

Spiked and Original Roosters What are the Differences?

Nicholas J. Wolinski

The problem

At the primary breeder level, male broiler breeders have been intensively selected for growth rate and breast muscle mass. Selection for these growth traits can negatively impact reproductive capabilities of males (Wilson et al. 1979). Three factors which may influence male fertility:

- 1) Male fertility declines when males become obese (Hocking and Duff 1989)
- 2) As a male ages his desire to mate declines (Duncan et al., 1990)
- 3) Extremely large breast muscle development can prevent males from breeding successfully (McGary et al., 2003)

In a typical broiler breeder flock some males will have a high fertility where as others may be sub-fertile or infertile. It has been shown by previous research (Ottinger and Gorham, 1986) that old age in Japanese quail can cause a condition where the testicles of older birds shrink and become too small to maintain semen production. Since the fertility of broiler breeder males tends to decrease with age broiler hatching egg producers commonly add spiked males to improve fertility. These juvenile males are added post peak lay (40-45 week of a breeder flock). These young (spiked) males begin breeding while at the same time stimulating older males to resume mating thereby improving overall flock fertility.

Definitions

-Spiked males = Juvenile male added post peak to an existing flock. In this experiment the spiked males were 47 weeks of age at the time of flock dispersal.

-Original males = Males which are the same age as the hens. In this experiment the original males were 63 weeks of age at the time of flock dispersal.

-Testicular regression is when a bird's averaged testes weight is less than 4 g. These extremely small testes would not be able to produce adequate semen.

Our Objectives

Determine if older males (63 weeks old) had a higher body weight, breast muscle weight and testes weight than the younger spiked males (47 weeks old).

Determine if 63 week-old males had an increased rate of testicular regression.

Determine if heavier birds had larger breast weight and testes weight than lighter birds.

Our Approach

We processed an entire population of commercial Hubbard broiler breeder males (327 males) at the end of a 63 week production cycle. In the flock there were 237 males that were 63 weeks old and 90 males that were younger spiked males, which were 47 weeks of age at the time of processing.

Physical Traits

The body weight was recorded for each male. Next the bird's breasts (Pectoralis major and Pectoralis minor) and testes (right and left) were removed and weighed. Birds were also visually examined for the presence of a fat pad.

Statistical Analysis

Pearson correlation coefficients were calculated to determine if body weight, breast weight and testes weight were correlated. In other words, data was analyzed to see if as body weight increased would breast weight and testes weight increase proportionally in a bird. Results were analyzed using a one-way analysis of variance (SAS 1999) for the spiked and original groups of males. Data were then sorted into HIGH, STANDARD, and LOW body weight classes irrespective of whether the birds were spiked or original to examine the effect of body weight on breast muscle mass and testes weight. Significance was assessed at the probability level of < 0.05 .

Our Observations

It was found that breast weight was strongly correlated (0.88) to body weight, in contrast testes weight was lowly but significantly (0.11) correlated to body weight. These findings show that as body weight increases, an increase in breast weight and to a lesser degree testes weight can be expected in males.

Quick fact : In broiler breeder males the left testis is larger than the right by 1.5-3 g.

Spiked vs Original

Average body weight of the original males was 4573 g, which was significantly greater than the average body weight of the spiked males (4096 g). Figure 1 is a visual representation which shows that spiked males consistently had lower body weights than most original males. When looking at breast muscle yield original males had significantly larger breast weights (678 g) when compared to spike males (576 g). It was also found that 22% of original males possessed a fat pad however, only 12% of spiked males had a fat pad. These results suggest that older original males which had a higher average body and larger breast muscle as a result of being older than spiked males.

Although carcass traits (body weight, breast weight) were significantly different for the spiked and original group testes weight was not significantly different. Interestingly though, 13/237 or 5.5% of original males had undergone testicular regression where as only 2/90 or 2.2% of spiked males had an average testes weight of less than 4 g (Fig 2). Overall, the effect of increased body weight, breast weight, and incidence of testicular regression observed in older males may be factors, which explain the age related reduction of fertility that male broiler breeders experience.

Body Weight Category

After sorting birds into a body weight class HIGH (4901-6117 g), STANDARD (4001- 4900 g), and LOW (2695-4000 g). The average body weight of each group was significantly different the HIGH being 5264 g, STANDARD 4451 g, and LOW 3712 g.

The breast weight was found to be significantly different for each body weight class; HIGH being 841 g, followed by the STANDARD group 646 g, and the LOW group 499 g (Fig 3). It was seen that body weight did effect average testes weight with the HIGH group having the largest testes weight 18.1 g next was the STANDARD group with an average testes weight of 15.3 g and the LOW body weight class had the smallest testes weight of 11.1 g (Fig 4).

What Does It Mean

Older males are typically becoming larger toward the end of production and experiencing a higher rate of testicular regression. This may be one factor that explains why fertility of males tends to decline with age. Although testes weight was not influenced by a birds age it was affected by body weight because HIGH body weight birds had significantly heavier testes weight than STANDARD or LOW birds. It is important to note that larger testes weight does not equate to increased semen production (Wilson et al. 1987). Since breast muscle mass was highly correlated to body weight a heavy bird will have larger breasts. These larger birds also tended to have larger average testes weights however; increased breast muscle deposition in large birds, may lower fertility due to increasing the distance between male and female reproductive organs during mating which results in poor semen transfer. In a practical sense a male with a body weight of 3500- 5000 g that had adequate testes size would be preferred to extremely large or extremely small males.

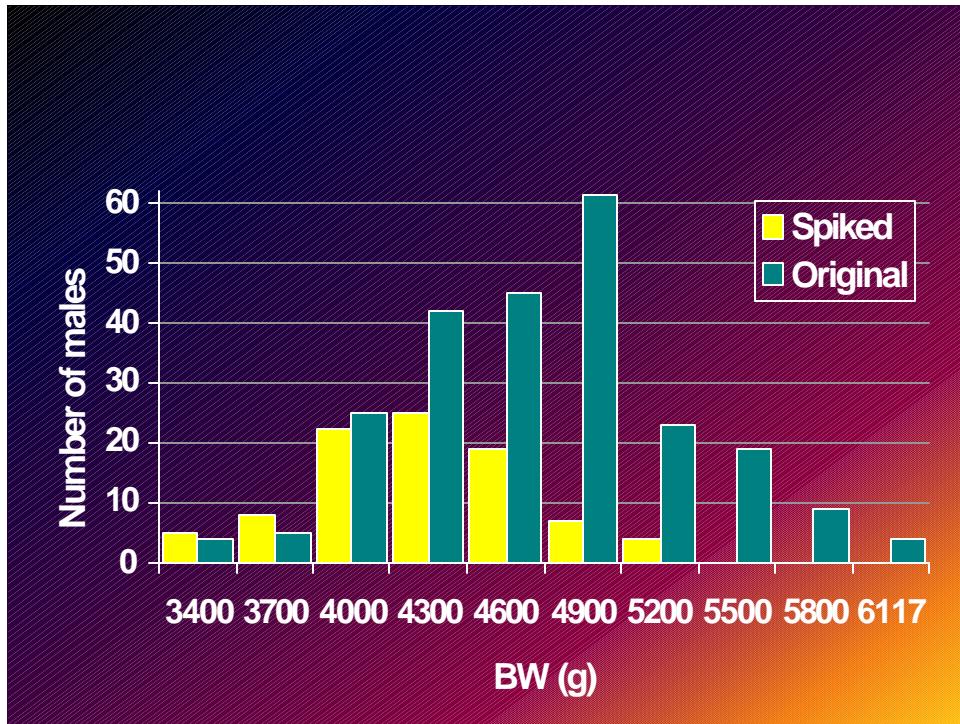


Figure 1 shows that spiked males tended to be lighter than older original males.

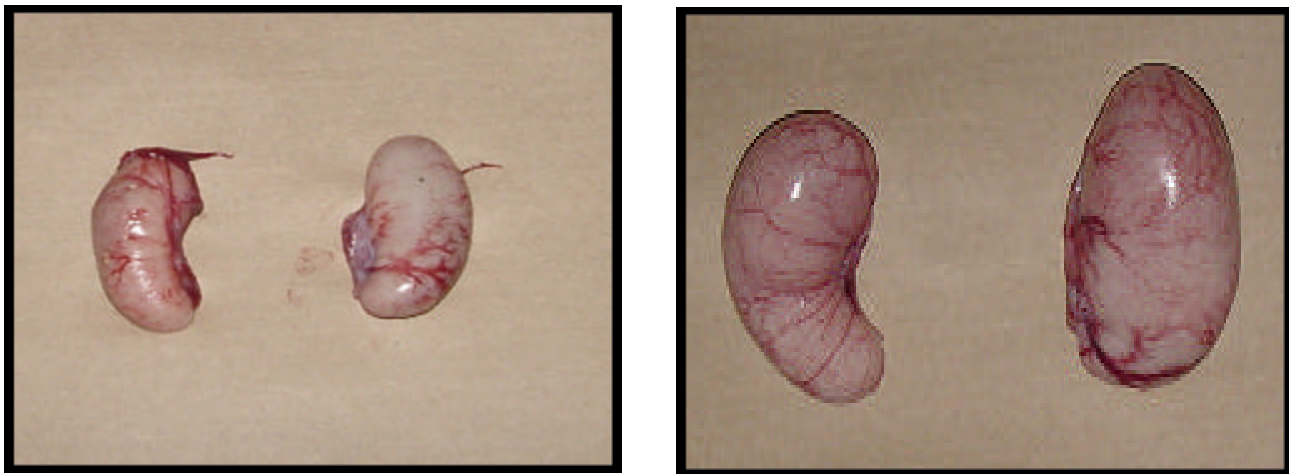


Figure 2
 Regressed testes from 63 week-old male (left) normal testes from 47 week-old male (right)

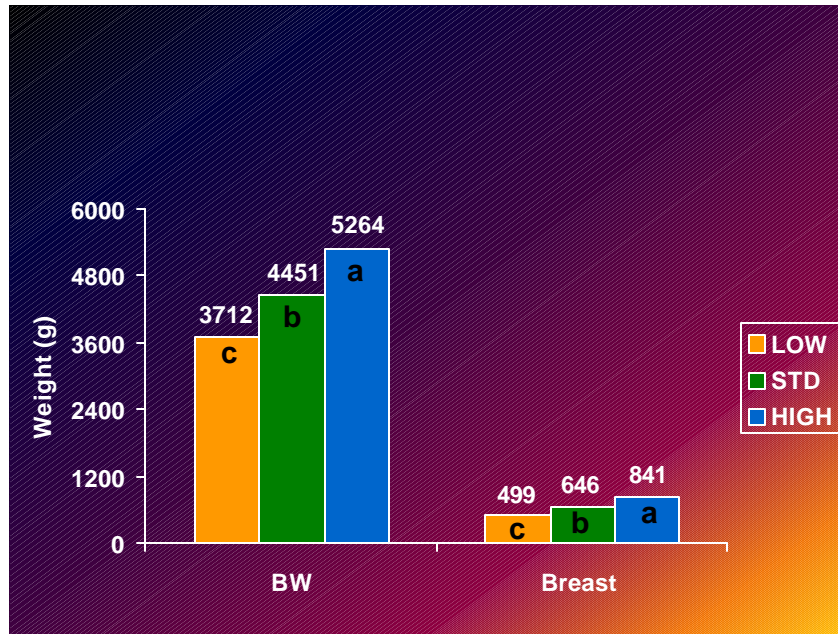


Figure 3
Body weight and breast weight of birds in LOW, STANDARD, and HIGH body weight classes.

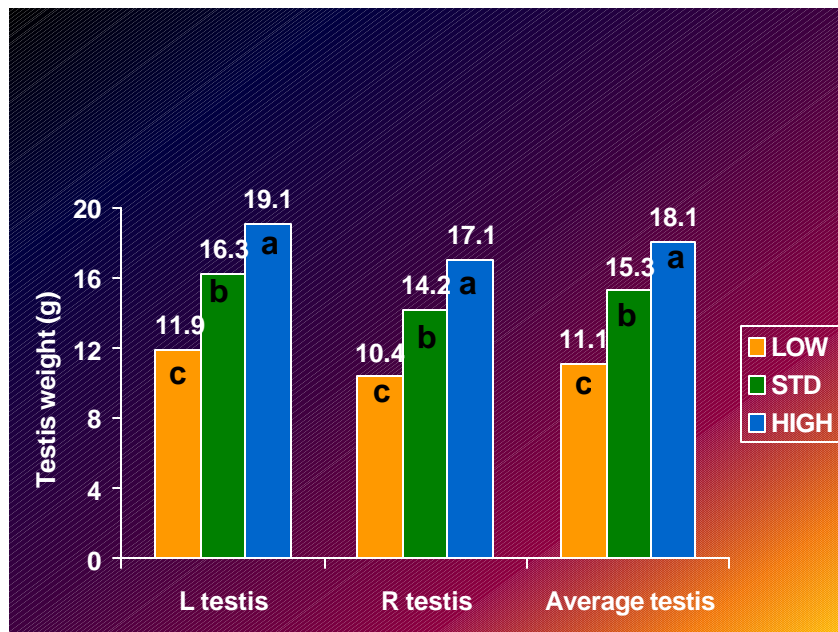


Figure 4
Displays the left, right, and average testes weight of birds when sorted into LOW, STANDARD, and HIGH body weight classes.