery supply flocks during May 2002, up 7 percent from May 2001.

### **Turkey Eggs in Incubators on June 1 Down 5 Percent**

Turkey eggs in incubators on June 1, 2002, in the United States totaled 32.3 million, down 5 percent from June 1 a year ago. Eggs in incubators were 2 percent below the May 1 total of 32.9 million. Regional changes from the previous year were: East North Central, down slightly; West North Central, up 1 percent; North and South Atlantic, down 15 percent; South Central, up 4 percent; and West, down 10 percent.

### **Poults Placed During May Down 4 Percent From Last Year**

The 25.6 million poults placed during May 2002 in the United States were down 4 percent from the number placed during the same month a year ago. Placements were down 2 percent from the April 2002 total of 26.0 million. Regional changes from the previous year were: East North Central, up 7 percent; West North Central, up 2 percent; North and South Atlantic, down 18 percent; South Central, up 8 percent; and West, down 8 percent.

### **Broiler Eggs Set In 19 Selected States Up 1 Percent**

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 19-State weekly program set 212 million eggs in incubators during the week ending June 15, 2002. This was up 1 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 Slightly**

Broiler growers in the 19-State weekly program placed 174 million chicks for meat production during the week ending June 15, 2002. Placements were up slightly from the comparable week in 2001. Cumulative placements from December 30, 2001 through June 15, 2002 were 4.08 billion.

### **May Egg Production Up Slightly**

U.S. egg production totaled 7.26 billion during May 2002, up slightly from last year. Production included 6.13 billion table eggs and 1.14 billion hatching eggs, of which 1.07 billion were broiler-type and 65.0 million were egg-type.

The total number of layers during May 2002 averaged 334 million, slightly

### **Broiler Export Forecasts for 2002 and 2003 Lowered**

According to the latest Economic Research Service reports, U.S. broiler exports in 2002 are expected to total about 4.9 billion pounds, down 500 million pounds from earlier expectations. If realized, 2002 exports would be down about 650 million pounds from the 5.56 billion pounds exported in 2001. Even though this is a huge decline from the previous year, exports in 2002 would be about even with 2000. While the disruption of exports to Russia since mid-March represents the chief factor behind the reduction in export estimates, disruptions in shipments to and changes in other markets has added to the overall uncertainty of the export market. Other countries have also banned imports of U.S. poultry products. These bans have ranged from total bans of all U.S. poultry products (Ukraine) to bans on products from specific States (Japan). The second major factor is the slowdown of poultry imports into China, which has effected both direct exports to China and those going indirectly to China through Hong Kong.

The major impact of these bans or slowdowns is expected to be felt in the second and third quarters of 2002, but the lingering effects of changes in the regulations governing imports in a number of countries are expected to last through 2003. Thus, broiler export forecasts for 2003 are now 5.45 billion pounds down 400 million pounds, from earlier expectations.

Because the export market had become such a major proportion of the domestic broiler production (17-18 percent), the reduction in broiler exports is impacting domestic production, parts prices, and stocks. Broiler production is expected to be about 32.2 billion pounds this year, 3 percent higher than the previous year with more of the growth in the first half. Since the middle of March the year-over-year increases in the weekly number of chicks placed for growout have slowed considerably, with the average for the last 5 weeks at slightly over 1 percent. Earlier in the year, chick placement had been running over 3 percent higher than the previous year. The drop in the export market is having a varying impact on broiler prices, depending upon the amount of product exported. Since only small amounts of whole birds and breast meat are exported, the price of these products has been impacted less than other products. The drop in shipments to Russia and the slowdown in shipments to China have had a major impact on leg quarter and wing prices. Over the first quarter of 2002, leg quarters made up almost 60 percent of all broiler exports to Russia, and leg quarter exports to Russia accounted for 57 percent of all leg quarter exports. In April 2002 leg quarter prices averaged 19.2 cents a pound, down 29 percent from a year earlier. China's dominance in broiler wing exports is even stronger. In the first quarter of 2002, exports of broiler wings to Hong Kong and China totaled over 55 million pounds, down over 20 percent from the same period in 2001. This market accounts for almost 85 percent of all U.S. wing shipments. Wing prices in April 2002 averaged 62.5 cents a pound compared with 102.5 cents a pound the previous year, a decrease of 39 percent.

As exports have slowed, broiler stocks have expanded. At the end of April, stocks of whole broilers and broiler parts in cold storage were reported at 847 million pounds, up 31 percent from the previous year. While stocks of whole birds have risen faster (up 123 percent), the increase is chiefly due to a 28-percent increase in stocks of broiler parts, as parts make up about 95 percent of all broiler stocks.

### **Turkey Stocks Higher, Parts Prices Lower**

Turkey production over the first 4 months of 2002 was 1.88 billion pounds, up 6.6 percent from the same period in 2001. This rate of growth is expected to fall considerably later in 2002 as the number of poult placed for growout in the first 4 months of 2002 is up less than 1 percent from the same period in 2001. However, currently, the larger production has raised stock levels and put downward pressure on turkey prices. Turkey stocks in cold storage at the end of April were 512 million pounds, up 30 percent from the previous year. Most of the increase is the result of a 53-percent increase in the amount of turkey parts in cold storage. While the prices for some turkey parts are only slightly lower than the previous year, the prices for turkey breasts and mechanically deboned meat (MDM) turkey have fallen sharply. The March wholesale price for turkey breasts was \$1.24 a pound down from \$1.60 the previous year. The March price for MDM turkey was down almost 6 cents a pound from the previous year, this represents a decline of almost a third.

# Meetings, Seminars and Conventions

## 2002 July

**July 16-17: Hatchery-Breeder Clinic**, Sheraton Birmingham Hotel, Birmingham, AL. Contact: U.S. Poultry & Egg Assoc., 1530 Cooledge Road, Tucker, GA 30084-7303. Phone: 770-493-9401; Fax: 770-493-9257. Email: 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: scotth@reggfarm.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://wcgalp.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

## 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. 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

**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

**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; 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

**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

**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.

**Oct. 29: Carolina Feed Industry Assoc.**, Feed Production Technology School, Sheraton Imperial Hotel, Research Triangle Park, Raleigh, NC. Contact: Owen Robertson, 2116 N. Shoreline Dr., Sanford, NC 27330. Phone: 919-776-3054.

**Oct. 31: Carolina Feed Industry Assoc.**, Poultry Nutrition Conference, Sheraton Imperial Hotel, Research Triangle Park, Raleigh, NC. Contact: Owen Robertson, 2116 N. Shoreline Dr., Sanford, NC 27330. Phone: 919-776-3054.

## 2002 November

**Nov 12-13: Alabama Breeder/Hatchery 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.

**Nov 12-15: EuroTier 2002**, International Exhibition for Livestock and Poultry Production, Hanover, Germany. Contact: Website: [www.eurotier.de](http://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/>