

The importance of grading for better flock performance

Grading, the separation of broiler breeder females into weight dependent sub-populations to improve total flock uniformity, is not a new concept. Many parts of Western Europe have been managing this process regularly since the early 1990s.

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As the poultry industry, and in particular the chicken industry, has expanded, managers have looked in increasing detail as to how they can improve hatching egg and chick output and have found that a more uniform flock will have optimal performance and welfare.

A well graded flock with minimal variation in body weight will be:

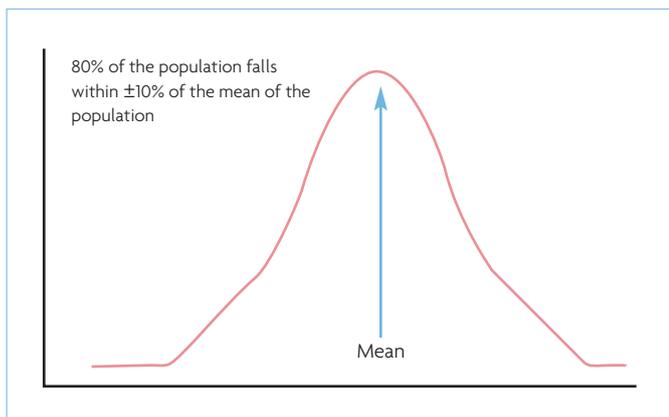
- More predictable in response.
- More persistent in production.
- Easier to manage.
- More profitable.

This article covers the key points of why grading is important, how grading should be managed, and the challenges that may be experienced.

Why is grading important?

The biological traits of any animal population exhibit natural variation. The normal distribution of that variation is bell shaped. For example,

Fig. 1. Normal distribution of a population.



A well graded population with birds separated into different pens according to body weight, stocking density, feeder and drinker availability.

when looking at the distribution of weight within a population of animals of the same age, there will be a large range of weights within the population, but the majority of individuals will be expected to fall within close proximity to the mean body weight with the number of individuals at the extremes being low (Fig. 1).

During grading the 'average' birds (those that fall within a given range of the mean body weight) are separated from those birds that are

heavy or light compared to the mean (those birds that are at the extremes of the population). The light and heavy birds should be placed into separate pens to allow closer management of their body weights.

The objective is to manage the light and heavy populations by con-

trolling the feed increments and feed levels of each weight category so that they can be brought back to the mean body weight of the flock (the 'average' population) by the end of the rearing period (19-22 weeks of age). It is important to state at this stage that grading is about management of the whole population, to reduce the variability within the flock by point of lay.

The more variable a flock, the more variable the:

- Reproductive performance.
- Individual nutrient requirements.
- Liveability.

How should grading be managed?

Grading should be done between 28 and 35 days of age. A representative sample of the flock must be weighed using an accurate set of either dial or electronic scales.

A minimum of 5% of the population or 100 birds, whichever is greater, must be weighed – taking birds from at least three different sample points within each pen.

The variability of body weight within the population should then be calculated.

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CV%	Uniformity (% age birds falling within $\pm 10\%$ of mean)	Grade required
10	80	2-way
12-14	65-75	3-way
>14	<65	3-way

Table 1. Grading methodology based on variability of body weight within a flock.

Table 2. Grading cut-off points based on flock CV%.

Flock uniformity CV%	Grade	Population after grading (%)		
		Light	Average	Heavy
10	2-way	20	80 (78-82)	0
12-14	3-way	22-25	70 (66-73)	5-9
>14	3-way	28-30	58 (55-60)	12-15

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There are two ways to calculate how variable in body weight a flock is:

● **Coefficient of variation (CV%).** CV% is the standard deviation divided by the mean body weight expressed as a percentage. It shows how much variation from the mean there is within a flock. A high CV% indicates that there is a lot of variation within the flock and that body weights are spread over a large range. A low CV% indicates that the spread of body weights around the mean within a population is small i.e. the flock is less variable.

● **Uniformity** Uniformity shows the percentage of the flock that falls within a given range of the mean body weight of a flock ($\pm 10\%$ of the mean is a good range to use to optimise subsequent flock uniformity).

If a high percentage of the population falls within this range it indicates a more uniform flock. If a low percentage of the flock falls within this range it indicates a less uniform flock with a greater spread of body weights.

After flock CV% and/or uniformity has been calculated the number of populations into which the flock should be graded can be determined.

A less uniform flock (low uniformity or high CV%) will need to be split into three populations (light, average and heavy), while a more uniform flock may only require a 2-way grade (light and average).

Table 1 gives an indication of how many populations a flock should be graded into depending on the variability in body weight within the flock.

The weight categories that the birds are graded into depends upon the method chosen by the producer to measure flock variation. For those using the uniformity calculation, all birds that are more than 10% lighter than the mean should be placed into a separate 'light' pen and all birds more than 10% heavier than the mean should be placed in a 'heavy' separate pen (if using $\pm 10\%$ as your range).

If CV% is to be used, then the cut

Table 3. Recommended female feeding space.

Age (days)	Feeding space	
	Track feeder (cm)	Pan feeder (cm)
0-35	5	4
36-70	10	8
71-105	15	10

	Rearing (0-15 weeks)	Lay (16 weeks – depletion)
Automatic circular or trough drinkers	1.5cm per bird	2.5cm per bird
Nipples	One per every 8-12 birds	One per every 6-10 birds
Cups	One per every 20-30 birds	One per every 15-20 birds

Table 4. Recommended drinking space for females.

off weights for light, average and heavy populations should be as given in Table 2.

When moving birds into their graded populations/pens, it is important to remember that bird stocking densities of 4-7 birds/m² and feeder and drinker space must be adhered to (Tables 3 and 4).

In particular, it is important to make sure feeder and drinker space is correct for the number of birds in the pen. This is more easily managed where adjustable penning is used as pen sizes can be increased or decreased to accommodate bird numbers.

Failure to maintain stocking densities and to appropriately match feeding and drinking space will lead to increased variation within each pen as birds will not be able to exhibit correct feeding and drinking behaviour.

Once graded into separate populations, birds should remain in the same pen until they have reached target body weight for age. Control of body weight in graded populations is done by adjusting feed levels and weekly feed increments.

General management strategies used to do this are:

- Overweight (heavy) birds may need smaller weekly feed increments, feed increases delayed or feed levels held for a maximum of two weeks rather than increased weekly.
- Underweight (light) birds may need larger weekly feed increments, feed increases brought forward and/or more than one increment per week.

If by 63-70 days, the graded populations have still not reached the desired body weight and/or variation within the flock has become worse, it may be necessary to regrade. Birds that are still over or underweight by this age should con-

tinue to be managed back to the target weight by 105 days.

The challenges of grading

Grading can be, and often is, seen as a challenging and difficult task, which seems like a lot of work for little return. There are a number of reasons why many managers do not attempt a thorough and detailed grade of their flocks:

- More labour may be needed to help during the process which increases costs.
- Moving birds between houses and pens is potentially stressful for the birds (but this should be balanced against the long term benefits of grading for flock performance and welfare).
- Configuring feeders and drinkers to pen sizes and bird numbers can be a difficult task.
- Adjusting feed amounts according to the number of birds in smaller and larger pens requires careful management and attention to detail.
- Managing feed times without each pen having its own feeding system, creates many difficulties when trying to give extra feed to a light population of birds housed in the same house as a heavy and/or average population of birds.

Table 5. The impact of increasing variability/reducing uniformity of a breeder flock.

CV%	Effect
<8	Predictable onset Higher sustained peak Better persistency Lower mortality Easier to manage
8-10	Becoming less predictable onset after initial stimulation High peak Poorer persistency Higher mortality Harder to manage
10-13	Unpredictable onset – possible eggs before initial stimulation Lower peak Poorer persistency Higher mortality Difficult to manage
>14	Very difficult to manage at every stage

● Vaccinating work may be made more complicated with a number of different pens within a house.

● Some facilities may not have the availability of adjustable penning to allow accurate graded numbers of each weight category by making pens larger or smaller depending on the size of the graded population.

This may lead to a higher level of variation than wanted as weight ranges within each pen may need to be wider to accommodate stocking densities.

Each of the challenges noted above can be managed in a logical and practical way. Moving birds from one pen or house to another with minimum stress is overcome by ensuring that anyone who is handling birds is trained appropriately and is using the right equipment.

Adjusting feed amounts for each pen without making a mistake may be done by simple spreadsheet use and recording what was fed, clearly and concisely. Vaccination may actually become easier as smaller pens are easier to manage for manual tasks.

Conclusion

Grading of a flock is increased work for the manager and does require extra effort and input. But, if managed well, the benefits of grading to improve flock uniformity and welfare are greater than any perceived disadvantages (Table 5).

If at the end of the rearing stage, a flock has a CV <8% and a uniformity >85%, then the grading process has been managed well and a flock will have been produced with much greater production potential, that is easier to manage, more predictable, more persistent and more profitable. ■