Promoting Persistency in Production

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Breeding companies have been producing fast growing and very efficient broilers for over 10 years. Like the broilers, the broiler breeders have been changing rapidly. They are selected for an increase in eggs numbers, but their main focus is still on broiler traits. The correct management and nutrition is essential to get the maximum amount of eggs out of the broiler breeders. One of the main reasons why flocks don't achieve their goals is the drop in egg production persistency. Flocks have a good peak but drop too fast in production after 40 weeks of age. This article describes the possible reasons for these drops and how to get the maximum production until the end of the cycle. This article will also illustrate a field example. However, let's first define the objective of production persistency for our parent stock flocks. The production persistency is expressed as a production index number or PI. The definition is: PI = % of production added to the age of the flock starting at peak production. Example: 30 wks of age with 84% peak = 114. The objective of the flocks is now to maintain this PI of 114 for the whole production period of 40 weeks. This means at 60 weeks of age a weekly production of 54% (60+54=114).

Production persistency is maintained by taking the following management criteria into consideration:

1. Have a good sexual uniformity at 23 weeks of age that will guarantee a good peak production and production persistency over 80%. Sexual uniformity also includes fleshing and fat uniformity, so that the females are in the best possible condition to continue producing well.
2. Do not over stimulate with artificial light (see Table 1) and try not to go over 15 hours of total light. Some companies are using a maximum of 14 hours of total light and see a general improvement in the livability of the females and in better production persistency.
3. Avoid over stimulation with feed going into peak production in order to avoid excess body weight. If excess weight occurs in this period use the alternative feeding program.

Table 1: Cobb recommended feed and light program in dark out houses.

Daily Egg Production	Rearing Standard g/day	Alternative g/day
5%	130	130
15%	136	133
25%	142	136
35%	148	142
45%	154	150
55%	160	160
65%	166	166

Light program	
Days	Hours
140	8
147	11
154	13
161	14
168	15
175	15
183	15

Body Weight (BW) should increase by no more than 18% from start to peak production. The better the control of BW going to peak production the more flexibility there is to have enough increase in BW to the end of production.

4. Avoid bringing the flock into production too early (23weeks or earlier). Be especially careful if the females are not properly prepared to start production. Early production will result in a good peak but less persistency, more wear and tear of the feathers and smaller egg size.
5. Avoid over weight birds after peak production by reducing the feed on time. Normally when peak production is achieved**,** feed reduction can be implemented with 2 g per week for 2 weeks in a row and then with 1 g per week till 40 weeks of age. After this period reduce more slowly, 1 g every 2 weeks. Many flocks in the field become over weight 3 to 5 weeks after peak production, indicating that excess feed was available in peak or just after peak.
6. By contrast, do not let the females plateau in weight gain. Females need to continue to gain BW slowly so that production is maintained.
7. Try to avoid any feed changes at 40-45 weeks of age that involve a change in the ingredients. Every change is a stress and can affect a production drop from which the females may not recover.
8. Feed quality and feed consistency is very important to maintain production performance. Without consistent quality the feed reduction program will be compromised and will not result in the desired effect to control BW and maintain production.
9. Any management error related to feathering condition, light, watering or the feeding program will result in production swings and drops.

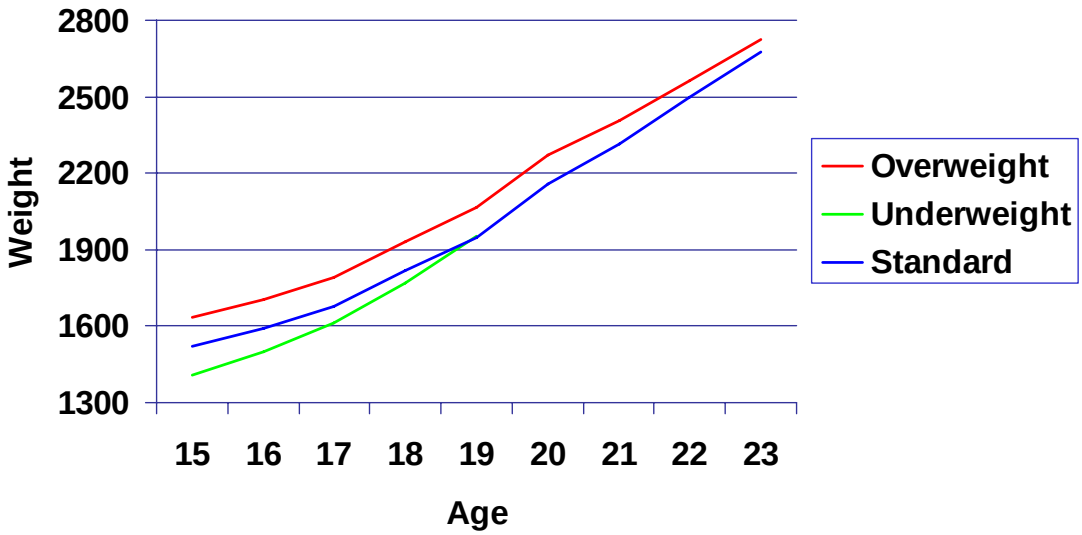
Rearing period.

Management and nutrition during the rearing stage has a great influence on the final breeder performance. In this period we have to produce good uniform pullets from day old chicks. It is essential that the pullets have good skeletal development where the body weight profiles of the breeding companies are

followed. Assure a good weekly gain and good uniformity for fleshing. Flock uniformity is a key ingredient in the recipe for highly productive flocks. Uniform flocks tend to respond to changing feed allocations in the same way without a lot of variation among birds. In the first 10-12 weeks of the rearing period the birds will define frame uniformity. From 12 to 20 weeks of age the birds define fleshing uniformity. Both are important but in general, grading needs more attention in the first 10-12 weeks of age.
With genetic potential of the broilers ever improving, this doesn't mean that we have increased our body weight targets. We have seen that higher body weight profiles in the rearing period between 10 and 16 weeks of age have a worse production persistency. The emphasis of a precise body weight control during rearing has become more important.

We can split up the rearing phase in different periods:
0 - 6 weeks → Growth and development phase
7 - 16 weeks → Control growth phase, bring the birds to the correct body weight.
17 - 20 weeks → Preparation for lay → acceleration of the growth.
After 15 weeks the development of sexual maturity increases. From this point the birds have to increase in growth as the standard specifies (see Figure 1). If the BW is on the target at 15 weeks then follow the BW curve. If it is, for example, 100 g above the target then maintain this until 20 weeks of age and try to use the light program to gradually come back to the BW curve before the onset of production.

Figure 1: 15 week body weight (g) variation.



Cobb advice is to rear the pullets in dark out houses where the light can be controlled. In the rearing period the light will be reduced from 24 hours in 2-3 weeks to 8 hours. Light intensity is reduced from 3 to a maximum of 10 lux.

The birds must have a clear night and day pattern. Between rearing and production the light intensity should increase a minimum of 10 times to have a clear influence on the hypothalamus and the pituitary gland.

Production.

1. Prepubertal period

The very critical time in broiler breeder management is the period from photostimulation to peak production. In this period the bird has relatively fast weight gain and internal changes occur of which hormones are produced by the newly active ovary.
Time of photostimulation plays a critical role in the flock. After lighting, the very small ovarian follicles begin to increase in size. The follicles produce large quantities of estrogen which influence the production of yolk precursors in the liver of the bird. The liver becomes paler as its fat content increases for the production of egg yolk liquids.
Secondly the oviduct increases in size so it is ready to receive the ovulated follicles,
Thirdly, estrogen influences changes to bone composition that allow calcium to be mobilized daily to make egg shells.

2. Light stimulation

The age of photostimulation has influence on the sexual maturity, egg production, egg persistency and egg weight.
Birds are most sensitive to circulate estrogen levels during 2-4 weeks after photostimulation. Overfeeding in this period leads to many follicles developing in the ovary; this will increase non settable eggs (like double yolks and soft shell eggs) and decrease production persistency. Many flocks that show good egg production persistency have a light program that does not over stimulate the birds into production and that gives a good balance between production and rest. Table 2 shows an example of a lighting program to maintain the egg production index (PI).

Table 2: example of a good working lighting program

Wks	20	21	21-22	22-23	23+
Light	8	11	13	14	15

Maximum 15 hours of light and a minimum of 10 fold light increase from rearing to production house.

Field trial

Research is done with two different lighting programs and two different feeding periods, slow fed treatment (SFT) and a fast fed treatment (FFT). One group produced a weekly increase of light and the other group produced a big increase from 9-15 hours.
The SFT treatment got very moderate increases in feed allocations between 20-25 weeks and the FFT treatment received a more generous feed increase between 20-25 weeks.

The slow photoperiod and the fast feed treatment had a greater ovary weight Birds with the big light increase came earlier into lay but had a poorer egg production after peak which resulted in as much as 10 fewer eggs.
The FFT birds had higher embryo mortality, which resulted in fewer chicks. This indicates that egg and chick production can be compromised by overfeeding early in lay and over stimulation with light too early will decrease production persistency.

The decision to stimulate the birds with light depends on the following conditions:

- Body weight of the birds is on or above standard around 2250 g dry BW
- Less than 5% of the birds weigh under 1900 g
- Body weight uniformity is greater than 75%
- Body composition is correct (flesh/ fat score of 3-4).

Incorrect light intensity can also be detrimental to egg production. Very low levels of light intensity can limit ovary development, follicle production and egg production. On the other hand high light intensity can cause birds to go photosensitive too early.

Feeding

Getting the right amount of feed to the broiler breeder at the right time is one of the most important parts of raising broiler breeders.

Figure 2 shows how a broiler breeder needs to supply the feed to the organs, bones and muscles.

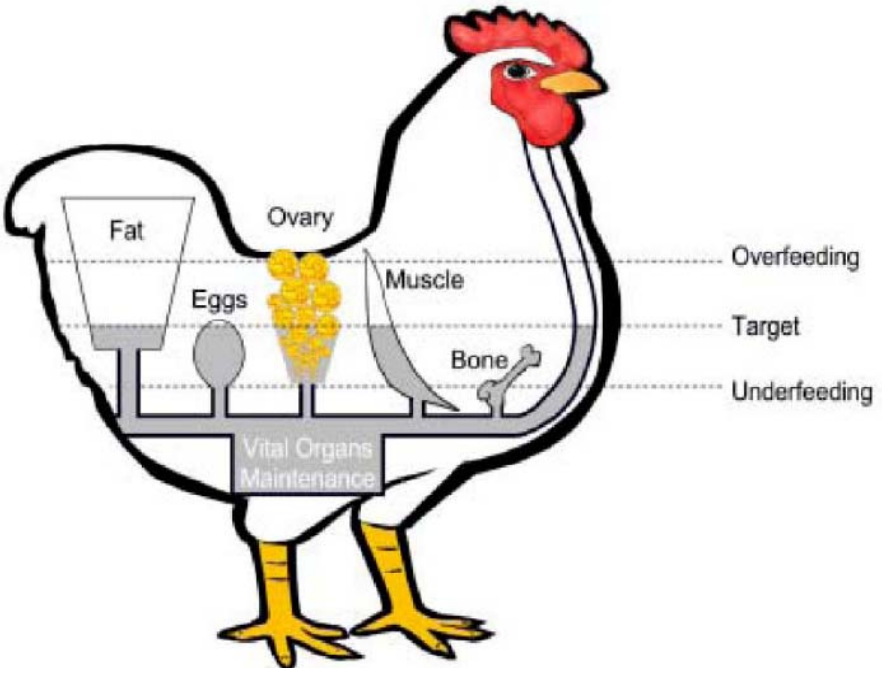


Figure 2: Nutrition Partition Model

The maintenance of vital organs, bone and muscle, have the highest priority followed by reproduction. Oversupply of nutrients results in excess fat and excess follicle production. (This can lead to SDS and Hemorrhagic liver syndrome as a direct consequence from start to peak production).

3. **Feed allocation**.

This is most critical when the birds are coming into production.
Hens need the energy to maintain their body weight, growth and egg production. When birds get too many nutrients they produce more body fat, more follicle development and excess muscle. Overfeeding is linked to reproductive disorders and poor persistency of lay. Part of the extra nutrients leads to excess fat which will have a negative impact on the production. A rule of thumb, for every 200 grams more of BW after peak the bird needs 5 grams more feed for maintenance. Females can rapidly become 200 g overweight after peak if the feed amount is too high. For that reason feed reduction in general should be started within 1 week of peak production and can often even start in peak production. Total feed reduction from peak should be between 8-14% depending on the time of the year, production persistency and BW of the females.

Nutrient shortage will result in smaller and /or fewer eggs. When broiler breeders don't get enough nutrients, their BW and production decreases. First priority is that the birds have the vital organs and bones (see figure 2). Important parameters to indicate that the birds are receiving enough and the right nutrients are BW and to some extent egg weight. This should be measured on a frequent basis and feed allocations should be on these figures.

General advice from Cobb is to recommend a conservative feed program, about 120-125 gms/bird/day at 1% production and peak feed at 65-70% production. To reach a good peak production and persistency a Cobb bird needs about 24-25 grams of protein and 465 Kcal with mash feed or 450 kcal with pelleted/crumble intake.

Field example

Cobb regularly completes flock analysis for their customers. From this information we can find trends that could improve performance. An example of a flock analysis is in figure 3. In this case the 25% top flocks were compared to the 25% bottom flocks.

Figure 3: Production curve of Top and Bottom quartile flock performance

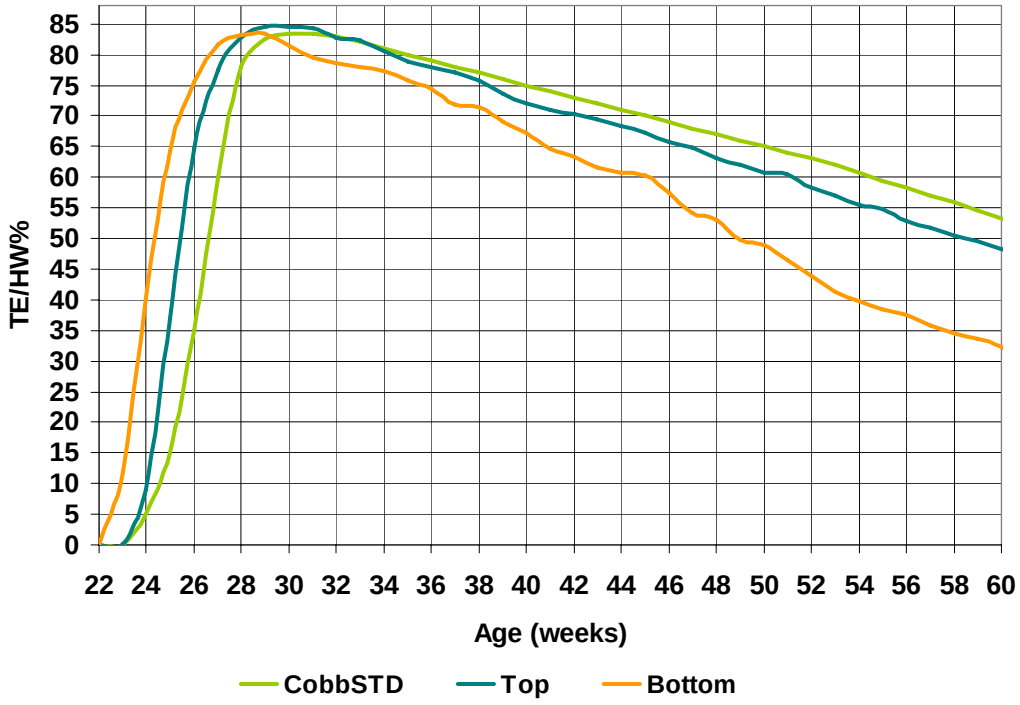
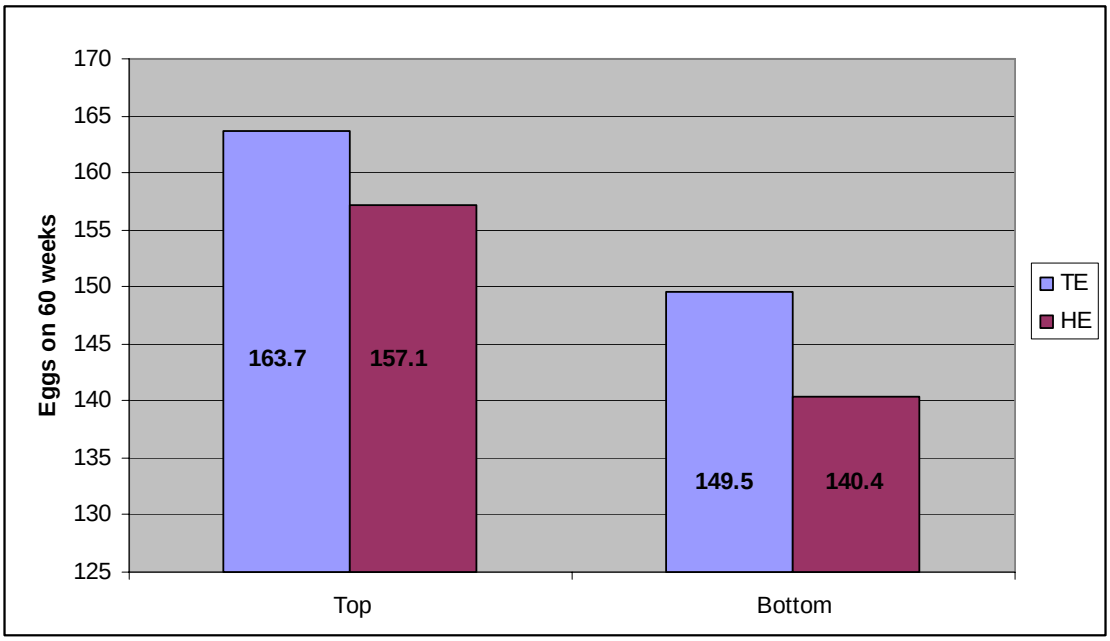


Figure 3 shows that the bottom flocks came into lay about one week earlier than the top flocks. Both production profiles show good peak production of 83%

versus 85%. The bottom flocks reach their peak already at 27 weeks and top flocks at 29 weeks. The peak production of the top flocks is about 2% higher. The big difference between the two flocks is the persistency. The gap between the two production profiles gets bigger after 38 weeks. In a lot of cases customers are glad that production starts early and giving a lot of eggs at 30 weeks. Figure 4 shows the difference in total and hatching eggs between these 2 profiles.

Figure 4: Difference in Eggs at 60 weeks between 25% Top and 25% Bottom flocks



Between the top and the bottom flocks there was a difference of 14.2 in total eggs and 16.7 in hatching eggs. Birds which are coming later into lay produce heavier egg weights and less double yolks as their earlier maturing counterparts.
The top flocks had an egg recovery of 96% and the bottom flocks 93.9%. This means that on the bottom flocks we had 2.1% more non-settable eggs.

An explanation to the reason for the difference in total and hatching eggs could be due to the following:

- The top flocks were grown according to the Cobb standard during rearing period. The bottom flocks on the other hand gained too much body weight in the early rearing period, this negatively affected the uniformity.
- The bottom flocks did not put enough weight on between 25 and 28 weeks. In this period the birds should be gaining enough reserves for good peak production and persistency. It is therefore important to adjust the feeding program to BW and production.

Financial consequences
When we take a flock of 10,000 breeders and an average hatch of 83% then the financial difference will be as follows:
Difference in hatching eggs:
10,000 x (157.1-140.4) = 167,000 hatching eggs
Difference in chicks:
167,000 x 83% = 138,610
Difference in profit:
138,610 x € 0.30 = € 41,583

Summary

This article describes that egg persistency is dependant on a lot of factors. During the rearing period we have to develop a uniform flock of pullets with the correct frame size, fat deposits and fleshing. In the production period the correct moment of light stimulation with a well designed management program is very important to get good production out of the flock. To keep a good production and persistency the breeder manager has to monitor the flocks on a regular basis with regards to BW and production, and make adjustments where necessary.

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