European parent stock seminar

Recently Aviagen hosted their European Parent Stock Seminar in Edinburgh, Scotland, and almost 150 invited delegates attended from 16 European countries. The two day programme focused on many of the key aspects of broiler breeder management and over the next few pages we have attempted to summarise the salient points for our readers.

Rearing of male breeders

In the opening presentation Aviagen's Lindsay Broadbent focused on the critical inputs that are essential in the rearing of male breeders. He defined the objective of this as being able to produce sufficient good quality males to mate with the females typically at 18-19 weeks that have the potential, if managed correctly, to maintain high levels of fertility throughout the whole production period.

He held the view that a population of poor males will still be poor after final selection and that poor rearing will already have impacted on potential fertility levels.

If high levels of fertility are to be obtained during lay the correct growth profile and the control of uniformity are essential. Experience has shown that the best results are obtained if the male breeder is kept on a constantly increasing weight and feed profile.

Early growth and development are very important if good future fertility is to be achieved and skeleton size and leg length have a real impact on fertility.

Males with smaller skeletons and shorter legs will usually have late fertility problems as they have physical difficulty to mate efficiently.

Some 80% of the skeleton's development is completed by 10-12 weeks of age and so a correct early growth profile is absolutely essential if the correct skeleton size and leg length are to be achieved. If the male has short legs at 10 weeks of age he has no chance as they will then stay short.

The objective must be to achieve or just exceed target weight by seven days of age and to maintain it through to the end of the fourth week, while at the same time maintaining uniformity.

This can be done with the aid of a special starter and extending day length in the first four weeks is also beneficial. Even at this stage it is important to ensure that the males and females have separate feed and water systems as they do have different growth profiles.

Males and females should be reared separately until they are mated and recent work in the USA has shown that separately reared males have better fertility (see Fig. 1). In this instance the separate sex rearing gave a significant advantage in terms of fertility (94.1 v. 92.7%).

To achieve the required uniformity at selection males should be graded at four to five weeks of age and a further grading can be undertaken at 10 weeks if required. There is no point grading any later as the effect on the skeleton and legs will be minimal.

It was also recommended not to move males between pens after grading as this will change feed levels and prevent the constant growth which is required.

The target is good uniformity at mating and a realistic target for %CV is 5-7% or to have a population in which all the males are within 10% of the mean weight.

Lindsay recommended that sample weighings are undertaken weekly from day one throughout the rearing period.

This can be achieved by bulk weighing on the first three occasions and thereafter birds should be weighed individually.

At each weighing the average weight should be compared to the standard and when variances occur appropriate feed adjustments should be made. On each occasion uniformity should be calculated

When weighing birds a minimum of 50 birds should be weighed. It is best to pen a group of birds and to then weigh every bird and, as was previously said, on each occasion the %CV should be calculated.

After the 10th or 11th week body weight and growth profile are very important because this is the time testicular development starts. This development starts to increase from 10-15 weeks and development is very rapid after 15 weeks of age (see Fig. 2).

It is very important to avoid disruptions to the growth pattern after 15 weeks of age.

Males should be stocked at a rate of 5.0-5.5 birds per m^2. If they can be stocked at lower rates (3.0-3.5) this would be even better. In trials these lower stocking rates have given excellent results but obviously the housing cost per bird increases significantly.

Stocking rates of above 5.5 birds per m^2 seriously adversely affect male quality and uniformity.

Feeder space is also important and linear feeder space of 5, 10, 15 and 18cm were recommended for birds up to five weeks of age, 6-10 weeks of age, 10-15 weeks of age and birds older than 15 weeks respectively.

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Fig. 1. Fertility. Mixed versus separate rearing.

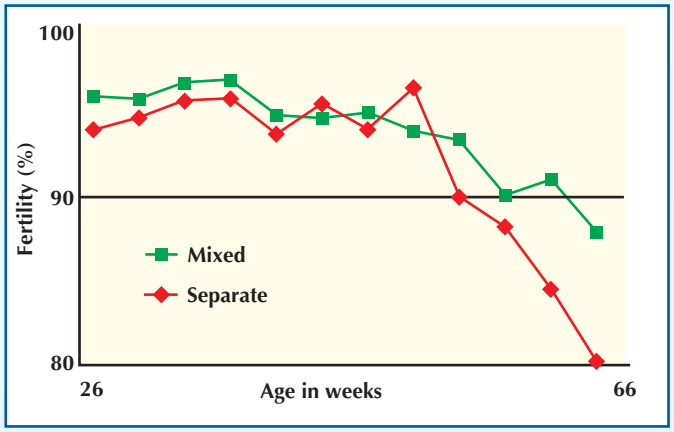
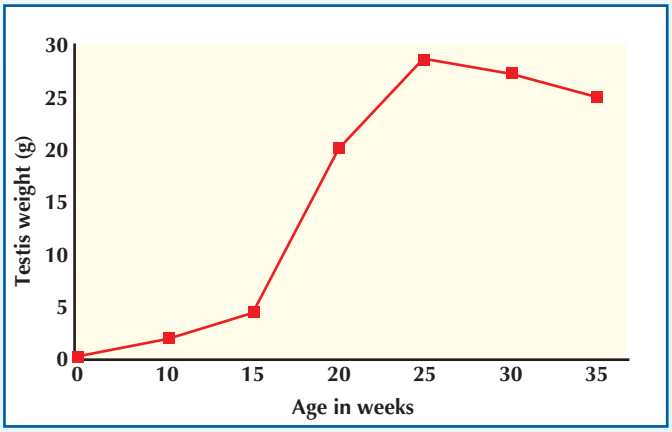


Fig. 2. Testis weight versus age.



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As far as feeding is concerned very little feed is required between eight and 15 weeks of age and there are merits in using a low density feed as this increases the quantity that has to be eaten.

This favours a more uniform feed uptake by the birds and ensures adequate mineral and vitamin uptakes are achieved.

Nowadays, lower density diets in which energy is decreased by 10% and protein by 5% are the norm in continental Europe.

Needless to say, as numbers are reduced by mortality or grading the amount of feed fed and the amount of feeder space available should be adjusted accordingly. The final aspect of male management is the selection prior to mating.

A good male will be of the right weight, from a uniform flock and should have a well fleshed breast.

Legs and toes should be straight with no deformities. Comb and face colour should be good and the males and females should be at a similar stage of maturity. Feather condition should be right for the males' age.

The beak is a very important mating organ – sharp beaks will damage the females, while males with short beaks will not be able to mate properly. The good male will be upright and have a straight back with no deformities. ■

Nutrition and chick quality

Breeder nutrition has an important impact on chick quality and was considered by Aviagen's Marcus Kenny. As a prelude to his paper Marcus compared the equivalents of a 1% change in feed price. A 1% price change equated to a 0.24% change in hatchability of all eggs, a 7.4g change in broiler final weight or a 0.0015 improvement in FCR.

He cited examples where underfeeding just prior to point of lay adversely affected chick quality at peak of lay.

He also had data to show how increasing the feed had given real benefits in terms of seven day mortalities in progeny chicks and reduced parent dead on arrival figures.

When it comes to diluted breeder diets the general aim is to improve bird welfare by feeding low energy, high bulk feeds and this is done mainly in the rearing period. This whole subject raised issues relating to feed quality and ingredient availability; the merits of pellets and feeding programmes but it did benefit progeny chick quality.

When applied to 40 week old parent stock a reduced energy in the rear and laying rations had no significant effect on broiler performance, but did significantly reduce progeny mortality (see Table 1).

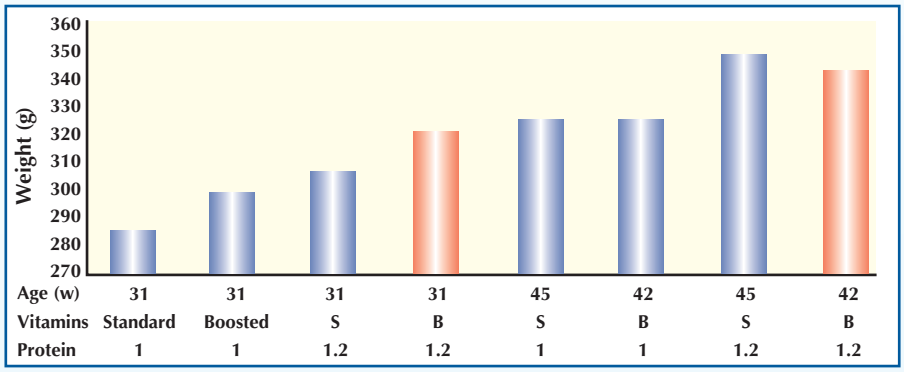

Fig. 1. Influence of nutritional strategy on 11 day broiler liveweight (as hatched).

A combined strategy of improved protein levels and/or vitamin levels had a real impact on progeny chick 11 day weights (See Fig. 1).

When it came to vitamins the role of vitamin E should not be underestimated. Dutch work was cited in which additional vitamin E (110 v. 46mg per kg vitamin E) was shown to reduce candling clears from 17.3 to 12.2% at 60 weeks and from 26.9 to 17.9% at 64 weeks. ■

Table 1. Benefits of reduced breeder energy on broiler mortality.

Rear (MJ/kg)	**10.9**	**10.9**	**9.6**	**8.4**
Lay (MJ/kg)	**11.7**	**10.5**	**10.5**	**9.2**
Broiler body weight (g)	2338	2347	2361	2338
Broiler FCR	1.670	1.652	1.661	1.664
Broiler mortality (%)	6.8	7.5	4.5	4.2

Reducing floor eggs

Henk Steenbink from Ross-EPI considered ways for reducing floor eggs which resulted in losses from eggs being broken, damaged or lost as well as being contaminated (bangers etc).

At the breeder level susceptible females can be selected out of a breeding programme.

In order to prevent floor eggs in lay it is important to have a light intensity of at least 10 lux as this favours horizontal rather than vertical movement by the hens. For a similar reason electric anti-roost wires on feeders or drinkers are not to be recommended.

Research has shown that in rear pan feeders without perches give a two to three times higher risk of floor eggs than do chain feeders and nipple drinkers favour floor eggs more than bell drinkers.

This was substantiated by the following field data:

- Spin feeders and bell drinkers
– 89% of farms had <3% floor eggs.
- Chain feeders and bell drinkers
– 71% of farms had <3% floor eggs.
- Pan feeders and nipple drinkers
– 10% farms had <3% floor eggs.

Floor eggs could be prevented/reduced by using perches (1-2cm per bird) or platforms (1m² per 500 birds). When transferring birds into the laying accommodation it is best to place them on the slats and to initially minimise the amount of bedding material in the litter area.

In the laying house the male feeders should be 80-90cm from the wall while the hen feeders should be close (80cm) to the slatted area. The drinkers should be 60cm from the nests and light levels of 50 lux in the littered area and 30 lux over the slats are recommended and the slatted area should slope up towards the nests.

Obviously to prevent floor eggs there must be enough nests (four or five hens per nest opening) and there should be no draughts over or into the nests.

Management issues to focus on were the feeding of the birds within 30 minutes of the lights coming on or six to seven hours after. The nests should be opened up 15 minutes before the lights come on and they should be closed an hour before the lights go off.

It was stressed that automation minimises the time people spend with the birds and so more time has to be spent observing the birds' behaviour in rear and lay and birds that do not learn to move around will produce more floor eggs. ■

Management of hatching eggs

Michael Longley addressed the important subject of looking after hatching eggs.

This process starts with egg collection and here the objective must be to remove eggs from the nest and to a clean environment as soon as possible after they have been laid and, ideally, while they are still warm as this minimises further growth of the germinal disc.

In addition, prompt disinfection limits the chances of micro-organisms being drawn into the shell pores as the egg cools.

Eggs should be collected at least three times a day and the on farm egg handling area should be similar to the laying house temperature and should not fluctuate.

Hand and tray hygiene are important and eggs must be trayed large ends up. Eggs that are not suitable for hatching should not be placed on setter trays.

Egg hygiene is critical because bacterial penetration of the shell results in increased early dead, weakened embryos, high 'dead in shell', bangers, higher percentage of culls at take off, yolk sac infection and elevated first week mortality.

Recent research from the USA was cited in which clean eggs with no defects were shown to have almost 5% better hatchability.

Aspects of egg storage were reviewed. Duration of storage can adversely affect hatchability and figures of 0.7% loss in hatchability per day for eggs stored for 6-10 days and 1.2% per day for eggs stored for longer than 10 days were given.

When it comes to temperature the physiological zero is somewhere between 23 and 28°C and hatching eggs should be stored between 16 and 18°C.

If eggs are stored too cool, sweating (condensation) will occur and if they are stored too warm embryonic development can occur.

The ideal humidity for egg storage is between 70 and 80% as this minimises water loss.

If humidity is too high condensation can occur on the eggs and if it is too low dehydration can occur.

Conditions which are too warm favour bacterial growth, whereas temperatures that are too cool and/or too humid increase the risk of condensation and favour fungal growth. ■

Managing females for persistency

When it comes to managing the breeder hen in lay, persistency of lay is a key issue and Ross-EPI's technical director Otto van Tuijl reviewed important aspects of this topic.

The optimal starting point for persistent lay is a good peak and, thereafter, the aim is to minimise the decline in production throughout the rest of the lay period.

He highlighted five aspects of management and the first of these was the provision of optimal conditions in the laying house and minimising stress on the in lay bird.

Basics such as feeder and drinker space, available nests and nests per hen, the stocking density in relation to the equipment present, the height of the slatted area, ventilation and absence of draughts, litter quality, water management, feed distribution and house temperatures were all important in this context. One or more of these is often overlooked.

For a flock starting in winter and being depleted in summer the house temperature should ideally rise from 18 to 25°C over the period and feed intake should be reduced to some 92.5-90.0% of the allocation at peak.

For a flock moving from summer into winter the corresponding figures are 25 to 18°C and 97.0-98.5% of allocation at peak.

The second issue is bird related factors and included here are things such as uniformity, beak condition, feather cover, mating ratio, fleshing and the condition of the legs and feet.

A good flock will have a feather score between two and three and poor feathering will increase feed requirement by up to 10g per bird per day.

The difference in feed requirement between a well feathered flock in summer and a badly feathered winter flock can be as high as 25g per bird per day!

Bird weight management is not just a rearing issue and it should be continued throughout lay.

It is centred on having had a good weight profile in rear, bird weight at the start of production, bird weight at peak production, reliable weekly weighings and monitoring of weekly bodyweight increases.

Weight at 20 weeks (g)	2007		2434
Weight at 30 weeks (g)	3300		3680
5% egg production (day)	165		161
Weight at 62 weeks (g)	3935		4323
Increase 30-62 weeks (g)		635	
Increase per week (g)		20	
Indexed egg production	**100**		**98**
Indexed feed intake	**100**		**105**

Table 1. Detrimental consequences of exceeding growth rate profile.

Exceeding growth rate profile in late rear and/or having heavier (+10-20%) bodyweights at 21 weeks will result in a decline in persistency after 40 weeks of age (see Table 1).

Heavier birds at 20-30 weeks of age results in an earlier start to egg production, a need for more feed per hen per day, more feed per hatching egg produced and a poorer persistency in lay.

To obtain reliable body weights it is important to undertake regular sample weighing, either manually or automatically, to take a large enough sample of birds per house and to do the weighing at the same time on each weighing day and on the same day each month. Flock uniformity should be regularly calculated and monitored.

Trials have shown that weekly body weight gains of 24.5, 28.0 and 29.5g produced indexed egg production of 100, 96 and 97 respectively at 31-40 weeks and at 41-50 weeks weekly weight gains of 22.5 and 32.9 produced

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Table 2. Impact of reduced weekly weight gains.

Total gain (g)	Weekly gain (g)	Indexed egg production
765	25.0	100
710	23.5	98
635	21.0	97

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indexed egg productions of 100 and 97 respectively. If one looks at the whole cycle the impact of reduced weekly weight gains is also a phenomenon of concern (see Table 2).

In summary, the target weight gain after 30 weeks of age should be 20-30g per week.

Too much gain results in undesirable fat deposition and too little can result in the risk of the flock going into moult. When it comes to light management early light stimulation adversely affects persistency.

Ideally the first light increase should be at 18 or 20 weeks. The data from over 300 flocks shows that first light stimulation at 20 weeks results in a slightly higher peak in the week of stimulation but had no affect on the number of hatching eggs to 60 weeks (see Table 3).

Light stimulation	18 weeks	20 weeks
Eggs at 30 weeks	30.6	29.4
Eggs at 60 weeks	134.0	134.3

Table 3. Lighting effects.

Does changing day length have any meaningful effect?

Results show little effect on peak production but in flocks with a decreasing light production after 40 weeks a drop in indexed production of 2.5% was seen.

Feeding the in lay hen is important and the achievement of a uniform feed intake is very much dependent on production level, hen bodyweight, the condition of the females, egg weight development, the uniformity of the hens, housing conditions and the expertise and experience of the farm staff.

Overfeeding can result in the formation of too many large follicles and the risk of this is greatest at the onset of lay.

After 40 weeks feeding is less critical in this context and after 50 weeks it only harms the costings.

Stress factors are important. Included here are things such as fluctuating house temperatures, the mating ratio and the rigour of the males, spiking and other bird movements, parasites, such as red mites and worms, and diseases such as infectious bronchitis, avian pneumovirus infection, infectious laryngotracheitis, fowl cholera and colisepticaemia.

In concluding, Otto summarised by saying that managing parent stock females for consistency is not impossible but that it is certainly challenging and that it requires a forgiving bird, well managed conditions, good stockmanship and a lot of common sense! ■

Control of late egg size

During the life of a broiler breeder flock egg weight increases because of bodyweight gain and reducing production after peak. Bigger eggs are beneficial to broiler performance in that they produce bigger chicks with more residual yolk and which are less susceptible to dehydration.

However, there is a downside in that big increases in egg size in late production will affect quality and handling and large eggs tend to have poorer hatchability, poorer shell quality and more cracks. Aviagen's Jonathan Harrison explained ways to control late egg size.

In general, flocks with better production have lower egg weights and better uniformity, whereas a flock with poor production will often have heavier eggs and a poorer egg weight uniformity.

This being the case, maximising egg production throughout a flock's life and avoiding a drop in persistency after peak will help to control late egg size. Many of the management issues previously touched upon come into play here.

In addition, heavier bodyweights are associated with heavier egg weights and so good control of bodyweight in lay will help to control late egg weight. Also, excessive increases in bodyweight may lead to poorer persistency and this can compound the issue of late egg size.

A flock in which early eggs are heavy will tend to produce heavier eggs late in lay and birds, which are heavy at sexual maturity, will tend to lay bigger early and late eggs. Light stimulation will reduce the number of very small eggs produced without increasing egg weights later on.

On going genetic changes are likely to lead to some increases in egg size but daily attention to the flock's management should help to control increases in late egg size. This centres on good bodyweight control, maintaining persistency and feeding the birds in line with their requirements.

In particular, hens should not be over fed at peak, the flock must be managed and not under fed late in lay and there may be occasions when a change in the feed's specification can be beneficial. ■

Male management in lay

Nick Spenceley then addressed the issue of male management in lay. He defined effective male management as males being fertile at time of first eggs, peak fertilities over 90% that persisted with a final fertility of over 78% at depletion at 60 weeks.

The key points in rear are the achievement of 1100g at six weeks of age to promote frame size as a well framed bird can carry weight without becoming obese. Males should not be damaged during transfer and they should continue to grow until they are fully mature. Poor males must be culled.

Increasing target weight at 24 weeks by 100g helps early fertility which, in turn, also tends to give a better (+90%) peak. The male must be observed. The male must be dominant otherwise delayed mating can become a problem.

As far as mating ratios are concerned these should be established by 22 weeks and opinions vary between 8 and 10% as to the ideal figure. Males should be culled weekly, not monthly, and a ratio of some 6% at 55 weeks should be the aim.

If we only use 8% males at 22 weeks they should stay fit and active longer and there will be less competition between the males. It should be easier to control weight and condition and there will be no subsequent need to reduce mating ratios. In essence less management of the males will be needed.

It was stressed that it is not body weight per se that is important. Bodyweight must always be assessed in association with bodily condition (and especially relative to skeletal size) and the uniformity of the males.

Male feeder systems must provide a uniform feed intake for all males and prevent hens from getting the male's feed.

It is important to reduce the number of male feeders and the number of males declines and in doing this the same amount of feeder space per male should be retained. Feeder height should be closely monitored and managed.

The good male is going to be dominant, of the right weight, colour up in his wattle and comb, be well fleshed and will need a little extra feed as he gets older for maintenance, growth and mating activity.

In late lay additional feed for the males can be just as effective as spiking – and a lot less risky!

In males foot infections are a real and often under appreciated problem. Hard and/or wet litter predisposes to the problem and it is worse in overweight males. Control involves managing the ventilation, minimising water spillages and regular top ups with fresh litter. ■