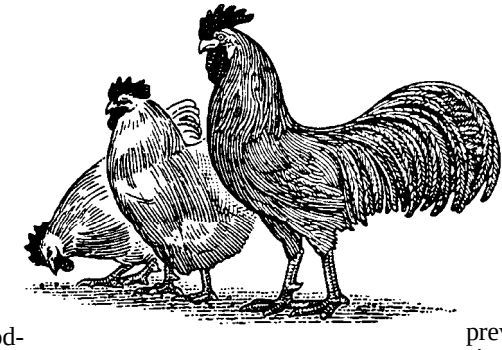
Gangrenous Dermatitis

Gangrenous dermatitis is a disease that primarily affects birds 4 to 8 weeks of age. Although mortality can be rapid with no apparent indication of a problem, affected birds often exhibit depression, lack of coordination, and anorexia. If present, skin lesions start as small pimple-like lesions that spread rapidly becoming large open or discolored areas covering the skin. These lesions are often accompanied by large amounts of blood-tinged gelatinous fluid that weeps from the wounds. Affected birds may also exhibit skin swelling that when rubbed emits an odd crackling sound, due to the presence of bacterially-produced gas under the skin.

Gangrenous dermatitis is caused by several bacteria, including members of the group *Clostridia* as well as *Staphylococcus aureus. Escherichia coli (E.coli)* are also frequently isolated from gangrenous dermatitis lesions, although their role in the disease has not yet been determined. Mortality rates differ, but are highest in birds infected with clostridia. Birds infected with *Staphylococcus aureus* tend to exhibit a more chronic problem associated with lower mortality.

Prevention of gangrenous dermatitis is made difficult by the fact that exposure is universal, since the responsible bacteria are commonly found throughout the environment Soil, feces, dust, contaminated feed, water, and equipment have all served as sources of infection. Exposure becomes problematic with the simultaneous presence of viruses such as infectious bursal disease virus or chick anemia virus which diminish the immune response to bacterially contaminated skin wounds and scratches.

Recent attention has focused on litter or soil treatments for the prevention of gangrenous dermatitis. Many testimonials have touted the advantages of using products as widely varied as salt, alum, and sodium sulfate. In reality, little reliable information is available on the effectiveness of most of these products. Caution should always be exercised before any of these products are used. None of these products will offer an excuse for poor flock management.



Primary components of gangrenous dermatitis prevention should include immune system surveillance and minimization of bacterial exposure. Birds should be monitored regularly by service personnel, including submission to an appropriate diagnostic laboratory for immune status evaluation. Adjustment of immunization programs may be necessary. Feed and water equipment should be regularly cleaned and disinfected to prevent organic accumulation and bacterial proliferation. Proper litter management as specified by company policy should be maintained, including regularly scheduled litter replacement. Houses that have previously experienced an outbreak should be thoroughly cleaned, and all litter removed and disposed of off the farm, to prevent re-contamination. Cuts and scratches should also be minimized by proper management of environmental conditions (temperature and airflow), as well as lighting and feeding programs.

Proper management during an actual outbreak is also critical for minimizing the economic impact of the disease. Affected houses should be carefully walked through several times each day so that dead birds can be quickly removed. Sick birds showing even minimal signs should be eliminated immediately since they will serve to spread the disease and ultimately not survive. Antibiotics, such as penicillin or the tetracyclines are sometimes given, although frequently without success. Vitamin and mineral stress packs may be used during an outbreak, but will not lessen mortality.

This information was provided by Dr. Robert Norton of the Auburn University Poultry Science Department.

AU Notes

Auburn's Poultry Science Department has placed a number of undergraduate and graduate students in the poultry industry in recent months. Graduate degree students who have taken jobs recently include; Randy Gordon-Nutritionist with Gold Kist; Omar Oyarzabal-Product Development Manager with Novus International; Scott Whitt-Product Sales with Gold Kist; and Danielle Benefield- Quality Control with Perdue. Nathan Collins, a graduate student working with Dr. Ed Moran, has been awarded a prestigious Purina Nutrition Fellowship for 1997-1998. The Poultry Science Department currently has 15 graduate students in the areas of health, physiology, nutrition, and food safety. Two additional nutrition students are expected to begin studies winter quarter.

Characteristics Of Water Sources For Broilers

Introduction

Water, until quite recently, had been called the forgotten nutrient due to the lack of attention given its importance in animal health and nutrition. Our cells are essentially floating in a salt water sea, and the maintenance of that environment is of utmost importance in promoting bird health. Basic water issues as they relate to animal productivity include availability, temperature, pH, and contamination.

Most of us realize that broilers consume consider ably more water by weight than feed. In fact, water consumption ranges from 2 to 5 times feed consumption with open watering systems depending on environmental temperature. For this reason, characteristics of water can have a significant effect on bird comfort and health.

Availability and Temperature

Researchers and field technical managers have attempted to control litter moisture through restricting water intake by broilers. In each instance, live performance was reduced above 10 to 15% water restriction. Early research with broiler nipples showed that bird weights were reduced, particularly in hot weather, due to restricted intake.. Larger size nipples essentially eliminated this problem, while allowing improved control of litter moisture over open watering systems.

Work by Dr. Teeter at Oklahoma State University, using electrolyte packs in hot weather, has shown that increased water consumption can accelerate growth by increasing feed intake. Also, cool water acts as a heat sink, pulling heat from the birds body and lowering the heat load. This becomes particularly important when birds are utilizing evaporative cooling through panting to lower body temperatures.

pH And Performance

Hydrogen ion concentration (pH) in water varies greatly across Alabama poultry areas. Some regions of the state routinely have low pH readings (4 to 6) while growers using municipal water sources often have pH measurements of 8 to 10. Research examining the effects of pH in broilers has been sparse and not conclusive. Recent field observations in south Georgia (Dr. Keith Bramwell, personal communication) indicate that houses with pH readings in the low 4s had good bird weights and increased water consumption. Increasing the pH to 6 reduced water consumption and weight, but improved feed conversion.

Although low pH can affect exposed metal in the watering system and cause corrosion, it may not negatively influence broiler growth, and may help acidify the gut of very young birds to improve digestion and inhibit pathogenic bacteria. Effects of pHs in the 8 to 10 range have not been documented to any extent.

Contaminants

Enclosed drinker systems have gone a long way toward reducing secondary bacterial infections following viral challenge by minimizing bacterial growth in the water and Litter. These systems do not reduce the level of bacteria in the water source, so additives such as chlorine are needed to ensure a reduced bacterial 1evel An occasional check of well water for bacteria is advisable to monitor incoming bacterial levels if chlorination is not routinely practiced. Shocking wells and water lines between flocks can temporarily reduce bacterial loads.

Mineral contaminants have been shown to affect broiler performance and health. Nitrates/nitrites, dissolved salts, and microminerals can be present in sufficient quantities to reduce performance. Dr. Barton at Arkansas associated relatively low levels of water nitrates with decreased broiler growout efficiency. Work by Dr. Balnave from Australia showed that high sodium levels in drinking water reduced eggshell thickness and increased shell problems in hens. Elevated magnesium, sulfate, and sodium levels can cause wet Litter and reduced efficiency. through diarrhea.

Data from 36 broiler farm wells in Alabama showed two farms with nitrate levels over 20 ppm and two over 10 ppm, while most contained less than 2.5 ppm. Only one farm had sodium levels over 50 ppm, while 3 farms showed levels between 20 ppm and 30 ppm. Other contaminants were well below suggested levels for livestock and poultry.

Recent laboratory studies completed at Auburn by Vodela, et al, indicated the potential for moderate levels of industrial/pesticide contaminants to impair broiler and breeder health and reduce performance.

This information was adapted from a presentation by Joseph B. Hess at the 1997 Alabama Broiler Industry Seminar.

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Current Concepts In Broiler Production is a publication of the Alabama Cooperative Extension 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.

What Will Be The Impact Of The "Mega-Reg" On The Vertically Integrated Broiler Complex?

T month, January 1998, processing plants with 500 or more employees will be required to be in compliance with the USDA's Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; Final Rule, that was published July 1996, and quickly became known as the "Mega-Reg." There are four main components of this rule: 1.) Adoption of sanitation standard operating procedures, 2.) Generic *E. coli* testing, 3.) Development and implementation of HACCP, and 4.) *Salmonella* performance standards. The first two components, which took effect in January 1997, focus on maintenance of sanitary conditions for production of wholesome products, while the latter two focus on food safety (pathogen reduction) and process control. Closely tied to the Mega-Reg is the USDA's final rule on zero tolerance for visible fecal material. Failure to comply with these regulations may lead to withdrawal of inspection from the plant and possible product recall.

Compliance with these rules will require the processing plant to identify and access the potential hazards that can occur at each step in the process from receipt of live birds through shipment of final product Specifically, the plant must address hazards that can occur before, during, or after birds enter the plant This implies that hazards that arise at various points in the complex must be addressed by a plant's HACCP plan and system; therefore, most of the operations of a vertically integrated complex will be affected by these new regulations. More importantly, many of the hazards encountered at the processing plant begin prior to arrival of birds at the plant These hazards include those biological, chemical, or physical entities that can cause illness or injury to the consumer if they persist into the final product

Given this, other operations within a complex should be aware of their role in helping the processing plant, and ultimately the complex, stay in compliance. Hazards of primary concern in poultry are microbiological in origin. Specifically, *Salmonella* and *Campylobacter*, which can cause moderate to severe gastroenteritis in humans, are the most significant hazards that must be addressed. These bacterial pathogens can colonize the GI tract (feces) of chickens, and then be spread through fecal contamination to the exterior of live birds (feathers, feet) prior to processing or onto carcasses during processing. Therefore, to reduce the presence of these pathogens, efforts should be made to reduce exposure of broilers to sources of the pathogens. *Salmonella* can be introduced at the breeder farm, hatchery, or during growout via contaminated feed / water and contact with contaminated feral animals (e.g. mice, birds, insects). The spread of *Campylobacter* is not as clearly understood, but exposure to feral animals, contaminated water, and over all farm sanitation seem to be risk factors.

In addition to the microbiological hazards, chemical and physical hazards can arise prior to birds arriving at the processing plant Chemical hazards include but are not limited to residues, pesticide residues e.g. weed killers, insecticides), and illegal feed additives. Such hazards could arise at the feed mill or during growout. Physical hazards prior to processing would include things such as rocks, nails, BBs, etc. that would be collected in the gizzard or crop. Typically, the chemical and physical hazard are not as serious as the biological hazards, but they can pose a sign&cant risks to consumers if preventive steps are not taken.

Although foodborne hazards can arise during live production, HACCP will focus primarily on the processing plant at this time. However, the National Broiler Council endorses a number of good manufacturing practices that can be applied during live production that will help the processing plant meet their regulatory food safety goals (i.e. HACCP, zero tolerance for fecal contamination, *Salmonella* performance standards). A brief synopsis of these live production practices is given below.

Management Practices

- l Maintain growout facilities in good working order.
- l Provide growers with pesticide use information.
- l Enforce biosecurity programs.

Animal Health Care

- l Strictly adhere to pharmaceutical laws and regulations.
- l Enforce company standards for pharmaceutical use.

Breeding Operations

- l Use only high quality feeds with established standards.
- l Monitor and control breeder flock health including *Salmonella* programs.
- l Establish procedures to prevent eggborne disease transmission.
- l Monitor and control egg cleanliness.

Hatchery

- l Effectively sanitize incubators and hatchers.
- l Establish thorough sanitation program for entire facil-

- l Monitor incoming egg cleanliness.
- l Monitor microbiological effectiveness of sanitation

- l Properly dispose of all waste materials.

Feed Mill

- l Microbiologically test feed ingredients.
- l Test feed ingredients for hazardous chemicals (e.g. fungicides, pesticides, etc.).
- l Maintain records of feed distribution.
- l Maintain proper pharmaceutical inventories, and adherence to laws and regulations.
- l Maintain proper sanitation and dust control.
- l Pellet feed when appropriate.
- l Test for bacterial pathogens and chemical residues in finished feeds.

Growout

- • Control wild birds, rodents, and insects.
- • Establish litter management program.
- • Inspect birds prior to live-haul.
- • Establish preslaughter chemical residue monitoring program.
- • Ensure proper drug withdrawal procedures.

(Continued on page 4)

("Mega-Reg" Continued from page 3)

- Use proper feed and water withdrawal protocols.

Livehaul

- Ensure proper holding times.
- Use cage, coop, and truck sanitation program.
- Minimize stress on birds (e.g. temperature shock, excessive noise, etc.).

Although HACCP is not currently mandated for live production, live production will undoubtedly be tied into the processing plant's HACCP plan. The above list of good production practices represent a partial list of measures that can be taken to improve the safety of the final product, and can be utilized to support HACCP plans adopted at the plant level. Furthermore, as HACCP evolves, live production may be mandated to adopt HACCP. In this case, these good production practices would serve as prerequisite programs from which HACCP plans could be developed.

SUGGESTED READING

USDA, 1996. Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; Final Rule. 9 CFR Part 304, et al., p. 38805.

National Advisory Committee on Microbiological Criteria for Foods, 1997. Generic HACCP application in broiler slaughter and processing. *Journal of Food Protection.* 60: 579-604.

Bryan F. L. and M. P. Doyle, 1995. Health risks and consequences of *Salmonella* and *Campylobacter jejuni* in raw poultry. *Journal of Food Protection* 58: 326-344.

This information was provided by Dr. Donald Conner of the Auburn University Poultry Science Department.

Research Shorts

Recent research of interest to poultry managers

1. Saleh, E.A., S.E. Watkins and P.W. Waldroup, 1997. Changing time of feeding starter, grower, and finisher diets for broilers. 3. Birds grown to 3.3 kg. *Journal of Applied Poultry Research 6(3): 290.*

In male broilers raised to 7+ pounds, body weight, feed conversion and breast meat yield were reduced if finisher feed was started more than 14 days prior to processing. There was a linear increase in breast yield across periods shorter than 14 days in a second experiment.

2. Cunningham, D.L., 1997. Contract broiler grower returns: A long-term assessment. *Journal of Applied Poultry Research 5(3): 267.*

Broiler grower long-term returns were less variable and more positive than for most other U.S. agricultural producers.

3. Bilgili, S.F. and J.B. Hess, 1997. Tensile strength of broiler intestines as influenced by age and feed withdrawal. *Journal of Applied Poultry Research 5(3): 279.*

Gut strength decreased as feed withdrawal increased beyond 14 hrs in hot weather. This decrease may lead to increased contamination if feed withdrawal times are extended. Also, gall-bladder size increased to a point, indicating that extended withdrawal times may increase the opportunities for gall contamination.

4. Palmu, L. and I. Camelin, 1997. The use of competitive exclusion in broilers to reduce the level of Salmonella contamination on the farm and at the processing plant *Poultry Science* 76(11) : 1501.

Competitive exclusion bacteria applied in the spray cabinet at the hatchery reduced Salmonella contamination at the plant (6% vs 42%).

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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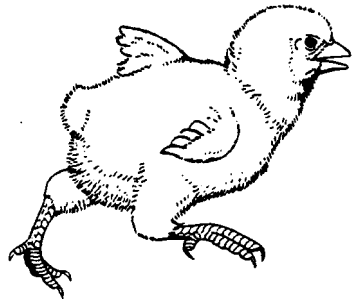

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