Summer 8-2001

Avian Advice, Summer 2001, No. 2

Dale Bumpers College of Agricultural, Food, and Life Sciences (University of Arkansas, Fayetteville). Center of Excellence for Poultry Science

University of Arkansas (System). Cooperative Extension Service

Summer 2001 • Volume 3, Number 3

AVIAN Advice

UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

INSIDE

A 10-year Comparison of On-Farm Feed Weights and Feed Truck Weights

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Introduction

For a number of years there has been concern among poultry growers as to whether the feed weight stamped on a grower's feed tickets is the actual weight of feed delivered to that grower's farm. Since feed makes up 65-70% of the cost of production, and the lower the cost of production, the better the bottom line, grower concern over accurate feed weights is understandable.

Because contract growers are not responsible for feed manufacturing, or delivery, it is almost inevitable that growers will have questions about the process. Many growers do not realize that truck scales at feed mills are required by law to be certified scales. They must be routinely checked, calibrated and serviced by scale manufacturers to maintain this certification. These professional inspections usually occur at least every six months. In addition to professional servicing, an increasing number of feed mills have purchased and use their own calibrated test weights on a regular basis to check truck scale calibration. In recent years, several integrators have responded to grower concerns about accuracy of feed weights by inviting growers to be present at the feed mill when their feed is being weighed. Growers are also invited to follow feed trucks to and from their farm if they feel the need.

The Applied Broiler Research Unit (ABRU) at the Center of Excellence for Poultry Science at the University of Arkansas is in a unique position since it operates similarly to other contract broiler growers, but has the capability to weigh feed on-farm. November 2000 marked 10 years worth of data consisting of 56 flocks of broilers available for comparison. Thus, this project was undertaken to compare feed ticket weights with weights obtained on-farm.

How Feed Weights were Compared

Each of the four houses on the ABRU has two large (11-ton capacity) feed storage bins and a small feed bin (3-ton capacity). Each small bin is equipped with a J-Star Electronics Model 15 Electronic Scale Indicator System (Digistar Electronics, Ft. Atkinson, WI[1]) so that all feed that enters each house enters through the weigh bin at that house. The two large storage bins are used to refill the weigh bin once or twice each day depending on bird age and feed consumption patterns. Measurements are recorded before and after each refill and at 12:00 pm each day. Weights were totaled to get a 24-hour feed consumption for each house. After the flock was harvested, daily feed weights were totaled to obtain the weight of feed consumed for each house and the farm. The weight of feed delivered according to integrator feed tickets was calculated by adding together feed ticket weights for that flock and comparing that weight to the weight charged to the farm on the settlement sheet after the flock is harvested. The two weights (on-farm system vs feed tickets) are then compared to determine the difference between the two. Percentage differences between feed weights were determined by dividing the difference in weight by the on-farm weight and multiplying by 100.

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. . . helping ensure the efficient production of top quality poultry products in Arkansas and beyond.

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Side-by Side Comparison of Feed Weights

A comparison of on-farm feed weights and feed delivery ticket weights for 56 flocks of broilers produced from November 1990 through November 2000 is shown in Table 1. These data show that the on-farm weights and those shown on feed tickets were never exactly the same. However, it should be noted that on all but four occasions, weight differences favored the grower. In addition, differences between on-farm weights and feed ticket weights averaged 0.96% for the entire 10-year period and over 43 million pounds of feed.

On-farm feed weights were less than feed ticket weights for flocks 20, 25, 30 and 51. While weight differences for these four flocks were each less than 1%, a 6.86% difference in favor of the grower was detected in flock 46. This difference was 51,190 lbs, which happens to be very close to the weight of a semitrailer load of feed. Records were double checked by both farm personnel and the integrator, but no record of an additional feed ticket was ever discovered by either source. In addition, there were no problems detected with the on-farm scale system. While it may seem unlikely, it is not beyond possibility that a load of feed was actually delivered for which no record exists.

How Feed Weights Get Confusing

Unavoidable events occur that give growers reason to question the feed weighing process. Feed trucks break down on the road and at the farm and must be taken back for repairs before the entire load of feed is delivered. The remaining feed on the truck must be weighed and the grower credited for that amount. Feed storage bins on farms may not hold all the feed on the truck and again the remaining feed must be returned to the mill, weighed, and the grower given credit. Unless growers are willing to follow the truck to the mill, they must trust that the credit process is handled accurately. They must also trust that the scales are working accurately when each load of feed is weighed and that the truck driver delivers the correct amount of feed to each farm. However, growers must also recognize their responsibility with feed.

Integrators are justified in their concern that growers properly maintain their feed storage bins and manage feed delivery systems inside the poultry house to obtain maximum benefits and efficiency from the feed. Investments in high-quality feed ingredients, feed mills, manufacturing and delivery equipment, and the salaries associated with feed manufacturing and deliveries represent much of the expense related to maintaining an integrated poultry operation. Feed is a high cost item for integrators as well as growers.

Making the System Work

While at times it may seem that growers and integrators are on opposite sides of the fence, both parties actually want high-quality feed that is weighed accurately, delivered correctly and fed properly. This doesn't happen of its own accord and it takes a committed team effort from numerous individuals for the system to work. While mistakes happen, in most cases, there are enough checkpoints and safeguards along the way to eventually find the answer to any questions that may arise. However, situations are best resolved when both the integrator and the grower keep records.

Growers can help themselves out by keeping up with their feed tickets. Be aware of when the last load came and how much was delivered. This can help determine if you are getting feed too often or if too much is being delivered. Pay attention to the type of feed stamped on your ticket. You should not be getting withdrawal if your chicks are 2 weeks old. If you cannot find your ticket after a delivery, ask your service technician to bring you a copy. It is to your advantage as a grower to monitor what goes on at your farm. You should be able to catch something out of the ordinary at your farm before anyone else. The sooner a potential problem is brought to the integrator's attention, the better it will be for everyone involved. It is much easier to solve a problem with a load of feed while that feed is still in your bins. If you wait until after that load of feed has been eaten and additional loads delivered or after the flock has sold, it becomes much more difficult to resolve any problems associated with the flock. An integrator may be responsible for hundreds of growers at each complex making it difficult to monitor everyone at once. Any help growers can provide immediately after a question arises is often times extremely valuable. However, if you wait too long to speak up, there may little the integrator can do to help resolve your concerns.

Summary

The feed weighing and distribution process in the poultry industry almost ensures that there will be concerns as to the accuracy of the system. However, 10 years of data comparing feed weights of two different integrators between two different scale systems found less than 1 percent average difference between the two weighing systems. The average difference in feed weights for the 56 flocks over the entire 10-year study period was 0.96%. Feed weights from an on-farm weigh system were actually greater than feed ticket weights for 52 of 56 flocks. Therefore, it appears that the weight of feed charged and delivered to contract commercial poultry farms by poultry integrators is quite similar to the weight of feed actually fed on the farm. Yet the data make it clear that errors in feed deliveries will occur. Both growers and integrators must be vigilant in their record keeping of feed deliveries to help resolve any questions that may arise. However, the data indicate that the current feed weighing and delivery system is accurate and reliable most of the time.

[1]Mention of trade names does not constitute endorsement by the University of Arkansas Cooperative Extension Service or the Center of Excellence for Poultry Science and does not imply their approval to the exclusion of other products that may be suitable.

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Table 1. On-Farm Feed Weights Versus Feed Ticket Weights

Flock No.[1]	Flock Dates	Farm Feed Wts (lbs)	Scale Ticket Wts (lbs)	Difference (lbs)	Difference (%)
1	11\19\90 - 1/14/91	853330	846900	6430	0.75[2]
2	2/1/91 - 3/29/91	819520	814480	5040	0.61
3	4/15/91 - 6/9/91	814290	806240	8050	0.99
4	6/20/91 - 8/18/91	Load Cells Inaccurate Due to Lightening			
5	8/29/91 - 10/23/91	865658	859360	6298	0.73
6	11/12/91 - 1/7/92	911938	903720	8218	0.90
7	1/23/92 - 3/16/92	802864	793960	8904	1.11
8	4/2/92 - 5/21/92	688720	683580	5140	0.75
9	6/8/92 - 7/30/92	757580	751230	6350	0.84
10	8/7/92 - 10/1/92	885928	881620	4308	0.49
11	10/15/92 - 12/10/92	967180	962810	4370	0.45
12	12/21/92 - 2/17/93	970436	962900	7536	0.78
13	3/2/93 - 4/29/93	973240	965190	8050	0.83
14	5/11/93 - 7/6/93	875352	868970	6382	0.73
15	7/9/93 - 9/2/93	857972	853220	4752	0.56
16	9/17/93 - 11/11/93	984974	978570	6404	0.65
17	11/29/93 - 1/25/94	1072612	1062440	10172	0.95
18	2/10/94 - 4/6/94	948546	935060	13486	1.42
19	4/19/94 - 5/31/94	660784	655240	5544	0.84
20[3]	**6/9/94 - 8/3/94**	**748054**	**748560**	**-506**	**-0.07**
21	8/5/94 - 9/14/94	588722	586160	2562	0.44
22	9/20/94 - 11/3/94	666354	664020	2334	0.35
23	11/15/94 - 12/28/94	671776	665860	5916	0.88
24	1/10/95 - 2/23/95	692770	686280	6490	0.94
25	**3/7/95 - 4/19/95**	**578528**	**582980**	**-4452**	**-0.77**
26	5/5/95 - 6/15/95	649266	644900	4366	0.67
27	6/29/95 - 8/9/95	618756	610200	8556	1.38
28	8/18/95 - 9/28/95	647574	641960	5614	0.87
29	10/13/95 - 11/22/95	613104	605720	7384	1.20
30	**12/7/95 - 1/22/96**	**665134**	**671360**	**-6226**	**-0.93**
31	1/26/96 - 3/7/96	557626	552940	4686	0.84
32	3/15/96 - 4/26/96	601490	595900	5590	0.93
33	5/9/96 - 6/20/96	598276	593240	5036	0.84
34	7/4/96 - 8/16/96	618418	606780	11638	1.88
35	10/31/96 - 12/10/96	685446	689340	3896	0.57
36	12/30/96 - 2/6/97	591834	581120	10714	1.81
37	2/24/97 - 4/7/97	663096	654200	8896	1.34
38	4/24/97 - 6/6/97	661088	652410	8678	1.31
39	6/26/97 - 8/18/97	858594	850380	8214	0.96
40	9/1/97 - 10/22/97	776572	770300	6272	0.81
41	11/7/97 - 12/30/97	839070	830120	8950	1.07
42	1/27/98 - 3/20/98	848298	843280	5018	0.59
43	4/6/98 - 5/27/98	777952	767860	10092	1.30
44	6/12/98 - 8/6/98	816662	813440	3222	0.39
45	8/18/98 - 10/12/98	866424	863020	3404	0.39
46	10/30/98 - 12/15/98	746540	695350	51190	6.86
47	1/8/99 - 3/1/99	818744	810900	7844	0.96
48	3/22/99 - 5/14/99	831298	820820	10478	1.26
49	5/31/99 - 7/27/99	933730	928680	5050	0.54
50	8/5/99 - 9/29/99	911550	901080	10470	1.15
51	**10/12/99 - 12/3/99**	**851880**	**856600**	**-4720**	**-0.55**
52	12/20/99 - 2/8/00	784042	778900	5142	0.66
53	3/13/00 - 5/4/00	854550	845030	9522	1.11
54	5/15/00 - 7/11/00	930726	930940	214	0.02
55	7/21/00 - 9/12/00	853534	842980	10553	1.24
56	9/22/00 - 11/13/00	844766	841120	3646	0.43
	TOTALS	43813528	43497180	402975	---
	AVERAGE	781330	774731	7327	0.96

[1] Flocks 1-34 were grown for Integrator 1. Flocks 35-56 were grown for Integrator 2.
[2] % Difference = (Difference (lbs) / Farm Feed Wt (lbs)) x 100
[3] Bold numbers indicate when scale ticket weights were greater than farm feed weights.

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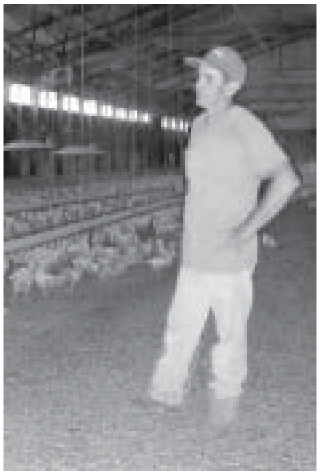
Center of Excellence for Poultry Science • University of Arkansas



What do Poultry Growers Think?

Introduction

What do growers think? Company personnel may believe they understand the thoughts of growers. Yet growers may have an entirely different view of what they and their fellow growers think. Since few surveys of grower attitudes have been published, there is little objective data.

In 1999, the Arkansas Farm Bureau sanctioned and funded the distribution of a survey sent to their members identified as poultry growers. Its purpose was to determine characteristics of their growers and to identify attitudes of these growers regarding a range of production and economic issues they currently face. The survey, conducted in late 1999 by the Department of Agricultural Economics and Agribusiness at the University of Arkansas – Fayetteville, was structured to address questions and concerns raised by the Poultry Division of the Arkansas Farm Bureau. Initial results of the survey were communicated to the Arkansas Farm Bureau in early 2000 and have been shared with various integrators and the Poultry Federation. Permission has now been received to publish the results. Results of the survey are briefly summarized here and a full, detailed report on the survey is expected to be available in published form later this year.

Characteristics of Farms Surveyed.

Of the 1,310 surveys mailed, 283 were completed and returned in usable form; 109 survey recipients were no longer producing poultry and 11 surveys were not deliverable. Washington, Howard, Benton, Polk, Hempstead and Pike Counties accounted for 31% of responses. Of the respondents, 82% produced broilers, 15% produced breeders and 3% produced turkeys. Their farms averaged 208 acres, with 137 acres in pasture/hay, 61 acres in woodlands and 15 acres in cropland. The average farm had 3.4 houses ranging in average age from 14 to 20 years. On average, 2.1 houses were under mortgage. In addition, 1.2 houses had tunnel ventilation and 0.5 had cooling pads.

Company personnel may believe they understand the thoughts of growers. Yet growers may have an entirely different view of what they and their fellow growers think.

Grower Characteristics

Regarding characteristics of respondents, their average age was 48 years; 77% of the respondents were male. Educational levels of growers were as follows: 8% - less than a high school education; 54% - high school degree; 17% - associate or trade school degree; 16% - college degree and 5% - graduate degree. Respondents had been poultry growers an average of 18 years. Seventy-four percent of the growers classified themselves as full-time, 14% related they worked part-time on other on-farm work and 11% worked off-farm part-time. For spouses of respondents, 37% had full-time off-farm employment, 10% had part-time off-farm employment and 44% had no off-farm employment. Nine percent were not married. Poultry contributed 59% of all family income, other agriculture contributed 12%, off-farm employment contributed 23% and retirement and pension contributed 6% of all income.

Grower Thoughts

Growers stated they were generally satisfied with their business and were optimistic about the future of the Arkansas poultry industry. They were comfortable with their field representatives (Fig. 1) and hold them in high regard both personally and professionally. Growers felt that their representatives help them improve their operations (53% agree or strongly agree). Growers also felt they had a good relationship with their companies. However, there was a general feeling of "disconnectedness" between growers and the companies they grew for as evidenced by the company's understanding of grower concerns over profits (Fig. 2).

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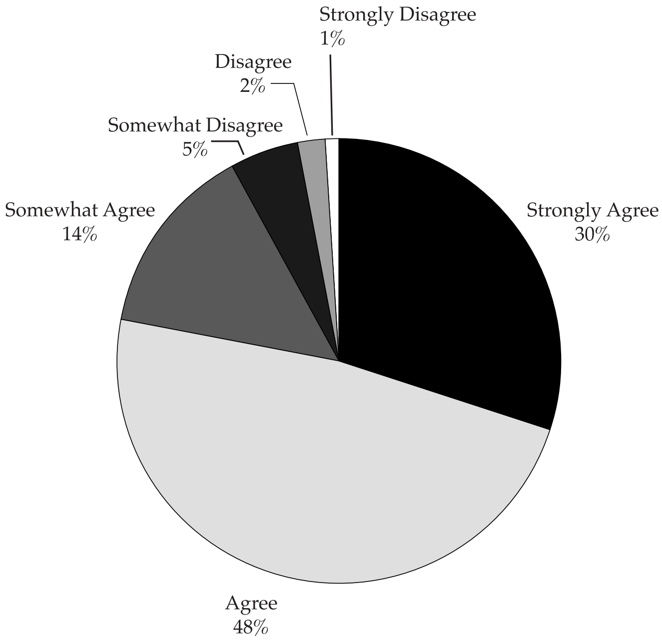

Fig. 1. I have a good relationship with my current field representative

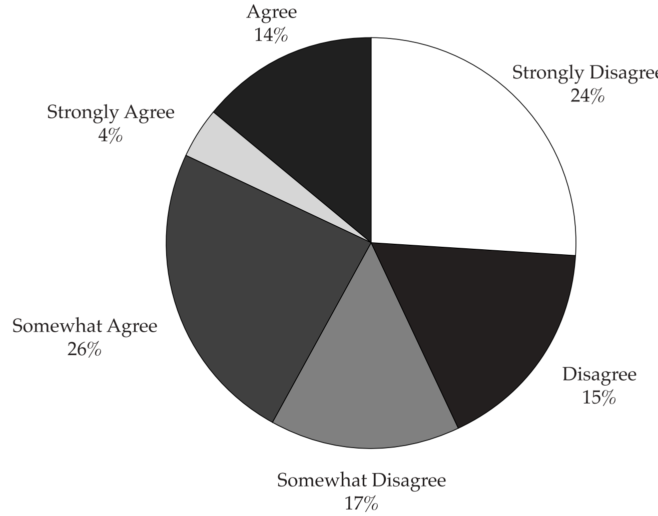

Fig. 2. My company is concerned with helping me increase my profit from my poultry operation

Growers appeared to be quite satisfied with many of the services provided to them by their companies. These services included feed quality (Fig. 3) and scheduling/timing of feed and chick delivery and pickup of birds and/or eggs (70%, 86% and 88% positive responses, respectively). However, chick quality was a point of dissatisfaction in general, with a large number of growers questioning whether chick quality was evenly distributed among growers (Fig. 4).

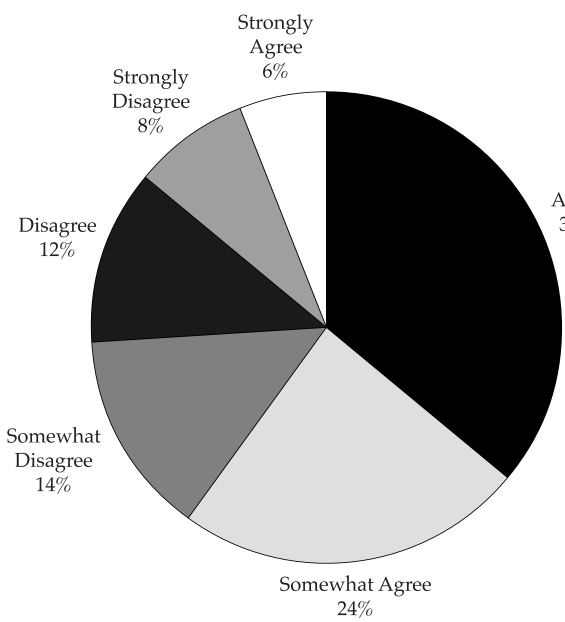

Fig. 3. Feed quality was consistent throughout the year

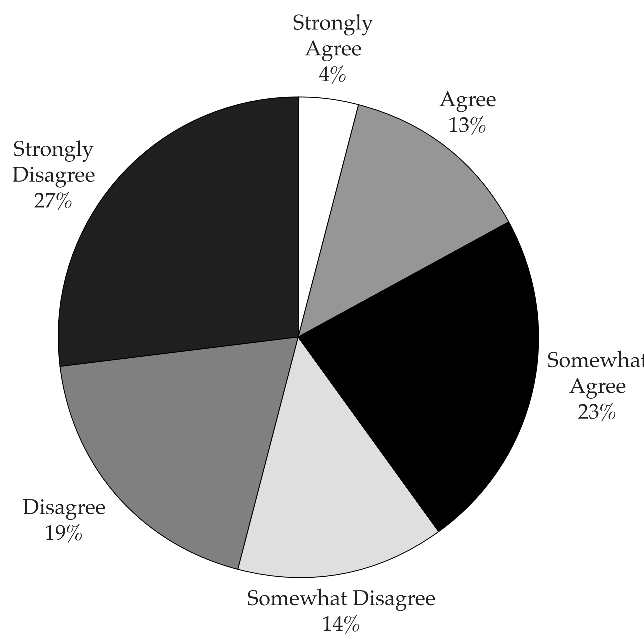

Fig. 4. Chick quality is evenly distributed among all growers

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A continuing area of concern for poultry producers -- and all agricultural producers -- was financial reward for their efforts. Growers felt inadequately compensated for their efforts, with 62% relating that their average payments were not adequate to maintain their standard of living. Additionally, a large percentage of growers responding (over 70%) did not think their payments should be tied to other growers' performance, commonly referred to as the tournament, or grower pool, method of payment (Fig. 5). Similarly, 67% of growers responded that they did not feel they were making adequate returns on their investments in poultry production. In excess of 65% of all respondents said the terms of their contracts were clear and that they understood the manner in which their settlement calculations were made. But growers overwhelmingly favored fixed-length contracts that guaranteed a set number of flocks and birds per year (Fig. 6). The average contract length suggested was five years.

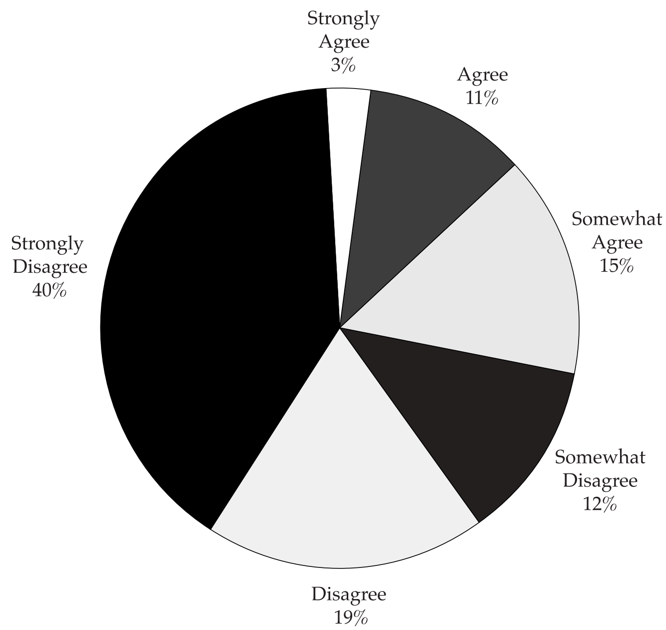

Fig. 5. Grower payments should be tied to the performance of other growers

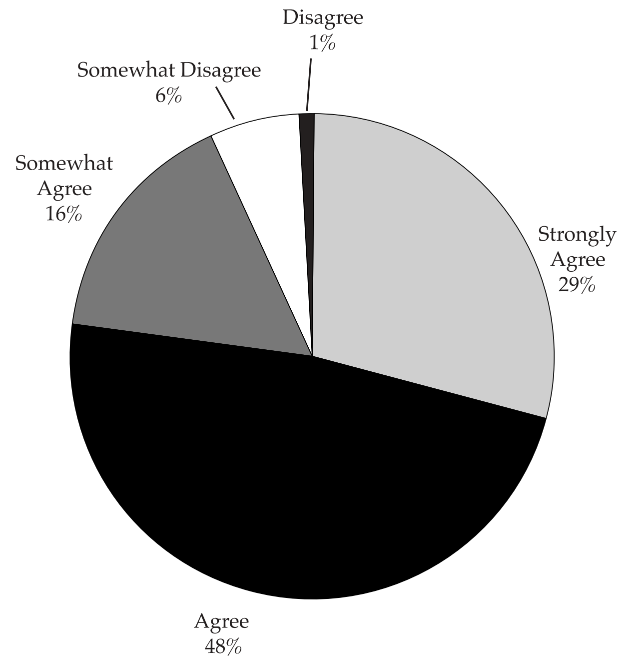

Fig. 6. I prefer a fixed-length contract that guarantees the number of flocks and birds

Growers also felt that there was room for improvement for communication among growers and integrators and specifically identified inadequate information from integrators related to information on the financial benefits of technological improvements. In addition, growers favored improvement programs for below average growers (Fig. 7) and educational programs for all growers on income and expenses related to their operations (Fig. 8). Formation of properly functioning grower committees was supported by three-fourths of all respondents.

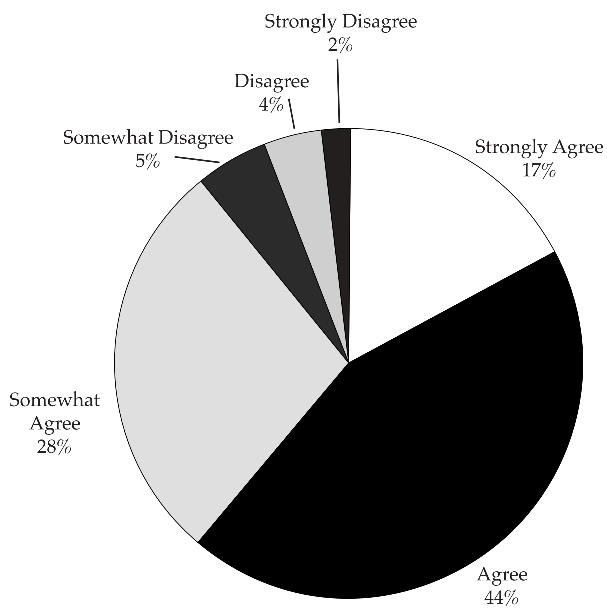

Fig. 7. There should be a special company program for growers who have fallen below average, with emphasis on problem identification and peformance improvement

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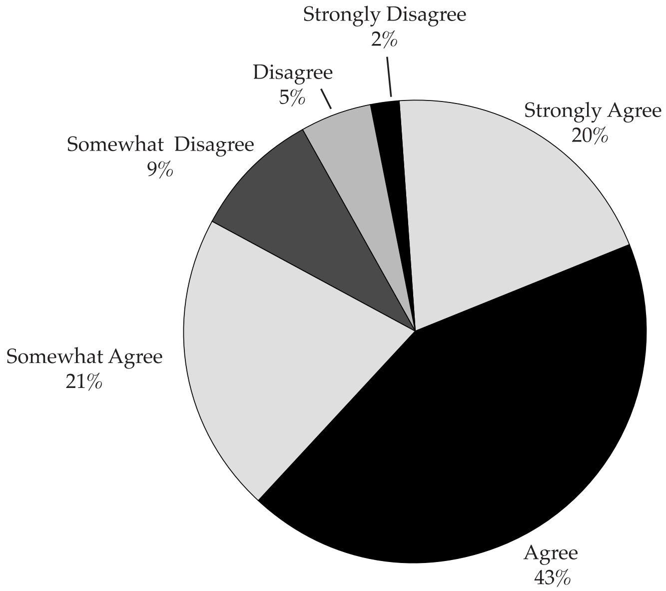


Fig. 8. My company should provide educational programs to help producers better estimate income and expenses

Summary

Growers were generally optimistic about the future of the poultry industry and they trusted their field representatives. However, growers apparently saw that improvements could be made in the production system. Growers recognized that certain services are done well (e.g. feed quality, scheduling/timing of feed and chick deliveries, scheduling/timing of bird or egg pickup), but were suspicious of chick quality issues. While growers understood their contracts, they view themselves as vulnerable economically. Yet growers were apparently willing to participate in programs designed to help them improve their operations.

Frank T. Jones • Extension Section Leader
Center of Excellence for Poultry Science • University of Arkansas

Why Birds Grow Fast Without Hormones

Introduction

During a recent meeting, a group of growers were asked by a visitor if their birds were fed hormones. To my complete shock, virtually every grower stated that their birds were fed hormones. Let me hasten to add (as I did in the meeting) ***COMMERCIAL POULTRY ARE NOT FED HORMONES!*** Following my impromptu lecture, growers were quick to ask, "If there are no hormones used, why do birds grow so fast?" This article will briefly address the question of why birds grow so quickly as well as a few other related questions.

Why hormones are NOT used.

First of all, why are hormones NOT used in poultry feeds? Dale and Davis (2001) recently published a concise list of reasons "why hormones are not and, in fact, cannot be used in poultry production." These are listed on the next page with brief explanations.

HORMONES - continued on page 8

Hormone use is illegal in the United States. Additionally, hormones are not effective.

1. Hormone use is illegal. The United States and most other countries have regulations that strictly forbid the use of hormones in feeds.

2. Hormones are not effective. Growth is a complex event which requires a combination of adequate nutrition, specific metabolic events, and exact hormonal signals. The administration of a single hormone will not lead to rapid growth in a reliable fashion in poultry.

3. Administration is extremely difficult. Poultry growth hormones are proteins. When protein is fed to birds it is broken down by the digestive tract and is used by the bird like proteins from other sources (like corn or soybean meal). Obviously, breaking the hormone down in the bird's digestive tract would make them ineffective. Birds would have to be ***injected*** with the hormone to retain its effect. In addition, the hormone would have to be injected numerous times for the hormone to have any lasting effect.

4. High Cost. Chicken growth hormone is presently not commercially produced. Starting mass production of chicken growth hormone would be expensive. In addition, the production of enough hormone to supply over 8 billion birds with several injections would require a sizable investment. When the facts are all examined, the cost of the hormone alone would far exceed the value of the bird itself.

5. Negative impact on bird performance. Modern birds are already bred for maximum growth. In fact, birds often grow so fast that the major organ systems in their bodies have trouble keeping up. This is why, for instance, we lose birds to leg problems, heart attacks and ascites. ***If*** we were able to suddenly force rapid growth in modern birds, that growth would likely mean that most major organ systems in the birds could not keep up. It would not lead to an increase in productivity.

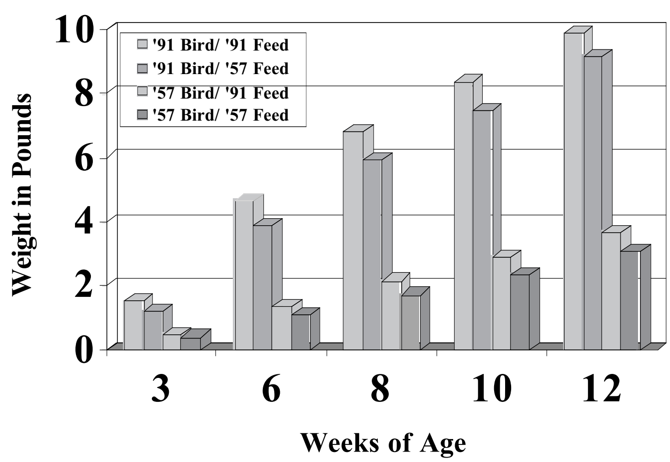
6. What about anabolic steroids? The press has documented the fact that athletes use anabolic steroids to increase muscle mass. There is no question that anabolic steroids can lead to an increase muscle mass if they are used ***AND*** are accompanied by strenuous physical exercise. If there is no exercise program there is no benefit to anabolic steroid use. The breast muscles are the most valuable part of commercial birds. Breast muscles are used by the bird to raise and lower its wings. Yet, domesticated birds such as these have been unable to fly for several thousand years. Thus, the lack of exercise would make it unlikely that birds would benefit from the use of anabolic steroids.

7. Hormones are simply not needed. The rapid growth of modern commercial birds is the outcome of steady improvements in genetics, nutrition, management and disease control. Hormones are simply not needed.

Why birds grow so quickly

If hormones are not fed to birds, what makes them grow so fast? Perhaps a study done at North Carolina State University will help answer this question. Havenstein and coworkers (1994) compared the performance of a broiler strain used in 1957 with a strain of broilers used in 1991. These researchers fed each of the strains feeds typical in 1957 or feeds typical today. The broilers were fed no antibiotics and (*of course*) no hormones. The average body weights of these birds are shown in Fig. 1 to the right.

Figure 1. Broiler Body Weights by Bird and Feed Type



While feed improved performance slightly, 1991 birds simply weighed more than 1957 birds regardless of the feed fed. At eight weeks of age the 1991 bird weighed approximately 4 pounds more than the 1957 bird! The comparison of the 1957 bird with the 1991 bird provides an example of the genetic progress made in the poultry industry with respect to growth. In addition, modern birds more efficiently convert feed to meat.

Feed conversion data are shown in Fig. 2. The 1991 bird more efficiently converted feed to meat than did the 1957 bird, in spite of the fact that it was much heavier. Yet, the news about rapidly growing strains of birds is not always good.

Fig. 3 shows the mortality data gathered in this trial. Mortality for the 1957 bird was highest between 0 and 3 weeks of age, while mortality for the 1991 bird peaked between 3 and 6 weeks. After 3 weeks of age, mortality for the 1957 strain was always less than 1%, while mortality for the 1991 strain was always above 2%. These data may be a reflection of the fact that modern birds are growing at the limits of their physical capabilities. This, in turn, means that in comparison to earlier broiler strains, modern birds grow much faster, but are more difficult to manage. HOWEVER, it should be noted that Havenstein and coworkers provided birds in this trial with 23 hours of light daily throughout the trial.

Figure 2. Feed Conversion by Bird and Feed Type

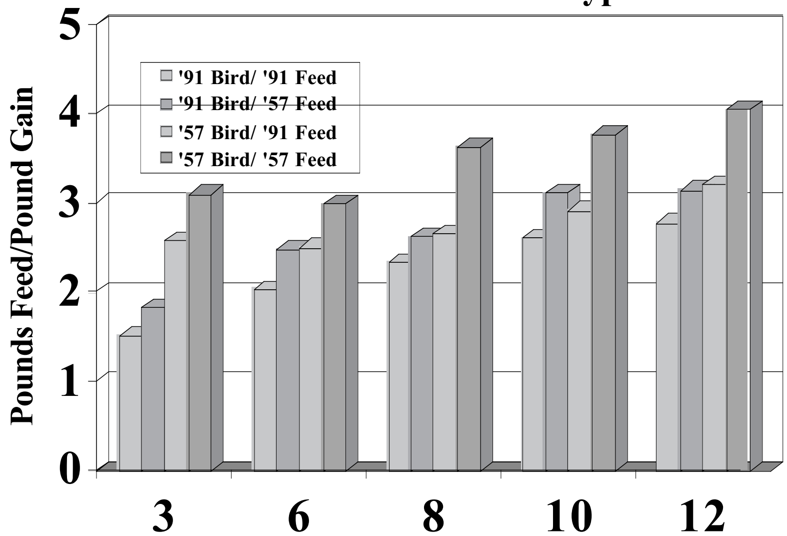
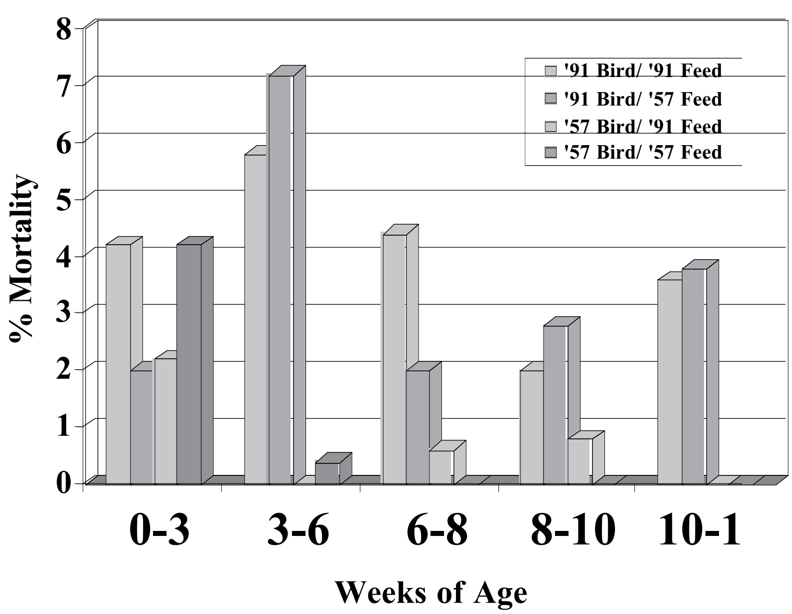


Figure 3. Mortality by Bird and Feed Type



Present day management techniques are designed to slightly slow growth so that birds can grow within their physical capabilities.

Nicholson (1998) published data similar to those above. These data are shown in Table 1 (page 10). The 1994 bird is superior to the 1976 bird in every way. In fact, Nicholson noted that it required 25 days longer for the 1976 bird to reach a weight of 2 kg (4.4 lbs) when compared to the 1994 bird! Clearly, the 1994 bird grows faster and produces more meat than the 1976 bird. However, Nicholson points out that modern birds cannot be managed the same as earlier genetic strains of birds.

New Broiler Management Techniques

Fifteen to twenty years ago the objective of broiler producers was to ensure that birds reach market weight as rapidly as possible. This meant providing birds with 23 hours of light so that they could eat as much as they want and grow as rapidly as possible. However, fast growing birds are at the limits of their physical capabilities and so management techniques have changed from earlier years. Present day management techniques are designed to slightly slow growth so that birds can grow within their physical capabilities (Nicholson, 1994).

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HORMONES - continued from page 9

Table 1. A comparison of broilers in 1976 and 1994[1]

Bird Characteristic	1976	1994
Weight at 49 days, lbs	2.83	5.90
Feed Conversion	2.20	1.89
Carcass Yield, (%)	65.1	70.0
Breast Meat Yield, (%)	11.53	16.82

[1] Adapted from Nicholson. 1998. Worlds Poultry Science 54:271-278

The data in Fig. 3 show that when fast growing strains of birds are provided with 23 hours of light, mortality increases as compared to earlier broiler strains. This mortality costs the grower. Nicholson (1994) points out that a 1% reduction in mortality in a flock of 50,000 broilers will yield an extra 2,200 pounds (1000 kg) of weight to sell at the end of the flock. This extra weight would obviously mean extra money for the grower.

Lighting programs recommended by many complexes are designed to limit access to feed and, in turn, to slow growth. Growth is slowed slightly so that the systems within the bird (primarily the circulatory system) are less likely to fail and the grower is able to deliver more birds to the plant. While delivering more birds to the plant requires generally means more pay for growers, more effort is required from growers than several decades ago.

Since present day broiler strains are growing to the limit of their physical capabilities, they tend to be more susceptible to the effects of environmental conditions and stressors than earlier broiler strains. This susceptibility means that for the bird to live up to its potential, growers must ensure as near an ideal growing environment as possible. Furthermore, rapid growth rates mean that bird health can deteriorate quicker and death can come much more rapidly than it did with earlier strains. Thus, fast growing strains of broilers allow producers to be extremely efficient, but clearly they must be managed so that they do not self-destruct!

Perspective and Conclusions

The modern day poultry industry makes production of massive amounts of high quality poultry products look quick and easy. Television and folklore may entice us to fantasize that some magic potion is responsible for the industry's ability produce products efficiently. However, nothing could be further from the truth.

The benefits of rapid, efficient bird growth are a result of the work of countless industry and university personnel over the last five decades. These individuals have worked innumerable hours seeking solutions to industry problems and improving production efficiency. Few magic bullets are used by the industry to attain this efficiency. Clearly in order to maintain this efficiency producers as well as company personnel must work harder than in previous years since birds are operating a the limits of their physical capabilities. Nevertheless, the efficient production of poultry products has been attained through use of scientifically based information, record keeping, communication, and through hard work, NOT magic potions.

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Management to Minimize Reduction in Fertility and Hatchability Late in Lay

Introduction & Review

In all avian species, as well as in other animals in the animal kingdom, increasing age has an adverse effect on reproductive success. The age related decrease in reproduction in the commercial fowl is due, in part, to a decline in egg production, fertility and hatch of fertile. This decline in egg production begins to occur once hens reach their peak in egg production. However, the precise factors that influence and cause the age related decline in reproduction are poorly understood.

The decrease in fertility and hatchability with increasing hen age may be due to a decline in the ability of older hens to retain sperm in special sperm host glands in their oviduct. Research has shown that the number of sperm residing in the sperm storage glands of virgin old and young chicken hens was equivalent. However, the release of the sperm from the sperm host glands in old hens was twice that observed in young hens. The exact cause of the release of larger numbers of stored sperm cells by older hens is unknown.

However, in older hens which have experienced a decrease in fertility, artificially insemination with an increased number of sperm or by reducing the time frame between inseminations can reduced the drop in fertility. From a practical standpoint, this means that older hens require inseminations at a greater frequency than when they were young. Perhaps this supports the belief that the older hens are somehow less able than younger hens to internally store sperm for long periods.

In all avian species, as well as other animals in the animal kingdom, increasing age has an adverse effect on reproductive success.

Controlled Experimental Data

A study was conducted to determine the effects of age of both the male and the female broiler breeder on sperm penetration, and thus fertility, using artificial insemination in caged birds. In this study, young hens had significantly higher sperm penetration values [holes in the outer membrane of the yolk caused by sperm cell attachment] (7.27), and fertility (73.7%) as compared to old hens (4.79, and 54.9%, respectively). When comparing the males based on age, interestingly enough, old males had slightly higher sperm penetration and fertility values (7.24 and 70.6%) as compared to young males (4.82 and 58.0%), respectively. As expected, egg production from the old hens was significantly lower over the four-week period than the young hens (37.3 vs. 79.2%, respectively).

Male role in infertility. It has been well documented that as males age the decline in fertility is associated with a reduction in the number of spermatozoa in the ejaculate and the volume of semen produced. However, when artificially inseminating hens with 50 million total sperm from either young or old males, there was not a decline in fertility or sperm penetration with increased age of the male. These results were not expected, but indicate that the physiological capabilities of sperm to penetrate and fertilize the ovum remains largely intact in older males. Results from this study show that if the physical abilities and libido of older males is preserved, their ability to fertilize hens will not be reduced as they age. The challenge, then, lies in preserving the older males desire and physical abilities to successfully complete matings. In the hen, physical impairments or the lack of response to male aggression *may* contribute to the decrease in fertility; while male competition, physical injuries and decreased libido *are* contributing factors in the male.

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Many producers try to overcome the negative effects of the older males by spiking flocks with young males beginning at ~ 40 weeks of age or when the male to female ratio gets too low. According to the literature, these young males should have higher concentrations of sperm and ejaculates of greater volume, however this may not always be the case. More often than not, the benefits of spiking are not due to increased mating by the newly added younger males. The primary initial reproductive benefits come from an increase in activity and aggression of the older, established males as they are challenged by new males. This idea is supported by the concept of intra-spiking in which a number of males are switched from either one end of the house to the other, or same age males moved from adjoining houses on the same farm. The young males used to spike flocks should be well fleshed and physically fit in order to establish themselves in the house and avoid the social castration that occurs to males unable to compete with the established males in a flock.

Hen role in infertility. As expected, in the previously mentioned study there was a considerable effect of hen age on egg production. Also, as expected, there was a corresponding drop in fertility in older hens as compared to the younger hens. Although the effects of age on fertility and egg production are well understood, prior to this study it was not known whether sperm had the same opportunities to fertilize ova from older hens as compared to the younger hens. Results from this study indicate that, when artificially inseminated with similar numbers of sperm, average sperm penetration was decreased in the older hens as compared to the young hens (4.8 vs. 7.3 holes) regardless of the age of the males used for sperm collection and insemination. However, the method of evaluating sperm penetration used in this study evaluated both sperm transport and storage within the hen and the capabilities of sperm to bind and penetrate. Thus, it was impossible to determine if the decrease in fertility was due to a reduction in the sperm transport and storage capacity of the hen or if sperm were less able to bind and penetrate. Nevertheless, the data indicate an obvious reduction in the ability of older hens to maintain optimum fertility when managed similarly to younger hens.

A few possible explanations exist as to why this drop in fertility occurs in older hens. These possibilities are: 1) sperm are released from the sperm storage glands in older hens more readily or in larger numbers than in young hens, 2) older hens are typically heavier and fatter which likely reduces the size of the sperm storage tubules thus older hens would not store as many sperm as younger hens, 3) sperm stored in older hens do not retain their viability as long as when stored in young hens, or 4) older hens produce less receptor sites on the ovum for which the sperm are able to bind and penetrate prior to fertilization.

The first scenario involving a more rapid release of sperm from the storage tubules does not seem as likely as a sole player in the reduction in fertility. This is due to the fact that if viable sperm were released from the sperm storage tubules in larger numbers in the older hens, this should be reflected in a subsequent increase in the measured sperm penetration values while not necessarily indicated by increases in fertility. From the previous study, following a single insemination older hens actually had a more drastic drop off in sperm numbers available to fertilize the ovum than younger hens.

The second scenario would help to explain why older, heavier hens can attain similar fertility levels if they are inseminated more frequently. If the reduction in fertility was solely due to less sperm available for fertilization then simply increasing sperm numbers in older hens would provide adequate fertility as data in our study showed. This would mean that commercial flocks in peak production with males which deposit excess sperm into the hens with each mating are likely to see a less drastic drop in fertility as the birds age. However, flocks in which the males do not produce and deposit excess sperm, will undoubtedly experience fertility problems much earlier in their life.

The third suggestion that sperm that is stored in older hens do not retain their viability as long is also possible. The more rapid decline in sperm penetration and fertility in older hens following a single insemination could occur due to sperm cells that are less capable of fertilizing the egg. There may be enough physiological changes in the hen to change the environment in the reproductive tract where sperm are stored in the host glands. If there are enough changes in the sperm storage environment of the hen's oviduct, a smaller percentage of the stored sperm would remain viable and capable of fertilizing the egg.

Lastly, there is likely a decrease in the number of sperm receptors on the surface of the ovum in older hens. When values for sperm penetration of the outer membrane of the ovum were determined for both old and young hens *in vitro* (outside the body of the hen), there was less sperm penetration in ovum from older hens. This method removes factors such as sperm release from storage sites, quantity of sperm stored, and duration of viable sperm storage as well as sperm transport in the oviduct and the success rate of actual insemination.

From this study then, what is the effect of age on the ability of older hens to produce fertile eggs? While it is commonly believed that most flock fertility problems are male related, from this study it is evident that the reduced fertility in older flocks is due in part to physical and physiological changes in the hen. However, given the fact that each male is responsible for anywhere from seven to ten hens, and through proper flock management fertility is often maintained, male management is still often to blame for poor fertility.

Field Data

Recently, records from broiler breeder flocks raised in the last several years were sorted and analyzed. These records were then separated out to include all flocks where a male body weight, or a hen body weight was recorded. Each record included flock information for a specific week of production, therefore, the total number of records does not indicate a total number of flocks. The records which included either a hen or male body weights were then sorted by age and records were pulled to compare all flocks at 30, 35, 40, 45, 50, 55, and 60 weeks of age. Flock production was then compared with the average body weight of the breeders.

Effects of male body weight. For the records which included a male body weight, each group from 35 to 55 weeks of age showed an increase in production parameters as there was a

FERTILITY - continued on next page

corresponding decrease in male body weight as shown in Figures 1 and 2. Obviously, there is a happy medium in obtaining proper male body weight. Too light a male will also cause serious problems reproductively. However, the data from this large sample of commercial broiler breeder flocks, clearly suggest that flocks with overweight males do not perform as well as those flocks where male body weight has been kept in control. As previously mentioned, although most older males are physiologically capable of producing high levels of fertility, they tend to lose the physical necessities to effectively mate breeder hens as often as necessary. The reduction in the physical necessities to mate may be caused by soreness in the legs and feet which restrict the mobility and balance necessary to successfully complete matings, or they simply lose the desire to mate hens frequently. Also, as was discussed previously, older hens require more frequent matings in order to maintain fertility, and overweight males often do not provide this.

Figure 1. Males at 55 weeks of age

132 flocks, avg=10.7 lbs, 9.05 - 13.29 lbs

Figure 2. Males at 50 weeks of age

121 flocks, avg=10.58 lbs, 8.96-13.63 lbs

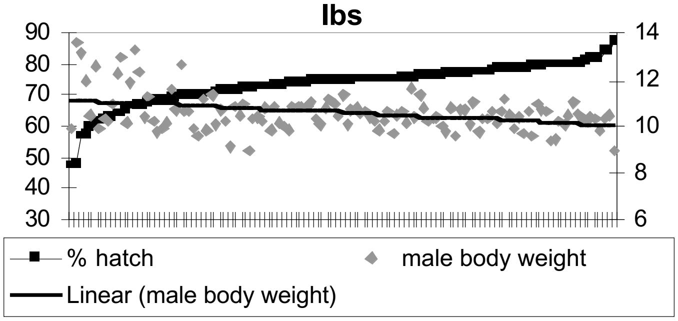
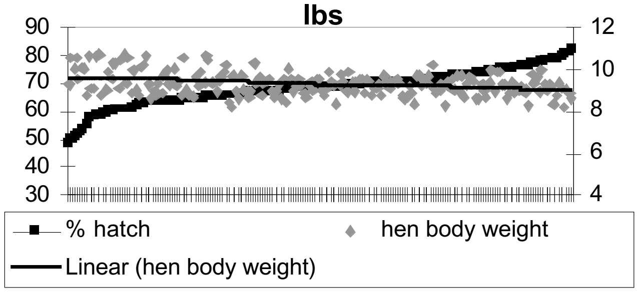


Figure 3. Hens at 55 weeks of age

202 flocks, avg=9.31 lbs, 8.16-10.72 lbs



Although this concept is well understood by most broiler breeder managers, too often they are more concerned with having under weight or under fed males as opposed to a thicker, robust and slightly heavy male. Also, it is well understood that breeder males should not lose weight at anytime in their life cycle, so keeping them gaining a small amount, but not too much weight is difficult. Indeed, while severely under weight males will actually shut down their reproductive system, over weight males often do not experience physical problems which reduce fertility until late in the production cycle of the flock. While many producers feel that a slightly heavy male may be more active and capable of attaining fertility early, from this data set flocks with the lowest male body weight at 35, 40 and 45 weeks of age also had better reproductive performance. So, from this data, the benefits of strict control of male body weight are seen throughout the production life of the flock. Strict control of weight gain and over all body and fitness can only be achieved through monitoring the body weight from a sufficient number of males often and correctly throughout the breeder house.

Effects of hen body weight. Other than egg production and shell quality, reproductive performance of a flock is determined by fertility, and when problems exist the male is generally blamed. Indeed, considering that each male is 'responsible for' eight to ten hens, it would appear that male problems can rapidly affect a large number of hens. However, this concept is probably over rated with hens contributing a greater responsibility to fertility than previously believed. Using the same data set discussed previously, flocks with hen weights recorded at 50 and 55 weeks of age were sorted by reproductive success and it was found that hen body weight was also a significant factor in overall flock hatchability as seen in Figures 3 (this page) and 4 on the next page.

Again, there is a happy medium as to maintaining breeders too light, but the data set indicates that when older hens are too heavy, reproductive performance suffers as well as egg production. The possible explanations of this are several. One, relates to the storage of sperm cells in the sperm storage glands. As it was postulated, when hens become overweight, the excess mass in the abdominal region may cause the holding capacity of the sperm storage tubules to be reduced. If these hens, which are

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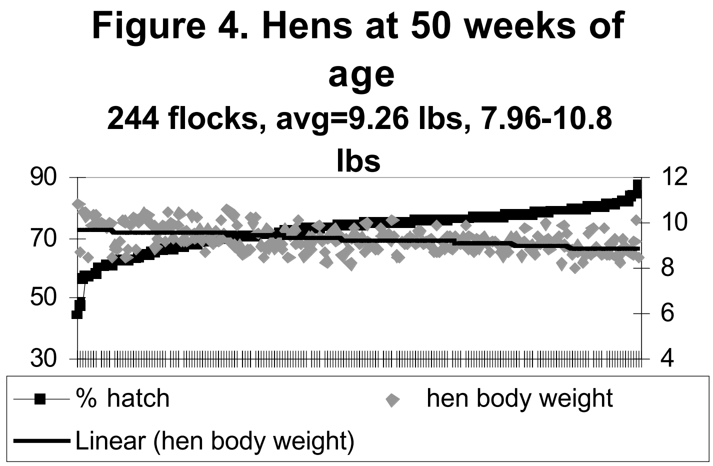

already less capable of producing fertilized eggs, have a reduced ability to store viable sperm cells long term, and cannot internally store as many total sperm cells, fertility problems due to age would be compounded. Additionally, excess body weight, whether a function of a larger frame size or body mass, may decrease the success rate of male mating activity. In either case, the data makes it apparent that heavier hens do not reproduce as well as lighter hens as they age.

Summary

In conclusion, it is well understood that age does negatively affect reproduction and fertility in broiler breeders. While the fertilizing and penetration abilities of sperm from older males appears to be relatively unaffected by age, the hen undergoes some physiological changes as they age that affect their ability to be fertilized. However, in addition to management practices such as spiking, and maintaining appropriate *active* male:female ratios, body weight is clearly a major factor to maintain broiler breeder physical ability and desire to produce fertile eggs. While frame size and actual fleshing of the bird are equally important to actual body weight, these data clearly indicates a strong correlation between weight control in breeders and achieving a high fertility level throughout the life a broiler breeder flock. ■

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Photo courtesy of Dr. Marlene E. Janes and Dr. Mike G. Johnson, Department of Food Science, University of Arkansas.

E. coli Infections (Colibacillosis) in Poultry

***E. coli* Strains**

Colibacillosis is the term used for an infection caused by the bacteria *Escherichia coli* (*E. coli*). The condition may also be referred to as coliform infections. Poultry worldwide are affected with *E. coli* infections.

E. Coli- continued on next page

E. coli is a gram negative, rod-shaped bacteria that can be found worldwide. It inhabits the intestinal tract of most species of mammals and many species of birds. There are many different strains of *E. coli* in poultry. Some strains can cause severe disease, while others often do not show symptoms in birds. These strains are widespread in the environment and in fact may be normal inhabitants of the intestinal tracts of chickens, turkeys, and other poultry.

E. coli can cause infections that result in numerous problems. Some infections cause high mortality (death loss), while other infections are more chronic (long term) in nature with few deaths resulting. *E.coli* infections can also worsen other diseases since it is considered a secondary or opportunistic invader.

Poultry can be infected with *E. coli* at almost any age. However, the disease is seen primarily in young growing birds or birds that have been immune compromised. *E. coli* infections that enter via the navel are usually associated with very high death losses. However, the bacteria usually gains entry into the bird via the respiratory or gastrointestinal tract.

Symptoms, Lesions and Diagnosis

The clinical symptoms of Colibacillosis vary with the type of infection. In the acute (sudden) septicemic form of the disease there are sudden death losses and usually few symptoms. Most *E.coli* infections cause a high number of sick birds (morbidity) with infected birds listless, unthrifty, and having ruffled feathers. Other symptoms may include, poor growth performance, loss of appetite, and weight loss. When the bacteria have infected the respiratory system there can be associated labored breathing, coughing, sneezing, or rales. *E. coli* may also be involved with intestinal infections with associated diarrhea.

Lesions associated with the disease depend upon the organ infected. Numerous organs can be affected or only a few. In the septicemic infection, which affects most organs, there is swelling, dehydration, and congestion of the liver, spleen, and kidneys with pinpoint (petechial) hemorrhages on organ surfaces. The most common lesion is a grey-white membranous exudate on the organ surfaces such as the liver, pericardial sac, kidney and air sacs. A caseous (cheesey) type of exudate can also be found on the organs. Infected intestines are usually reddened externally with a thickened internal (mucosal) surface. Hemorrhages may also be present and intestines may contain mucous or watery contents. A yolk sac infection may be seen in very young birds.

The disease is tentatively diagnosed by the symptoms and lesions. It is confirmed by isolating the bacteria from the affected organs. This is usually performed in a diagnostic laboratory and often the organs are examined microscopically for the associated pathological lesions. In addition, an antibiotic sensitivity can be performed to determine which antibiotic can be used since *E.coli* infections are often difficult to treat.

Treatment

Antibiotic therapy may have only limited use, since the bacterium develops resistance with amazing rapidity. Thus, management procedures designed to minimize the disease should be used. Sanitation is very important in reducing the *E.coli* organisms in the poultry house environment. A good cleaning and disinfection program using approved chemicals can help in the prevention of the disease. Efforts to reduce stress on the birds should also be utilized. Things to consider include; good litter management, adequate ventilation, chlorination of the water supply, vermin and rodent control, and keeping clean feed and water available to the birds. Other factors to consider are avoiding overcrowding, visiting the youngest birds first, and preventing chilling and overheating. These managerial practices and a good Biosecurity will not only assist with the prevention and control of *E. coli*; but, will help with numerous other diseases.

Summary

E. coli infections can affect almost any organ, with infection severity ranging from acute to nonexistent. Characteristic symptoms and lesions can provide a tentative diagnosis, but the organism must be isolated from affected organs to confirm the diagnosis. Antibiotic treatment can be of limited value in controlling the disease. *E. coli* infections are most effectively controlled by limiting bacterial exposure levels and reducing bird stress. ■

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Applied Broiler Research Unit Performance Report

Information Key

Variable	Units	Explanation
HSE	No.	House number
FEED CONV	LB/LB	Feed conversion or pounds of feed per pound of gain
HEAD PLACED	No.	Number of chicks place in the house at the beginning of grow-out.
HEAD SOLD	No.	Number of birds sent to the processing plant
LIV	%	Livability or Head sold/Head placed * 100
AGE	D	Age of birds at processing in days
AVE BIRD WT	LBS	Average live bird weight at processing
COND	%	Percentage of birds condemned by the government inspector at the plant. Condemned birds are not fit for human consumption.
FEED COST	$	Feed costs in dollars
CHICK COST	$	Chick costs in dollars
MED COST	$	Medication Costs in dollars
TOTAL COST	$	Total costs in dollars
COST/LB	Cent	Total costs per pound of live bird weight in cents per pount
PAY/LB	Cent	Payment received from the poultry company in cents per pound.
F.A.	$	Fuel allowance-a payment provided by the poultry company to help defray heating fuel costs
GAS USAGE	GAL	Propane usage in gallons
ELECT	KWH	Electrical usage in kilowatt hours

Unit Description

The first flock at the Savoy Broiler Unit was placed on November 19, 1990. The unit contains four 40 x 400 foot broiler houses. Each house contains Cumberland pan feeders, Ziggity nipple waterers and about 1.5 million BTU propane heating capacity for brooding. Each house is equipped with a computer controller which controls fans, brooders and curtains for temperature control. Houses are also equipped with temperature monitoring equipment (about 80 sensors per house), an electronic water flow monitoring system, weigh bins for feed delivery to the house, sensors for the monitoring of fan run time and devices to determine gas flow from storage tanks.

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Houses 1 and 2 were built with steel trusses with R10 insulation in the ceiling while houses 3 and 4 were constructed with wood trusses, R19 ceiling insulation and drop ceilings. Houses 1 and 3 are conventionally ventilated with misters for summer cooling, but 2 and 4 are tunnel ventilated. House 2 contains a "sprinkler" cooling system for summer cooling. The system was developed at the University of Arkansas and utilizes a landscape sprinkler system to deliver a coarse, cooling mist to the backs of the birds. House 4 utilizes evaporative cooling pads to cool the inlet air.

PRODUCTION SUMMARY: FLOCK 58 (January 30 - March 23, 2001)

HSE (No)	FEED CONV (LB/LB)	HEAD PLACED (No)	HEAD SOLD (No)	LIV (%)	AGE (D)	AVE BIRD WT (LB)	COND (%).	FEED COST ($)	CHICK COST ($)	MED. COST ($)	TOTAL COST ($)	COST/LB (Cent)	PAY/LB (Cent)	F.A.[1] ($)	GAS USAGE (GAL)	ELECT USAGE (KWH)
1	2.20	20680	18531	89.61	52	5.52	2.92[2]	11271	3516	48.35	14835	14.940	2.7322	579.30	1680	3946
2	2.07	20765	19174	92.34	52	6.00	2.92	11935	3530	48.35	15514	13.885	3.7868	579.30	1245	1995
3	2.08	20697	19211	92.82	52	5.61	2.92	11239	3518	48.35	14806	14.141	3.5307	579.30	1363	2430
4	2.05	20691	19016	91.90	52	5.84	2.92	11390	3517	48.35	14956	13.878	3.7939	579.30	2420	2549
FARM	2.10	82833	75932	91.67	52.00	5.74	2.92	45835	14082	193.40	60110	14.194	3.4780	2317.30	6708	10920

[1] F.A. - Fuel Allowance
[2] Condemnation percentage could not be divided by house

House No.	Mortality Count by Days of Age			
	0-14	15-43	44-52	TOTAL
1	494	639	1016	2149
2	447	597	547	591
3	501	510	475	1486
4	815	534	326	1675
Farm	2257	2280	2364	6901

Manager's Comments on Flock 58

Chick quality may have been a major factor in the poor performance of Flock 58. First week mortality was high and mortality stayed high throughout the flock. Final mortality figures are shown in the table. House 4 lost a significant number of birds in the first 2 weeks, while house 1 was breaking with a respiratory problem the last 2 days of the flock. Even though condemnation percentages could not be equally divided, it seems reasonable to assume that since House 1 was breaking with disease, it is responsible from most of the 2.92% condemnation. The high death losses near the end of the flock and the high condemnation rate dramatically increased feed conversion for the flock putting us well down on the ranking sheet. We ranked 9th out of 13 growers which was better than expected given the high mortality and bird health problems. Down time was 11 days between this and the previous flock and that is pretty close together given the winter season and built-up litter. This was the 6th flock grown on the same litter. The integrator paid to have 400 lbs of PLT put in brood end of each house before chick placement to assist with ammonia control. Caked litter removed from the houses was as follows: House 1 - 2 loads, House 2 – 3 loads, House 3 – 4 loads, and House 4 – 4 loads.

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PRODUCTION SUMMARY: FLOCK 59 (March 29 - May 10, 2001)

HSE (No)	FEED CONV (LB/LB)	HEAD PLACED (No)	HEAD SOLD (No)	LIV (%)	AGE (D)	AVE BIRD WT (LB)	COND (%).	FEED COST ($)	CHICK COST ($)	MED. COST ($)	TOTAL COST ($)	COST/LB (Cent)	PAY/LB (Cent)	F.A.[1] ($)	GAS USAGE (GAL)	ELECT USAGE (KWH)
1	1.87	22879	21861	95.55	42	4.04	2.28[2]	8276	3889	27.21	12192	14.134	4.1564	0.00	723	1941
2	1.87	22912	21954	95.82	42	4.10	2.28	8394	3895	27.21	12316	14.007	4.2831	0.00	625	1541
3	1.98	22885	21225	92.75	42	3.73	2.28	7844	3890	27.21	11762	15.196	3.0944	0.00	984	1754
4	1.98	22878	21477	93.88	42	3.83	2.28	8171	3889	27.21	12088	15.020	3.2701	0.00	1351	2022
FARM	1.92	91554	86517	94.50	42.00	3.93	2.28	32685	15564	108.84	48358	14.563	3.7276	0.00	3683	7258

[1] F.A. - Fuel Allowance
[2] Condemnation percentage could not be divided by house

Manager's Comments on Flock 59

Chick quality may again have been a serious problem on Flock 59. Overall mortality improved from the previous flock, however, birds were extremely uneven in size during the entire flock. Even though rigorous culling was maintained throughout the flock, over 1300 birds were left on the farm after catching due to their size and a few hundred more should probably have been left. Total birds left by house were as follows: House – 146 birds, House 2 – 209 birds, House 3 – 447 birds, House 4 – 561 birds. Condemnation remained high at 2.28%, but most of the condemnation on this flock was sep-tox, which was probably related to the poor flock uniformity. Ranking was a very lackluster 15th out of 20 growers. A small average weight bird coupled with a high condemnation rate and high feed conversion led to less-than-desirable performance. We were switched by the integrator from 8-week birds to 6-week birds on this flock and will continue to grow 6-week birds at least until the fall season. The integrator again paid for 400 lbs of PLT placed in the brood end at chick placement for ammonia control. While this did seem somewhat beneficial, House 4 continues to be our problem house for high ammonia. This can be seen in the fact that gas and electric usage was highest in House 4 due, in large part, to the extra ventilation needed for ammonia removal and the extra gas burned to compensate for the extra ventilation. Down time between this and the previous flock was 6 days. Caked litter removal was as follows: House 1 – 0 loads, House 2 – 2 loads, House 3 - 3 loads, and House 4 – 3 loads. To give you an idea of how much weight that is, we have a single axle decaker that hauls 3500 lbs of loose, dry litter or 4000 lbs of wet, caked litter per load.

PRODUCTION SUMMARY: FLOCK 60 (May 18 - June 29, 2001 [Houses 3 & 4] June 30, 2001 [Houses 1 & 2])

HSE (No)	FEED CONV (LB/LB)	HEAD PLACED (No)	HEAD SOLD (No)	LIV (%)	AGE (D)	AVE BIRD WT (LB)	COND (%).	FEED COST ($)	CHICK COST ($)	MED. COST ($)	TOTAL COST ($)	COST/LB (Cent)	PAY/LB (Cent)	F.A.[1] ($)	GAS USAGE (GAL)	ELECT USAGE (KWH)
1	1.95	22820	21651	94.88	43	3.68	0.81[2]	7775	3879	24.14	11678	14.762	2.8060	0.00	531	4180
2	1.80	22775	22057	96.89	43	4.37	0.81	8666	3872	24.14	12561	13.147	4.4214	0.00	367	3589
3	1.81	22874	21986	96.12	42	4.11	0.81	8184	3889	24.14	12096	13.509	4.0595	0.00	478	4071
4	1.92	22775	22099	97.03	42	3.94	0.81	8375	3872	24.14	12271	14.209	3.3597	0.00	749	3501
FARM	1.87	91244	87803	96.23	42.50	4.03	0.81	32999	15511	96.56	48607	13.866	3.7031	0.00	2125	15341

[1] F.A. - Fuel Allowance
[2] Condemnation percentage could not be divided by house

REPORT- continued on next page

Managers Comments on Flock 60

Chick quality improved on Flock 60 with the exception of House 1, which remained extremely uneven in size and mortality approaching 1200 birds by harvest. Condemnation was a much more respectable 0.81% even though this was the 8th flock of birds grown on the same litter. Ranking was 19th out of 27 growers. While Houses 2 and 3 did quite well, Houses 1 and 4 did not perform as well, which had a negative effect on our ranking. A couple of interesting observations can be made concerning House 2. In terms of both gross pay and net pay (gross pay minus fuel and electricity) per house, House 2 performed the best on each of the previous 3 flocks (Flocks 58, 59, and 60). House 2 is also the house that has received major renovations (for both summer and winter conditions) since its construction. These renovations have given us our best air speed and uniform air movement in the summer and the greatest control of minimum ventilation in the winter. Down time between this and the previous flock was 8 days. Caked litter removal after flock 60 was: House 1 – 1.5 loads, House 2 – 2 loads, House 3 – 3 loads, and House 4 – 3 loads. ■

Coming Events:

September 11-13, 2001 — **Annual Nutrition Conference**
Clarion Hotel, Fayetteville, AR
Contact: The Poultry Federation (501) 375-8131

September 13-15, 2001 — **Annual Turkey Committee Meeting**
Eureka Springs. AR
Contact: The Poultry Federation (501) 375-8131

October 1-4, 2001 — **America's Clean Water Foundation**
Environmental Auditor Training
Morrilton, AR (501) 575-3250

October 12-21, 2001 — **Arkansas State Fair**
State Fair Grounds
Little Rock, AR (501) 372-8341

November 26-29, 2001 — **America's Clean Water Foundation**
Environmental Auditor Training
Hope, AR (501) 575-3250

Avian Advice

Published approximately four times per year, Avian Advice is sponsored by The University of Arkansas Division of Agriculture, The Cooperative Extension Service and The Center of Excellence for Poultry Science.

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