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## ***HATCHERY/BREEDER TIP ...***

### **REPRODUCTIVE BIOLOGY OF THE BROILER BREEDER MALE**

In the poultry industry, there are many challenges facing individuals responsible for the reproduction of broiler breeders. Many of these problems stem from the knowledge that increasing body growth rate will generally result in a reduction in reproductive characteristics, and vice versa. This situation is likely to escalate due to increased consumer demands for more white meat and less dark meat. The continued trend toward high yielding, fast growing broilers is evident. Therefore, it does not appear that the job of managing broiler breeders is going to get any easier in the near future.

An article written by John Kirby from the University of Arkansas reviews some of the developmental milestones in the maturation of young, male broiler breeders and how management may influence some of this development.

The testes of young cockerel chicks contains both somatic and germinal precursor cells. The somatic cells eventually develop into Sertoli (nurse cells) or Leydig cells, as well as other structural cells. The Sertoli cells function to protect the developing sperm cells while the Leydig cells are involved in testosterone production. The germinal cells are the precursors for immature sperm. Although the broiler breeder male can theoretically produce trillions of sperm, the actual number of mature sperm produced is limited by the number of Sertoli cells in the testes. According to Kirby, Sertoli cell proliferation occurs sometime between 2 and 12 weeks of age but not at anytime after this point. Therefore, the maximum potential for sperm production is established in the first eight to ten weeks of age. Anything that may cause unnecessary stress to the developing male at this time may interfere with proper development of these very important testicular cells.

During this early period of development, portions of the brain (such as the hypothalamus) and the pituitary are also establishing a critical hormonal relationship with the testes. These portions of the brain must work together with the testes to maintain proper levels of the necessary reproductive hormones to initiate and maintain testes function. The early stages of maturation that help to establish

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the "feed back loop" are important in establishing the settings that will regulate pituitary function over the life of the male. Therefore, appropriate levels of reproductive hormones (FSH, LH, etc) are not only critical for the proper development and function of the testes, but also for the development of the relationship between the brain and the developing testes. This relationship must be set at this time of male maturation.

As the functional capacity of these hormones (primarily FSH) increase, there is a tremendous growth in testes mass which is associated with the onset of sperm production. This time period, also referred to as puberty, occurs between 16 and 24 weeks of age. Once the males attain peak semen production, testes weight and sperm production continue to decline thereafter.

In his paper, Kirby suggests that the set-point for establishing the regulatory thermostat for vital reproductive hormone secretion is at least partially completed within the first few weeks of a males life. In some of his studies, Kirby found that mild stressors which cause either weight loss or reduced water intake can lead to complete shutdown of testes function when occurring during critical stages of development. These males may be those that are usually "grown back to the curve" due to problems during development. Additionally, his data reports that it is possible to disrupt the normal pattern of testes development with too severe feed restriction between 6 to 8 weeks. This results in reduced testes size, sperm production, and the theoretical maximum number of sperm produced. Also, he has been able to reduce reproductive performance with severe feed restriction in males between 18-23 weeks of age, suggesting that the resources and hormone secretion required for normal testes function can be negatively and permanently affected around the time of photostimulation.

Proper management of breeder males will take into consideration these critical points in their development. Any unnecessary stress placed upon these birds at these critical points can have profound effects on the reproductive potential of the males. Many of these effects are either permanent or long lasting and can seriously affect the overall performance of the breeder males in the hen house.

#### References:

Kirby, John D., 1998. Broiler Breeder Male Reproductive Efficiency: Where Management and Biology Collide. Proceedings, North Carolina Breeder/Hatchery Management Symposium.

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\*\*Consult with your poultry company representative before making management changes.\*\*

“Your local County Extension Agent is a source of more information on this subject.”