



6 Female Reproduction: Reproductive Abnormalities

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Introduction

In broiler breeders, a lot of the selection pressure has been exerted on growth and feed efficiency. More emphasis has been placed on these “male line” traits than “female” reproduction traits. As a result, broiler breeder hens are prone to several metabolic disorders and reproductive anomalies. Some of these problems are related to feed and light management issues. Part of managing for egg production has meant managing for ideal ovary management. This chapter will deal with some of the common and some of the infrequent problems encountered in female broiler breeder reproduction.



Renema, R A, F E Robinson, J A Proudman, M Newcombe and R I McKay. 1999. Poultry Science 78:629-639.

Robinson, F E, R A Renema, L Bouvier, J J R Feddes, J L Wilson, M Newcombe and R I McKay. 1999. Canadian Journal Animal Science 78:603-613.

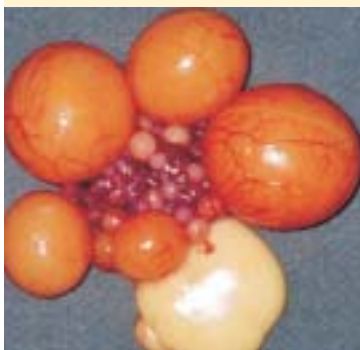
Figure 1

Follicular atresia *in situ*



Figure 2

Follicular atresia in a dissected ovary



Large Follicle Atresia

Not all follicles that initiate development result in ovulation. Particularly in the large follicle hierarchy, some birds are found to have follicle in a state of dissolution. These follicles lose turgidity and over a period of several days are reabsorbed into the blood stream. Figures 1 and 2 are representative views of single follicle atresia. It is thought that atresia may play a role in keeping the number of large follicles from becoming excessive.

Renema *et al.* (1999) reported that when hens are fed *ad libitum*, the number of small (< 5 mm) atretic follicles increased from 10 to 32. The rate of follicular atresia is typically inversely related to the number of large follicles within a population. Why some follicles become atretic and others do not is not understood. The condition in which all follicles become broken down in response to accidental water deprivation or the stress of a forced molting program is quite different from random follicle atresia.

Internal Ovulation

When ovulated follicles fall into the body cavity they are known as internal ovulations. These ovulations do not result in eggs. Sometimes hens exhibit many internal ovulations and peritonitis, an inflammation of the peritoneum which can be fatal. The cause of this is thought to be an oviduct mobility problem, leading to phantom follicles, as described below. However, internal ovulations likely occur throughout the reproductive life of the hen.

Phantom Follicles (Unreconciled Follicles)

Sometimes the first few follicles ovulated from the ovary do not result in eggs. It is becoming more and more apparent that several follicles are mature before the oviduct is ready to “catch” these follicles. We encountered this situation first by euthanizing hens on the day after their first oviposition. Such hens should have one post-ovulatory follicle (POF) to account for the egg, and possibly a second POF if the hen ovulated after the laying of that first egg. These are reconciled POFs. By counting the actual number of follicles and subtracting the number of reconciled follicles you can obtain the number of phantom (unreconciled) follicles. An example of an ovary with many phantom follicles (two of them are reconciled) is seen in Figure 3. Robinson *et al.* (1999) reported that typical

full-fed broiler breeder hens had about 3.4 unreconciled POFs. In another study Renema *et al.* (1999) found that full-fed hens had 2.1 phantom follicles, while restricted hens had only 0.3.

Excessive Follicle Development

Having too many follicles is a serious problem for broiler breeder hens (Hocking *et al.*, 1987, 1989). It is now well documented that *ad libitum*-fed breeder hens are very prone to developing excessive follicle development (Figure 4). These follicles can be arranged into multiple hierarchies by sorting them on the basis of weight. An example of a double hierarchy is shown in Figure 5. Sometimes hierarchies can also be triple ones, and they can be incomplete. We have shown in earlier studies that 34-week old hens that were full-fed from hatching had 9.1 follicles while feed restricted hens had 7.2 (Yu *et al.*, 1992). In the same project, the occurrences of simultaneous development was 1.7 follicles for the full-fed hens and only 0.6 for the restricted hens. Allowing 44-week old breeder hens to eat *ad libitum* for 14 days increased the number of large follicles from 5.8 to 7.0 (Robinson *et al.*, 1993). Yu *et al.*, (1992) reported that excessive follicle development can result in high numbers of multiple yolked eggs (Figure 6). As hens with multiple hierarchies are prone to erratic lay, they can be seen to have two eggs in the oviduct at one time (Figures 7 and 8). Prime sequence lengths are reduced in hens that are fed *ad libitum* (Robinson *et al.*, 1991).



Hocking, P M, A B Gilbert, M Walker, and D Waddington. 1987. *British Poultry Science* 28:495-506.

Hocking, P M, D Waddington, M A Walker, and A B Gilbert. 1989. *British Poultry Science* 30:167-174.

Robinson, F E, N A Robinson, and T A Scott. 1991. *Canadian Journal of Animal Science* 71:549-556.

Robinson, F E, M W Yu, M E Lupicki, and R T Hardin. 1993. *Canadian Journal of Animal Science* 73:159-167.

Figure 3

A stroma from a bird killed on the day following the first oviposition. Note several post ovulatory follicles, some of which are unreconciled (phantom)



Figure 4

The ovary of a hen with excessive follicle development as a result of *ad libitum* feeding



Figure 5

A double hierarchy in an *ad libitum* fed bird



Figure 6

The internal contents of a double yolked egg



Figure 7

An oviduct containing two eggs in different states of formation



Figure 8

An oviduct containing two eggs in one distended shell gland



Managing hens to avoid excessive follicle development is a major component of lighting programs as well. We have shown that follicle numbers of breeder hens at sexual maturity is influenced by light intensity (Figure 9).



Yu, M W, F E Robinson, R G Charles and R Weingardt. 1992. Poultry Science 71:1750-1761.

Joseph, N A, 2001 M.Sc. Thesis. University of Alberta.

Inadequate Follicle Development

Our observations suggest that the ideal number of large follicles at sexual maturity is between 7 and 8 (Robinson *et al.*, 1999). The hens that seem to have a very low number of follicles at sexual maturity are low body weight hens (Joseph, 2001). This influence of light intensity seems to be more related to inadequate follicular development at sexual maturity in response to low light intensity rather than to problems with high

Figure 9

The effects of light intensity on number of large follicles at sexual maturity

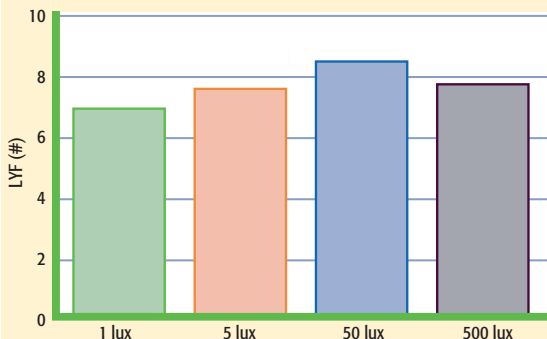


Figure 10

The number of large follicles in egg-type hens as influenced by age

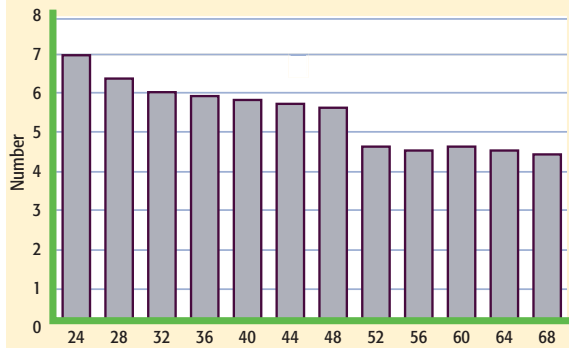


Figure 11

An internal oviposition in a hen



Figure 12

Multiple internal ovipositions in a broiler breeder hen



Figure 13

An egg-type hen with a distended abdomen



intensity. It is also very clear that regardless of the number of follicles a bird has at sexual maturity, the number of large follicles declines with age, unless feed allocation is greatly increased. In egg type hens the decline is quite linear, as seen in Figure 10.

Internal Oviposition

Sometimes eggs fail to develop and exit the cloaca normally. Instead, developing eggs move backwards up the oviduct and fall into the body cavity. These eggs can be soft shelled (Figure 11) or hard shelled. Some hens have many eggs in the oviduct. The hen in Figure 12 had over 20 eggs in her body. It is likely that these hens may have a blockage in the oviduct preventing normal oviposition, although this has not been investigated in detail.

Oviduct Failure

The hen in Figure 13 was a Leghorn hen which had acquired a very distended abdomen. Upon being euthanized, the hen was dissected to show that she had an 800 g egg in her oviduct (Figure 14). When this large soft-shelled egg was opened it was discovered that the egg had successive layers of albumen and shell membranes around it (Figure 15). This condition would have become more serious as time went on.

Two Oviducts

Chickens normally only have a single (left) ovary and oviduct. Occasionally we have encountered a hen with two oviducts. In some instances, both the right and left oviducts are of normal size (cover figure and Figure 16). In others, one is very small (Figure 17). We have never encountered a bird with an egg yolk in each oviduct. One double-

Figure 14

An 800 g egg removed from the hen seen in Figure 13



Figure 15

The contents of the egg in the abdomen of the hen seen in Figure 14



Figure 16

Two oviducts dissected from a breeder hen at sexual maturity.



Figure 17

A normal left oviduct and a small right oviduct dissected from a 16 week old breeder hen.



Figure 18

A medium-sized fluid filled right oviduct.



oviduct hen had some yolk material in her right oviduct, but it likely was an artifact of passive yolk movement as a result of internal ovulation.

Cystic Right Oviducts

Some hens with two oviducts accumulate a clear fluid in the right oviduct. This can be a relatively small volume (100 ml) as seen in Figure 18. In other more severe instances, the right oviduct can contain over 1000 ml of fluid (Figure 19, 20, and 21). Small amounts of fluid is a common occurrence, particularly in year-old hens.

Figure 19

External view of hen shown in Figures 20 and 21



Figure 20

Position of right cystic oviduct in distended body cavity



Figure 21

Dissected right cystic oviduct

