Do we pay enough attention to our data?

As the old saying goes 'There are lies, damn lies and statistics!' and whenever we consider the numbers or statistics we use on our breeder farm or in our hatchery we should always keep this old adage in the back of our minds.

So, when it comes to poultry breeding and hatcheries, just what are the figures that we use? In essence they can be defined as numerical quantifications of performance or efficiencies that are used for comparative purposes to see how well we are doing against our own standards or against the industry as a whole.

Thus, the value of any such comparison to our business is only as good as the figures on which it is based. In this context the computer industry's saying GIGO ('Garbage in, garbage out') really does hold true. That is, the figures we produce are only as good as the data they are derived from.

What is its purpose?

So, for anything we measure we need to consider the purpose(s) that the resulting figures will be used for. We need to ensure that we are producing accurate, meaningful figures. However, in doing this we need to define accuracy. For example, when it comes to weighing we may be happy to have records that show the feed stocks held by the company are accurate to within a tonne, whereas when we are measuring seven day old chick weights we need figures that are accurate to within one gram or even 0.1g.

For example, in the latter situation we get little value from weighing 10 chicks at a time in a bucket on scales with an accuracy of ±100g as this will give us chick weights with an accuracy of ±10g, which when we are talking of weights in the range of 100-180g is not at all acceptable.

This is unacceptable from the point of view of the accuracy of the mean weight produced, but we also have no base data to calculate a coefficient of variation (%CV) that will give us an indication of flock uniformity. Ideally we should individually weigh 50 or 100 chicks to an accuracy of ±0.1g.

When it comes to incubator temperatures a thermometer that will only give us a reading to the nearest degree is of little value to us – we need a thermometer that will give us accuracy to the nearest 0.1, or maybe even 0.01, of a degree.

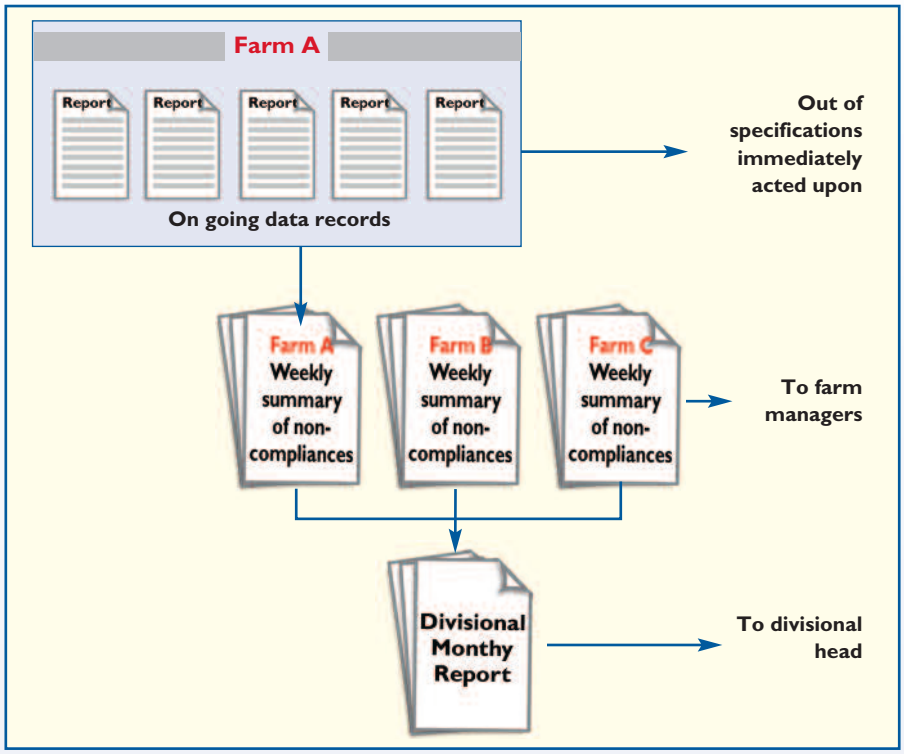

Fig. 1. The reporting cascade.

So, the first thing we need to consider is whether the measuring device is suitable for the task we want it to do and the data we want to generate. Here we need to consider two things. Firstly, is the measuring device reading true – that is, is the device correctly calibrated?

It is amazing how many people adopt the attitude 'we have had it calibrated and so it must be reading true'. If we are talking electronic balances one good knock can adversely affect the results that are generated. So, think of the scales that are calibrated once a year, say on 1st March, that on the 2nd March receives a knock. They could be giving us inaccurate readings for the next 355 days!

So, in such a scenario we need to have a quick way to check our scales each time we use them. Let us revert to our seven day weight of chicks. For these scales we need to find a piece of metal in the weight range of, say, 120 to170g and weigh it accurately. Let us say it weighs 146.6g. Then each time we use the scales we weigh this piece of metal that we keep with the scales and as long as it weighs 146.6g we know our scales are accurate.

It is important that we use a piece of metal because its weight will remain constant. We should not use wood as it will absorb or give up water, thereby altering its weight and we should avoid something like a lump of concrete that will lose weight if it is chipped.

Degree of accuracy

Secondly, we need to define the degree of accuracy that we need. For example, if we are calculating FCRs every variance of 10g in bird weight will affect FCR by 0.01. In this scenario a variance of 10g in bird weight might be acceptable, but one of 50g might well not be as it could adversely affect the resulting FCR by 0.05.

Another issue we need to consider is whether we are producing the right data?

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We have a good example to illustrate this in the hatchery with our fertility figures. What we get in our figures depends very much on how we measure 'fertility'.

The true sense of the meaning of the word fertile is 'capable of being fertilised' and we talk about other farm animals, such as cows and sows, as being fertile if they are ovulating. In the poultry context when we say 'fertile' we actually mean 'has been fertilised'.

Thus, to get a true fertility figure we need to do a break out of eggs that are literally a couple of days old to assess whether or not there has been fertilisation and if there is some development of the germinal disc.

In practice 'fertility' actually means all eggs less those with no blood ring on candling. That is, a fertile egg is one that gets past its third day of embryonic development. Alternatively, we are saying all eggs less those rejected at candling. That is, a fertile egg is one that gets past its 10th day of incubation.

Needless to say if we take such figures literally as 'fertility' we can be grossly misled if we are troubleshooting a drop in performance in the hatchery. We could assume we have a fertility problem when, in fact, we really have an early embryonic loss problem.

In such a scenario we could wrongly focus our attention on mating, male health and sex ratio issues when, in fact, the answer lies in egg handling on the farm prior to incubation or even in the first few days in the setters. So, we really need to be sure that everyone in our company knows how we are defining 'fertility' and the implications of that definition. This then becomes more important if we are using the data for comparative purposes – are we comparing apples with apples or are we comparing apples with pears?

This becomes even more of an issue when the measurement is very much based on a subjective assessment by different staff. What is a dirty egg? Ask six people and you are likely to get seven definitions.

In this context why do we reject small eggs on a visual appraisal when it is well known that the shape of an egg will influence our estimation of its weight.

Most people tend to underestimate the weight of round eggs and overestimate the weight of long, thin eggs. So, by just estimating egg weight we could well be rejecting eggs that should be kept and vice versa.

There may be benefits in actually weighing eggs from the first few weeks of lay, especially in countries where labour costs are low.

So, having addressed some of the issues let us now bring this whole subject into a logical approach for managers by asking a series of questions.

- **What do we want to measure/enumerate?** To prevent problems later it is worthwhile spending some time precisely defining what it is we actually want to measure. The early discussion on defining fertility highlights why this is important.
- **Why do we want to make the measurement/enumeration?** Knowing why we want to do the task is critical in helping us define what we are going to measure and, more importantly, how we are going to make the measurement. If the result is going to be used by others, for example for comparative purposes, we must be sure we are taking the measurement exactly as they want us to. For example should we record the temperature as °C or °F? If we are weighing breeders should we weigh them before or after feeding?
- **How are we going to measure or enumerate?** In essence we need to define, or better still write down, the procedure that is to be followed to achieve the measurement or count that we need.
- **When should the measurement be taken?** There are measurements that are undertaken relative to an event, for example the previously cited scenario of weighing breeders at feeding time. Also there may be some measurements that are time sensitive and a good example of this could be outside temperatures in that it is not very meaningful to compare a noon temperature on one day with a 9.00am temperature the following day. Alternatively, we may want to take a measurement so many hours into an operation, for example incubator conditions for settings that are placed at different setting times.

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- **What equipment are we going to use?** They key thing here is that the equipment to be used should be suitable and appropriate for the task. A key issue here is the sensitivity of the equipment. If we are talking scales are we happy for an accuracy of ± one tonne, ± one kilogram, ±100g, ±1.0g or ±0.1g?
- **Is this equipment reading true?** This has two components for consideration. The first is the issue of calibration and the second is the checks we undertake immediately before using the equipment.
- **Is the person doing the measurement competent to do it?** One of the key issues is operator competence. Does the operator know how to use and read the equipment, for example, when reading a thermometer does he know which part of the meniscus to use? Also, is he adequately aware of how measurements can be adversely affected and what to do to ensure this does not occur? A good example is when weighing birds. If one bird defecates on the weighing pan then the weights of all subsequent birds are the weight of the bird plus the weight of this faecal material!
- **Has this person been adequately trained and his competence confirmed?** If not, why is he doing the measurement?
- **Are the results correctly recorded?** There is no point making the measurements if the resulting data is not recorded. Ideally we should provide an appropriate form or book for keeping the data in and we should ensure our operators know how to correctly record the data. For example, should it be recorded to one or two decimal places?
- **Does the operator know the limits of normality?** We are usually measuring something to see if it is as we would expect it to be. This being the case, we need to advise our operators of the expected result and what to do if the result comes outside the zone of normality, for example, inform the manager.
- **Is the data being forwarded to those managers who need it?** It is surprising how often a worker regularly records something but that information is not forwarded on to those who require it. Here we need to give consideration to a reporting cascade.
- **Is the relevance of the exercise and the data it regularly generates periodically reviewed?** It is amazing how often staff a recording something that management no longer has a need for! So, we should regularly review what we are measuring and recording to see that it is still pertinent to current needs. Another way of approaching this is to justify each additional recording requirement and if it is essential let it take the place of something which is no longer of real significance. If we do not adopt this approach the list of things to be monitored and recorded will just keep on growing!

Records are the backbone of our business so it is worthwhile ensuring that everything is being done correctly. ■