

Good fertility starts with good testes development

Good testes development is critical for achieving and maintaining fertility levels within a breeder flock. From the early stage of development, right through the entire production period, proper management of the flock is essential for achieving this goal.

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Testes size is highly correlated with fertility, with poor fertility often being associated with small testes. It is therefore vital to ensure that management does not inhibit the development of the testes at any stage. If male management is to promote the growth of good, healthy testes, an understanding of the critical periods of testicular development during the male's life is needed.

At 2 - 15 weeks of age

Between 2 and 15 weeks of age testes development occurs mainly at the cellular level. During this period of time the physical growth of the testes is small (Figure 1), but vital multiplication of the sertoli cells occurs, which determine the fertility potential of the male. During the first 10 weeks after hatching the weight of the testes increases by a small amount (from a few mg to 60-100 mg), but the number of sertoli cells increases from 1 to 100 million. The sertoli cells provide support and nourishment for the developing sperm and the ability of the testes to produce sperm is closely linked to the number of sertoli cells present in the testes. If sperm production in the mature male is to be maximised, it is vital that multiplication of the sertoli cells is allowed to proceed normally.

Between 16 - 24 weeks

After 15 weeks of age the physical growth of the testes is accelerated. At 20 weeks of age, prior to any light stimulation and under a constant rearing, day length of 8 hours the weight range of the testes is typically 0.5-2.0 g (per pair) (Figure 2).

Further significant growth of the testes occurs in the first three weeks after light stimulation. Light stimulation commences sexual maturity by stimulating the secretion of the hormones that initiate the production of sperm, hence the dramatic increase in testes size. At 23 weeks the testes are typically in the weight range of 12-22 g (per pair) (Figure 3). The vas deferens (ducts that carry sperm from the testes during ejaculation) are also developing at this time.

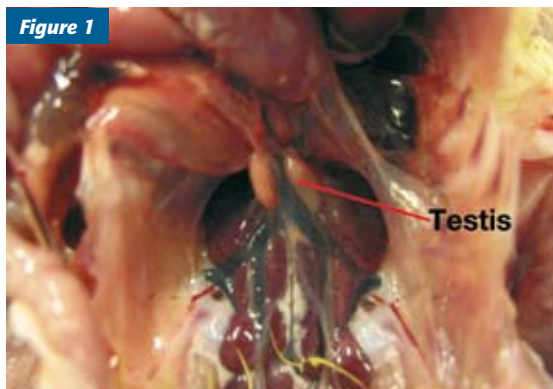
From 25 - 30 weeks

Peak testes weight and semen production occurs around 28-30 weeks of age. Figure 4 shows the testes of a good mature male at 35 weeks of age. Testes weight was 43 g (per pair) and the good development of vas deferens (a pearly white colour), the good blood vessel supply to the testes and their healthy cream colour, should be noted.

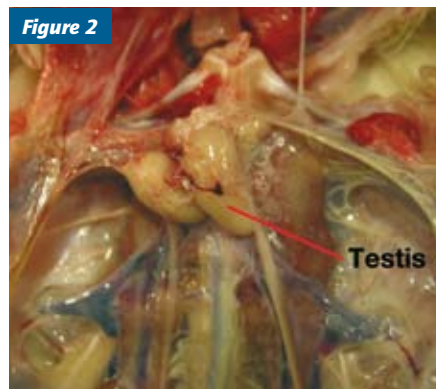


Beyond 35 weeks

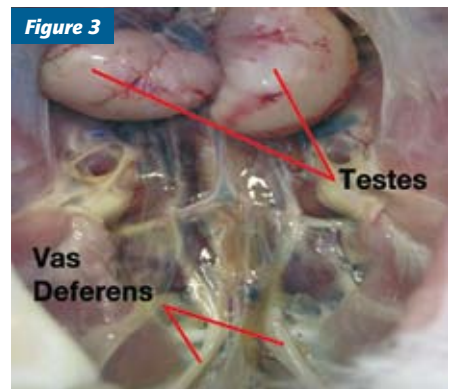
After 30/35 weeks of age there is a natural reduction in testes weight and sperm production, and a decline in fertility. However, male management at this time can significantly affect the rate at which this decline occurs. It is critical that male bodyweight and condition are



Testes weight at 15 weeks (typically 0.5 g per pair).



Testes at 20 weeks of age.



Testes at 23 weeks of age.

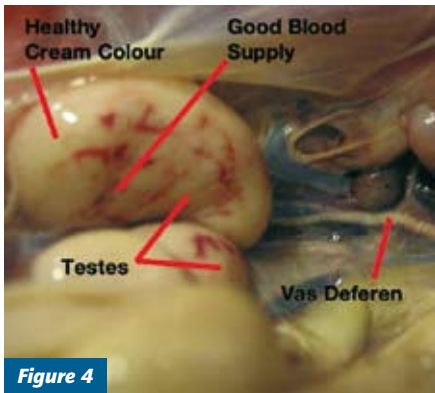


Figure 4
Testes of a good mature male at 35 weeks.

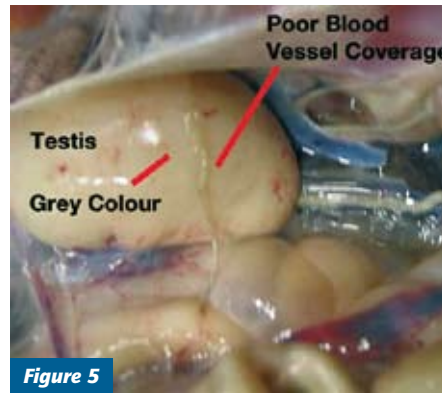


Figure 5
Regressing Testes.

maintained after peak if the rate of decline in fertility is to be minimised.

Figure 5 shows the typical regression of the testes. Note the poor blood vessel coverage, grey colour of the testes and the reduced vas deferens colour and size.

Testes regression

In field conditions, males are commonly over fleshed (overweight) or under fleshed (underweight). This is largely due to inadequate separate sex feeding techniques and poor flock management. The majority of problems can be related to the period from mating (23 weeks) up until physical maturity at around 30 weeks and commonly lead to poor testes development and fertility. The under-feeding of males post peak is a common problem, which will have a damaging effect on male condition, regression of testes and fertility. Periods of over-feeding followed by under-feeding will have a negative effect on the physiological development of the male, which will not be apparent during a physical assessment of male condition.

Condition important

The data shown in Table 1 was taken from a flock at 35 weeks with different physical fleshing conditions. Male 1 was a poorly fleshed bird, Male 2 was selected as a good working male, and Male 3 was considered over fleshed (Figure 6). The corresponding bodyweights for the 3 Males are given in the table with the corresponding testes weight (Figure 7).



Figure 6
Different fleshing of 35 weeks old males illustrating the effect of male weight and condition on testis size.

The results demonstrate the importance of physical condition (fleshing) on testes weight, with the two extremes of the population (males number 1 under fleshed and 3 over fleshed) having sub optimal testes development. As testes size is closely linked to sperm production and fertility, these males would be expected to have poorer fertility.

More than weight

There is a clear link between bodyweight, testes weight and fertility. It is therefore essential that good male management is achieved if the development of the testes is not to be inhibited. Although it is generally true that large males have large testes in modern broiler breeders, male bodyweight alone is not the definitive solution to achieving optimum fertility. Indeed, as has been shown, heavy over fleshed males often have sub optimal testes development. Good, fertile hatching eggs are obtained from flocks that have a proactive management approach using the following tools:

- Fleshing
- Feed volumes; observation at feeding time; separate sex feeding (stealing from females) and feed distribution
- Bodyweights
- Mating ratios
- Uniformity of the male population
- Vent size, moisture and colour
- Face colour



Figure 7
Testes associated with the differently fleshed males in Figure 6.

Key stages of testes development

- Between 2 and 15 weeks of age testes development occurs mainly at the cellular level and physical development is small
- After 15 weeks of age the physical growth of the testes is accelerated
- Further significant growth of the testes occurs in the first 3 weeks after the first light stimulation
- Testes weight peaks around 28-30 weeks
- Beyond 35 weeks there a natural decline in testes size and fertility occurs. The rate of this decline will be accelerated if management is poor.

Table 1 - Influence of different fleshing of 35 week old males

	Male 1	Male 2	Male 3
Bodyweight (g)	3200	4850	5350
Testes weight (g)*	27	43	29

* weights of testes are in grammes per pair

Vital multiplication

Male management for optimal testes development and fertility starts from a young age and continues throughout the male's life. Management pre-light stimulation is important for supporting the cellular development of the testes. During this time although the physical growth of the testes is small, vital multiplication of the cells that support sperm production occurs. After light stimulation the physical development of the testes is significant as the birds become sexually mature and sperm production is initiated, appropriate male management is critical at this time if fertility is to be maximised. Peak testes weight/development and semen production occurs between 28 and 30 weeks of age. After peak, testes size and fertility naturally decrease, but the rate of this decline will be influenced by management. Maintenance of male condition and bodyweight post peak is critical if the decline in fertility in older males is to be minimised. ■



Figure 8
Good, fertile hatching eggs are obtained from flocks which have a proactive management approach.