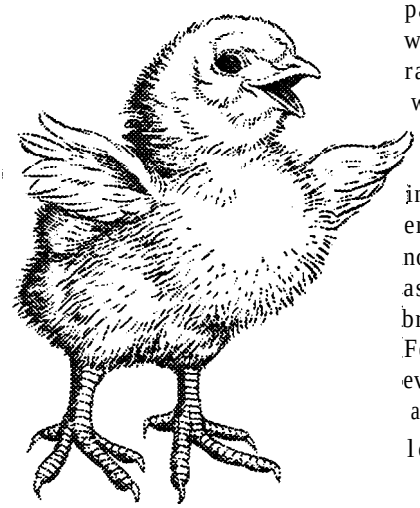
CURRENT CONCEPTS IN Broiler Production SPRING 1997

Water Contaminants Can Affect Broiler And Breeder Performance

Various authors (1,2,3) have promoted the idea that water quality is important to poultry health and per-formance; however, little actual data exist to delineate the effects of water contaminants on broiler or breeder productivity. In fact, many of the recommendations presented as to suggested mineral tolerances in poultry are extrapolated from other species. Barton (4) compared broiler farm well water profiles to grower rankings to determine whether water quality was correlated with broiler performance. His work indicated that several mineral contaminants, most notably nitrates, could be associated with aspects of broiler growth and health. Few other studies, however, evaluate bird performance at practical contamination levels.



Auburn Research

Research conducted in Dr. B. W. Kemppainen's lab at Auburn University's College of Veterinary Medicine examined the performance of broilers and broiler breeders exposed to volatile organic chemicals and heavy metals at levels found in ground water near hazardous waste sites. Contaminants in the water mixture included arsenic, cadmium, lead, benzene, and trichloroethylene (TCE) (See table).

Breeders in floor pens were given contaminated water from 28 weeks through peak production. Body weights were reduced linearly as contaminant level increased. Relatively low levels of contamination affected egg production, egg weight, and embryonic mortality, indicating that breeders are more sensitive to water quality in terms of hatchability than productivity. Water consumption was reduced at the highest contamination level.

Broilers given the same contaminants showed decreased water and feed intake, decreased body weight, and reduced immunity (humoral and cell mediated). Broilers given feeds with reduced vitamin levels were affected more severely by water contaminants, indicating that nutritional status influences the bird's response to an outside stress of this type.

Conclusions

These data further underscore the potentially negative effects of well water contamination on poultry productivity. Farmers handle a number of chemicals in routine crop and livestock applications, and proper handling to avoid ground water contamination must become an issue for poultry and human health. Continued monitoring of well water

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AU Notes

One charge of the Poultry Science Department is the graduate and postgraduate training of poultry professionals to work in industry and university settings. Auburn's Poultry Science group is currently training fifteen Graduate Research Associates in a number of disciplines under the supervision of Graduate Coordinator Dr. Don Conner. Preparation of abstracts for this year's Poultry Science Society meetings (Athens, GA, August 3 to 6) yielded seventeen abstracts in the areas of food safety bacteria, cellulitis, broiler prestarter feeds, bursal disease monitoring, reovirus infections, broiler breeder feeding, and corn screening nutrient levels.

Schematic plans for the new Poultry Science Building were presented to the Auburn University Board of Trustees on March 20. Fund raising from industry sources is underway, working toward a goal of $3 million. Federal and State funding is expected to raise $12 million. A successful campaign will result in a research and teaching facility that will support the poultry industry for years to come. Please help us make this facility a reality.

Concentrations Of Contaminants In Experimental Water Supply

	PPM				
	Control	Low	High	EPA[1]	ADEM[1]
Arsenic	<0.10	0.80	8.6	30.6	5.80
Cadmium	<0.10	5.10	50.0	0.85	0.46
Lead	<0.50	6.70	67.0	37.0	19.0
Benzene	<0.01	1.30	13.0	5.00	1.90
TCE[2]	<0.01	0.65	6.5	1.25	0.01

[1] Average ground water survey results from the Environmental Protection Agency (Yang and Rauchman (5), 1987, Fay, 1994 (6)) and Alabama Department of Environmental Management.

[2] Trichloroethylene

This information was provided by J. B. Hess of the Poultry Science Dept. and B. W. Kemppainen of the Department of Physiology and Pharmacology, College of Veterinary Medicine. Collaborators in Dr. Kemppainen's work included J. K. Vodela, S. D. Lenz, J. A. Renden, and W. McElhenney.

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quality would seem prudent, particularly when broiler or breeder performance is subpar despite reasonable efforts on the part of the grower. The really difficult questions arise when a problem well needs to be corrected.

References:

1. Keshavarz, K. 1987. Proper water management for poultry. *Poultry Digest*, Jan-

2 Vorha, P.N. 1980. Water quality for poultry use. *Feedstuffs*, July 7, pp. 24-25.

3. Balnave, D., and T. Scott. 1986. The influence of minerals in drinking water on egg shell quality. *Nutrition Report International* 34:29-34.

4. Barton, T. L. 1989. Effects of water quality on broiler performance. *Zootechnica International*, March, pp. 44-46.

5. Yang, R S. H., and E. R Rauchman. 1987. Toxicological studies of chemical mixture of environmental concern at the national toxicology program: Health effects of ground water contaminants. *Toxicology* 47:15-34.

6. Fay, M. 1994. Frequency of binary-pair mixture in major media, based on HazDat data from all National Priorities list sites. Hazardous Waste and public Health: International Congress on the Health Effects of Hazardous Waste. Princeton Scientific Publishing Co., Princeton, NJ, pp. 659-671.

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Current Concepts In Broiler Production is a publication of the Alabama Cooperative I&tension System with the cooperation of the Department of Poultry Science at Auburn University. This publication is designed to provide new and emerging concepts and information to those involved in broiler and breeder production.

Information on management, feeding, and disease will be compiled from research underway at Auburn University, as well as from other sources. New technologies and practices will be highlighted as they become available.

Compactors For Broiler Feed Conditioning

Several years ago I was introduced by a colleague in the Canadian feed industry to the concept of feed compaction as an alternative to expanders. Compactors, I was told, use friction to raise feed temperature and gelatinize a higher portion of grain starch than traditional pelleting. These units, however, require less space than an expander and are easier to install into an existing mill. For these reasons, compactors have been considered a lower-cost method of improving feed conditioning.

Although the starch gelatinization process is not as complete with compactors as that achieved with an expander, many of the field performance improvements seen with the latter can be expected. The most noticeable change is an improvement in pellet quality and durability.

A recent article by D. J. Castaldo in *Feed Management* reviewed this type of conditioning and outlined how one Canadian firm is using a compactor to improve feed texture and starch gelatinization. Compactors force feed through an adjustable gap in a compression chamber after a standard conditioning chamber. The resulting friction raises feed temper ature to 195 to 210°F and gelatinizes grain starches. Conditioned feed then passes through the pellet mill with much less friction.

The compactor has the advantage of not requiring the lump breaker needed with expanders. In addition, a thinner pellet mill die may be used since stress on this portion of the system is lessened. On the down side, system stress is placed squarely on the compression chamber which will require maintenance to keep the system running. In addition, flow coordination between the compactor and pellet mill has been a problem at the mill discussed in this article *in Feed Management.*

In short, companies considering feed conditioning systems, such as expanders, to improve pellet quality, ingredient usage, and broiler performance should look also at compactors to determine the most cost effective way to upgrade their mill.

Reference:

Castaldo, D. J. 1996. Friction Compactor Conditioning. *Feed Management*, December, 47 (12).

This information was provided by J. B. Hess of the Poultry Science Department at Auburn University.

Cellulitis Condemns Under Study

Avian cellulitis, sometimes called inflammatory process or IP, is a problem very familiar to most broiler integrators in the United States and Canada. The incidence of cellulitis has increased dramatically over the past few years so that, today, it rates as the second leading cause of condemnation at processing. Conservative estimates indicate that losses may exceed $40 million when losses from slowed line speed, direct carcass loss due to condemnation, and yield loss caused by trimming are combined.

Cellulitis is an infection that occurs under the skin of otherwise healthy, normally growing birds. Bacteria involved in these infections are frequently *E. coli.* Traditionally, there were thought to be two types of cellulitis. Type 1 cellulitis was traditionally thought to originate in the hatchery, occurring when the navels of newly hatched chicks were contaminated by bacteria. Type 2 cellulitis was considered to occur during growout when the skin of birds was scratched or punctured and the wound was contaminated by bacteria (1). Recent research at Auburn University has brought into question the prevalence of hatchery-related cellulitis (2). Two experiments were conducted in which the navels of newly hatched green chicks were contaminated with cellulitis bacteria. Although some of the birds developed omphalitis, none of the birds developed cellulitis (3), confirming earlier research which also failed to reproduce the disease *(4).* Further research has indicated that lesions for cellulitis can develop very quickly in market age birds. Using a model that was developed at Auburn scientists recreated the characteristic subcutaneous, cheesy, yellow plaques in as little as 18 hours (5). The plaques were so extensive at this time, had the birds been brought to processing they would have been condemned. Although cellulitis lesions could occur anytime during the bird's life, this information indicates that they may develop late in the production cycle. The older the bird, the more opportunity for scratches to occur and cellulitis to develop. This is supported by data presently being gathered by Extension specialists at Auburn that indicate older, heavier birds have a higher incidence of cellulitis. Condemnation results were gathered for several months from three commercial broiler operations. Birds in the 3 to 4 pound range averaged 0.14% cell&is at processing, whereas birds in the 5 to 7 pound range averaged 0.60%.

Prevention is as important as having treatment options available for cellulitis. Any management technique that causes increased bird activity is an opportunity for skin damage to occur, and, therefore, should be avoided. Meal feeding or lighting programs that tend to promote meal feeding provide conditions which will promote scratching by aggressive birds. Overcrowding can also promote skin scratches, particularly when associated with slow-feathering, high-yield birds which lack the fully developed protective feather coat.

Prevention and treatment options to control cellulitis are being tested currently with both drug and vaccine therapies.

References

1. Norton, R. A. 1996. Avian cellulitis-A review. Abstract S170 In: Proceeding of the concurrent meetings of the Southern Poultry Science Society and the Southern Conference on Avian Diseases. January 20-21, Atlanta, GA

2. Norton, R A, and S. Bilgili. 1996. Type-l IP: Does it really exist? *Broiler Industry,* December, pp.

3. McMurtrey, B. L., R A. Norton, K. S. Macklin, and S. F. Bilgili. 1996. Abstract S171 In: Proceeding of the concurrent meetings of the Southern Poultry Science Society and the Southern Conference on Avian Diseases. January 20-21, Atlanta, GA

4. Johnson, L. C., S. F. Bilgili, F. J. Hoer-r, O. A. Oyarzabul, and M. K. Eckman. 1996. Evaluation of various inoculation routes to reproduce cellulitis in broilers using field isolates of *Escherichia coli. Poultry Science* 75 (Suppl 1): 121.

5. Norton, R A, S. F. Bilgili, and B. C. McMurtrey. 1997. A reproducible model for the induction of avian cellulitis in broiler chickens. *Avian Diseases:* In Press.

This information was provided by R A. Norton of the Auburn University Poultry Science Department.

Research Shorts

Recent research of interest to poultry managers

1. Carr, L. E., C. Rigakos, and S. W. Joseph. 1997. Monitoring the efficiency of washing systems for poultry livehaul units. Proceedings of the 1997 Southern Poultry Science Society and Southern Conference on Avian Diseases, January 20-21, Atlanta, GA

Results indicated that visual washing, using cur rent systems, does not lower *E. coli* and *Salmonella* levels sufficiently.

2. Malone, G. W., and J. H. Martin, Jr. 1997. Influence of genotype and rearing density on the incidence of foot pad lesions of female broilers. Proceedings of the 1997 Southern Poultry Science Society and Southern Conference on Avian Diseases, January 20-21, Atlanta, GA

Both placement density and strain of bird affected paw quality in this study. High bird density affected litter quality, and foot pad

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lesions increased accordingly.

3. Simmons, J. D., T. E. Hannigan, and B. D. Lott 1997. Volumetric air flow and airflow patterns in tunnel ventilated broiler houses. Proceedings of the 1997 Southern Poultry Science Society and Southern Conference on Avian Diseases, January 20-21, Atlanta, GA

Airflow measurements during tunnel ventilation indicated that the use of flow-redirecting baffles reduced house air flow by 15%. Fans in the side wall showed a 4% reduction in flow as compared to those in the end wall. Louvers reduced flow 10%, while discharge cones increased fan flow 10%.

4. Fletcher, D. L., E. W. Craig, and J. W. Arnold. 1997. An evaluation of online inside/outside bird washing to reduce visible contamination of broilers. Proceedings of the 1997 Southern Poultry Science Society and Southern Conference on Avian Diseases, January 20-21, Atlanta, GA

On-line inside/outside bird washers removed 73 to 84% of visual contamination in birds Ming inspection without negatively affecting bacterial counts.

5. Brake, J. 1997. Effect of female feeding program from 11 to 24 weeks in combination with prebreeder feed from 16 or 20 weeks of age. Proceedings of the 1997 Southern Poultry Science Society and Southern Conference on Avian Diseases, January 20-21, Atlanta, GA

Prebreeder feed from 16 weeks was beneficial in birds brought into production on a slow rate of feed increase; however, birds given a faster rate of feed increase performed worse if prebreeder was started at 16 weeks.

We would like to compile an updated list of individuals interested in receiving *Current Concepts In Broiler Production* on a regular basis. If others in your organization would like to receive this publication, please fill out this form and return it to:

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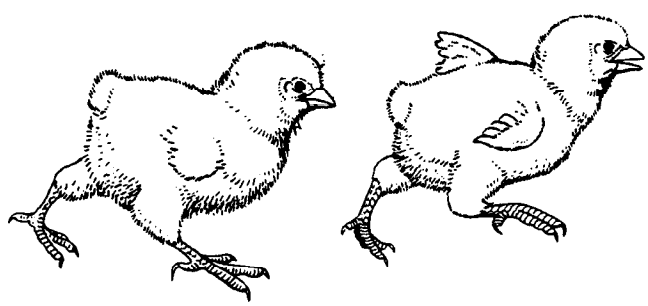

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