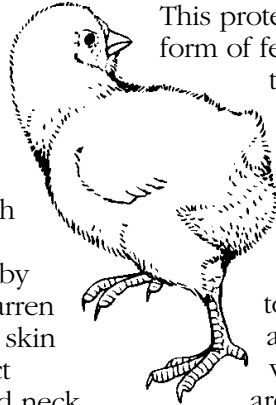


# Broiler Production

## Are Naked Broilers Coming to Alabama?

Hebrew University Professor Avigdor Cahaner of Jerusalem's Faculty of Agriculture in Rehovot, Israel, discussed in a recent report the value of using naked or featherless birds crossed on commercial broilers to replace the feathered varieties currently used. He started this genetic research 12 years ago, using the naked neck chicken. This particular genetic trait was first reported by Davenport in 1914 and later confirmed by Warren (1933a). Birds with this genetic makeup have skin that lacks or have greatly reduced feather tract numbers. Cahaner's approach using the naked neck chicken resulted in as much as a 40 percent reduction in feather coverage, as has been reported in several papers. He later decided to examine the total elimination of feathers using the scaleless mutant. In the next two years, Cahaner hopes to have conclusive data that will determine the economic potential of the featherless commercial broiler.

Featherless chickens, according to Cahaner, have several advantages. First, they have greater heat resistance than regular broilers and, therefore, fewer mortalities due to heat stress. Second, they don't need to be picked when processed. Thus, there is a savings on equipment costs, electricity, and especially water.



This protects the environment by avoiding waste in the form of feathers and contaminated water and by reduction of carcass damage that is part of the picking process. It also improves food safety by avoiding cross-contamination in scalding tanks. Third, the skin of the featherless bird has less fat, resulting in a leaner, healthier product. Fourth, the birds will be more comfortable; therefore, the industry will not need to use costly, modern ventilation equipment—a significant factor in developing counties where electricity is often not available in all areas. This too, he says, will alleviate food shortages.

Having read this far, one is tempted to say that this is the chicken of tomorrow. It seems that it might take the industry by storm. But, as a famous sportscaster often says, "Not so fast, my friend!" Remember, the naked neck chicken was reported in literature as early as 1914. In 1938, Hutt and Sturkie described nakedness in the chicken and the genetics behind it. In 1942, Sturkie reported a naked condition to which Hutt (1949) assigned the name *Apterlosis*. In 1957, Abbott and Asmundson reported a naked condition in which the feather papillae, scales, and spurs do not develop. This extreme condition has been named *scaleless*. The basic genetics to produce featherless chickens has been around since the beginning of the last century without producing a viable commercial chicken.

Some of the developing countries with areas of no electricity may be able to increase production using featherless birds because of their so-called heat resistance; but even that is questionable. Clearly, Professor Cahaner has contributed to the scientific knowledge in this area. However, it remains to be seen if this featherless chicken can be crossed with the modern, high-yielding and fast-growing broiler and remain commercially viable.

In fact, we may be able to select for a fully feathered bird that has increased heat resistance that might be more economically and commercially successful.

The featherless bird would certainly be at risk when exposed to direct sunlight that would result in burning the skin and directly heating the bird. Feathers protect the skin and provide insulation from heat and cold. In

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## AUNotes From Joe Hess, *Extension Poultry Scientist*

Alabama high schoolers participated in a number of local, regional, and national poultry events through Future Farmers of America and 4-H programs. The 2002 state champion FFA Poultry Judging team from Sand Rock High School participated in the 75th National Competition in Louisville, Kentucky. They placed ninth among 36 teams and earned a gold rating. Team members were Ross Lumsdem, Kevin Webb, Ryan Baker, and Dustin Teat. The Alabama team had strong showings in a number of categories at the 4-H nationals in Louisville. They placed second in Egg Demonstration, third in Turkeyque, fourth in Chickenque, and ninth in Avian Bowl. Programs such as these teach young people decision-making skills and introduce them to careers in poultry and poultry science. To those of you who have donated time and/or resources to these programs, thanks.

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cold weather, featherless birds will suffer and feed consumption will increase just to keep the birds warm. In the broiler house and during live haul, they will be badly scratched from bird-to-bird contact, resulting in increased cellulitis and increased trims and condemnations due to tears. This is already seen in some slow-feathering birds.

When this is combined with reduced yield, reduced growth rate, and increased feed consumption, resulting from crossing the featherless bird with commercial broilers, it becomes hard to imagine that this new bird would be commercially viable. There is also doubt among industry personnel whether consumers will be willing to accept the featherless bird. To date, the reaction has been negative.

Also, pressure from animal rights groups is a potential problem. Already they have raised the question of the role genetic engineering played in developing this bird. The answer to that question is that normal genetic selection gave rise to the bird. But the perception remains. Even some scientists claim the development of this bird is cruel.

Identifying this bird as leaner because of less fat does not take into consideration that most consumers do not eat the skin and that large numbers buy boneless, skinless chicken. The point is moot. Professor Cahaner claims there would be fewer mortalities due to heat stress. However, modern tunnel ventilation houses tend to keep the birds cool enough to offset this, even in the hottest, most humid weather.

That brings us to his fourth statement that chickens don't require costly ventilation systems. Without good ventilation, at over 100 degrees F, chickens are in trouble—featherless or not.

In addition, mosquitoes and breast blisters would likely be a problem with these birds. The statement that birds would be less contaminated due to not being scalded has not been scientifically proven.

As interesting as the featherless bird is, there will be no commercial naked broilers in Alabama.

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*R.A. Voitle of the Auburn University Poultry Science Department and the Alabama Cooperative Extension System provided this information.*

## Development of Edible Transgenic Plant Vaccines for Immunizing Poultry

Control of poultry viral diseases is through biosecurity, sanitation, hygiene, and vaccination. For most of the highly infectious and hardy viral diseases of poultry, immunization is the last and most important step for control. Although new vaccines are being developed, these products are not without problems. Conventionally produced live vaccines may cause a mild form of the disease. Mixing multiple live vaccines may result in interference. And mass administration methods in the field are often unreliable.

### Transgenic Edible Plant Vaccines

Over the past decade, scientific advances in molecular biology and immunology have improved understanding of many diseases and have led to the development of novel strategies for vaccination. The development of plants that express immunizing proteins is a promising approach. Plant-derived antigens have prevented the onset of disease in animals and have proven to be safe and efficacious in human clinical trials. A gene that encodes the immunogenic portion of the influenza virus has been cloned into a plant and fed to mice. These mice develop neutralizing antibodies against the virus and, when challenged with virulent virus, these mice have a reduced disease incidence. Transgenic plant vaccines against human viral diseases are also being developed in lettuce and tomatoes.

### Infectious Bursal Disease Virus

Infectious bursal disease is an important disease of chickens worldwide. Estimates of annual losses from IBD are in the hundreds of millions of dollars. Control is by increased biosecurity, sanitation, and vaccination.

Commercial vaccines, however, are not totally effective, and less attenuated products may cause a limited amount of both disease forms in susceptible chickens. Many live IBD vaccines are now successfully used by the in ovo route in the hatchery.

Many broiler flocks, however, and all breeder and layer flocks need booster doses in the field. These mass administration methods (drinking water, course spray, and injection) are not always effective. Therefore, edible transgenic plant vaccines containing IBDV immunogens would be useful during the growout as a vaccine booster. This technology, by providing a cheaper product, could benefit producers of grain, poultry companies, and ultimately poultry consumers.

IBDV is classified within the Birnaviridae family, which is characterized by a bisegmented double-stranded RNA genome. The VP2 gene has been confirmed to be the major host-protective antigen of

IBDV. Characterization of the VP2 protein has stimulated research for its use in subunit vaccines including *E. coli*, yeast, fowl poxvirus, and a DNA vaccine. The VP2 gene of IBDV-variant E strain, a common field strain, was amplified and was introduced into a vector for nucleic acid sequencing to make sure we had the correct gene. It was also introduced into yeast, because yeast has been shown to produce large amounts of VP2 protein in the right conformation for immunizing chickens.

A transgenic *arabidopsis* (a common weed) was chosen for preliminary trials because of its rapid growth rate in the laboratory and because its entire genome has been sequenced. The transgenic plant was able to express the VP2 protein.

We have purified and quantified the recombinant protein and will soon give it to young susceptible chickens. These chickens will be examined for antibody against IBDV and resistance to challenge infection with virulent virus. If these chickens are immune to IBDV, then we will attempt to produce transgenic alfalfa plants containing the VP2 gene using similar molecular techniques as done for transforming *arabidopsis*. Alfalfa will be chosen rather than corn or soybeans, which are more commonly found in poultry diets, because previous experiments have shown that they are more difficult to transform than alfalfa. The VP2 protein from the transgenic alfalfa will be similarly given to chickens to check for its immunizing capability. It is hoped that these transgenic plant trials will develop a variety of value-added alfalfa that can be used to immunize chickens against IBDV that can be grown by local grain farmers.

Transgenic edible plant vaccine technology should work for other common viral diseases of poultry. We are using this technology to develop a transgenic edible plant vaccine against avian reoviruses, which are also a common cause of morbidity and mortality in young poultry. We have isolated and amplified a viral gene that can produce immunity in chickens. We have cloned the gene into yeast and found that yeast expresses this protein. Our immunogenic studies with this system are under way. This is important because conventional live reovirus vaccines, as well as vaccines against infectious bronchitis and Newcastle disease viruses, can't be given in ovo, because they are too pathogenic for embryos. Therefore, the development of transgenic edible vaccines has a bright future.

*Joseph J. Giambrone and Wu Hongzhuang of the Department of Poultry Science at Auburn University provided this information. Coauthors include Narendra K. Singh and Robert Locy of the Department of Biological Sciences at Auburn University and Karyn Scissum Gunn of the Department of Biological Sciences, Alabama State University, Montgomery, Alabama.*

## Pellet Quality and Broiler Performance

Feeds and feed quality are important areas of interest for broiler producers due to the large proportion of broiler production cost associated with feed and the profound effects changes in feeds and feed quality can have on broiler performance. Weekly feed and ingredient analysis track feed-milling performance to insure that birds receive necessary nutrients at levels expected with little or no antinutritional factors. Most operations also monitor pellet quality in the mill to control feed texture throughout the system.

Although pellet quality has traditionally been considered less important in broilers than in some other avian species (turkey and ducks), poor pellet quality can affect broiler performance through feed wastage and stale feed in pans. Cleanup of excessive fines must be managed by the grower to keep feed fresh. In addition, poorly pelleted feed may not allow for maximum digestion if starch gelatinization is not within normal limits. Time and energy required to consume a feed is also increased (and feed efficiency decreased) if fines are excessive.

An article recently published in the Cobb-Vantress, Inc. series, *Technical Focus*, reviews the relationship between fat addition and pellet quality (Caloric Value of Pelleting, *Technical Focus*, Vol. 3, 2002). Authors Leland McKinney and Robert Teeter reviewed research comparing the balance between improved performance due to increasing fat (energy) levels in broiler feeds and losses in performance due to the erosion of pellet quality that occurs if fat is added in the mixer and not applied post pellet. Their research indicates that fat addition (in the mixer) over 4% negates the caloric value of the fat due to reduced pellet quality.

Also included in this article are broiler performance values across a range of pellet/fines combinations fed from 38 to 45 days of age. Percentage pellets ranged from 20% to 100% in 20% increments. As expected, increasing pellet quality improved both body weight gain and feed conversion. Within a practical range of 40 to 80% pellets, the improvements in performance were 0.033 lb. and 5 points in feed conversion. Interestingly, the majority of the improvements noted occurred between 60 and 80% pellets, indicating that quite good pellet quality may be necessary to capture improved performance. This concept is supported by their research, indicating that caloric value attributable to pelleting (34 Kcal/lb. feed) increases little between 20 and 60% pellets, with an improved gain in caloric value between 60 and 80% pellets (another 36 Kcal/lb.).

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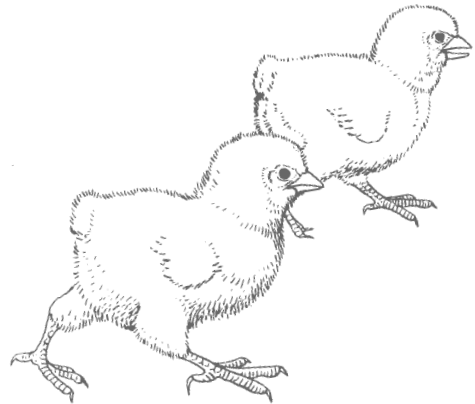
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These results are important in showing that the modern-day broiler will respond to improved pellet quality provided that pellet quality increases reduce fines to an appreciable level. In the field, pellet quality improvements of this magnitude would probably be accompanied by improvements in feed conditioning that would further improve performance through improved starch gelatinization.

*Joe Hess of the Poultry Science Department and Oladiran Fasina of the Department of Biosystems Engineering, both at Auburn University, provided this information.*



## Research Shorts

Recent Research of Interest to Poultry Managers

Lundeen, Tim, 2002. Feed intake called most important factor in meat-type poultry growth. *Feedstuffs* 74(41): 9.

This article, taken from a presentation by Peter Ferket of N.C. State and delivered at the 63rd Minnesota Nutrition Conference, reviews the importance of optimizing feed intake in meat-type birds and discusses factors that influence feed intake, including dietary (energy, protein, vitamin/minerals) and management factors (feed/water availability, stress, disease).

Engster, H.M., D. Marvil and B. Stewart-Brown, 2002. The effect of withdrawing growth-promoting antibiotics from broiler chickens: A long-term commercial-industry study. *Journal of Applied Poultry Research* 11:431-436.

This industry study compared 158 paired houses over a three-year period. Seven million broilers were involved. Birds raised without growth-promoting antibiotics showed a 0.2% reduction in livability in Delmarva and a 0.14% reduction in North Carolina. Body weight decreases were 0.03 lb. and 0.04 lb. at these locations, while feed conversions were increased 0.016 and 0.012, respectively.

Mateos, G.G., R. Lazaro and M.I. Garcia, 2002. The feasibility of using nutritional modifications to replace drugs in poultry feeds. *Journal of Applied Poultry Research* 11:437-452.

Nutritional methods to combat intestinal health problems associated with the removal of growth-promoting antibiotics are discussed. Programs discussed include modifying posthatch feeding programs, increasing feed particle size, reducing undigested protein in the hindgut, enzyme supplementation, and incorporating whole grains into the feed.

Tabler, G.T., I.L. Berry, H. Xin, and T.L. Barton, 2002. Spatial distribution of death losses in broiler flocks. *Journal of Applied Poultry Research* 11:388-396.

Mortality patterns in four broiler houses (two tunnel ventilated and two negative pressure cross-ventilated) were monitored for 6 months. No differences were found associated with type of ventilation system. Mortality during brooding was associated with the feeder and water lines, while mortality later in the growout was concentrated along the sidewalls and in darker areas.



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