What is genetic improvement?

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Although duck meat currently represents less than 10% of total poultry meat production and is largely concentrated in China and Southern Asia, this market has grown significantly in recent years.

Duck meat production has risen steadily over the last decade from 1.88 to 3.36 million tonnes according to FAO statistics.

The majority of this growth has been seen in East Asia, where production processes are becoming increasingly more sophisticated with the need for lower cost and better quality products for both domestic and export markets. This growth is likely to continue with genetic and husbandry advances making duck increasingly competitive to other poultry and meat products.

The growth of these markets has also led to more commercial style production with the movement of birds into intensive or semi intensive systems, often within larger integrated operations.

	%	Actual
Average daily growth rate (g/day)	+1.9	+1.63
45 day weight (g)	+1.2	+47.1
Test FCR (g/g)	-1.0	-0.021
Breast depth (mm)	+2.2	+0.45

Table 1. Predicted genetic gains per generation in a commercial duck. Eviscerated weight is approximately 68% of liveweight hence genetic gain in oven ready carcase weight = 32g.

Current breeding strategies in Pekin ducks are similar to those in broilers. Selection effort has primarily been driven by the demand for lower cost, higher quality food products typified by traits such as growth, breast meat yield and feed conversion ratio (FCR).

This selection has been very successful and has vastly improved the efficiency of growth and meat production of Pekin ducks whilst maintaining chick cost.

The genetic improvement programme at Cherry Valley is based on selecting a number of 'elite' pure strains. These are split into male and female strains and are used to produce crossbred parents and finally mated as a four way cross to produce a commercial bird.

Cherry Valley's elite hatchery in Lincolnshire, UK.

Elite birds are selected for the next generation on the basis of BLUP breeding values, which takes account of records from the individual's relatives as well as the individual's own performance so increasing the accuracy of selection to ensure the most effective genetic improvement.

Male strains tend to have more selection emphasis on feed conversion ratio, breast meat yield and growth rate, whilst the female strains are primarily selected for improved reproduction and carcase quality.

The aims of the programme are to increase the profitability of duck production by improving the growth and carcase characteristics of the commercial duck, whilst maintaining the liveability and reproductive capacity of the breeding bird.

Recent analyses of genetic trends show that current selection is moving the commercial bird in the right direction with ever improving FCR, growth rate and breast meat of approximately 1.5% per generation, with small improvements in primary feather length, gait and reproductive traits.

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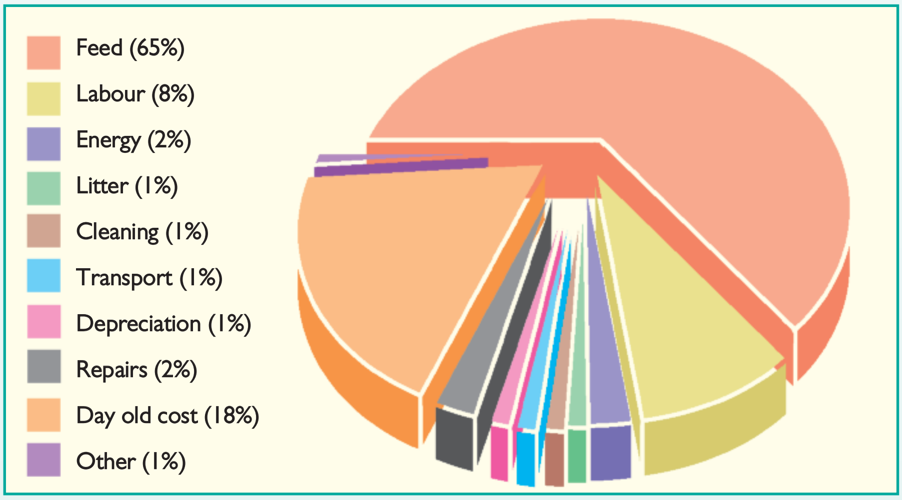
Fig. 1. Breakdown of Pekin duck production costs.



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Predicted genetic gains per generation in a commercial duck are given in Table 1.

Do we want improvement?

To demonstrate the benefit of such genetic improvement we can use the data to estimate the genetic potential of the birds, which increases with each year of selection (see Table 2).

These figures are based on trends in estimated breeding values over the last few years (supported by observed performance changes on our own farms). In these calculations no account has been taken of the improvement in carcase quality, in particular breast meat yield. We do acknowledge that not all operations will be able to exploit 100% of this genetic gain due to local environmental conditions, in particular health status and husbandry. However, most producers should realise at least 70% of this genetic potential, which will give significant economic benefits.

Genetic changes are continuous and additive. As a general guide genetic progress in elite flocks will take 2-3 years to reach commercial level.

Relative costs between generations to produce a duck to 3.4kg.

At 42 to 48 days old the duck will eat approximately 295g/day and grow at 85g/day.

Significant improvements in FCR to 3.4kg due to genetic improvement and reduced age at a weight.

Generation 1:	2.25 x 3400 = 7650g feed eaten per bird.
Generation 2:	2.21 x 3400 = 7514g feed eaten per bird.

Difference: = -136g/lifetime/bird.

For 10 million birds = 1,360 tonnes of feed saved to produce an average 3.4kg liveweight (2.3kg carcase), which at a feed cost of £150/tonne equates to a saving of £204,000.

Table 2. Estimating genetic potential of birds

Choosing the right duck

The various commercially available hybrid breeds of Pekin ducks currently used in production vary greatly in terms of their basic performance and the different cost of parent stock reflects this.

A breakdown of growing costs quickly reveals that it is the cost of feeding the duck through the growing period which is the key cost in duck production, often accounting for up to 65% of overall costs, whereas day-old cost only represents 18% of overall costs, and only 10% of this is due to the parent stock cost (Fig. 1).

To exemplify this, if the breeding stock cost was reduced by 50% this would only reduce the cost of a grown duck by 0.9%, yet the superior breeding stock has the potential to lower the growing cost by many times its own value.

A relatively small improvement in FCR can significantly lower the overall growing cost.

Recent independent trials have demonstrated that Cherry Valley ducks have an

FCR benefit of approximately 0.2 units better than other strains (Fig. 2).

This would result in at least an 8% reduction in feed cost, reducing overall growing costs by more than 5%.

Similar figures can be estimated for breeder performance given that parent stock of Pekin ducks currently used in production have different reproductive performance – 260-290 eggs per female over a 50 week laying period with a 70-95% hatchability of set eggs.

Given similar levels of performance, it is true that the higher the basic cost of the breeder the greater will be the commercial day old cost.

Ultrasonic measurement of breast meat.

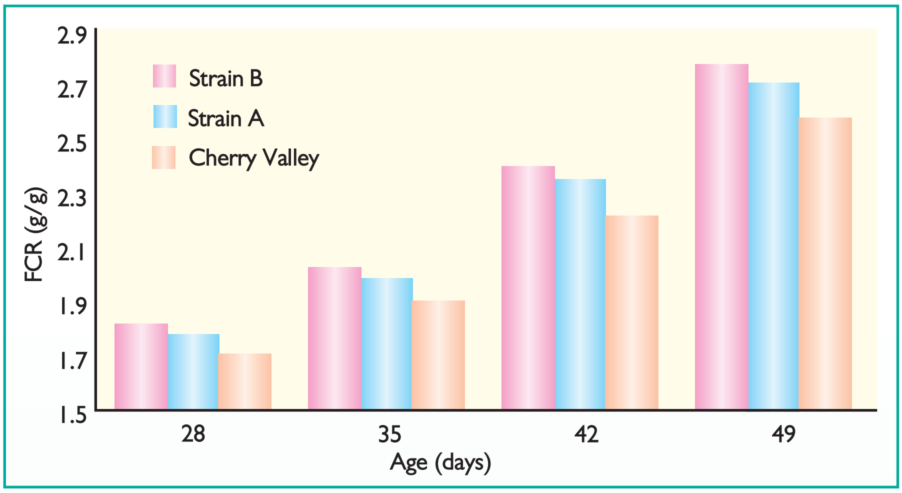

Fig. 2. Relative feed conversion ratio (FCR) of Cherry Valley and other commercial Pekin ducks.

However, the depreciation cost of the actual breeding stock represents only 10% of the overall day old cost, breeder costs have to vary very significantly to have any meaningful effect on day-old cost (a 50% reduction in parent stock cost reduces the day old cost by only 5%).

Whereas, breeder performance in terms of chick yield per female can have a major effect on the profitability of an operation selling day old chicks.

It is evident that genetic improvement in performance and reproductive traits has yielded significant financial benefits for duck producers. However, such genetic programmes are expensive to maintain and require constant revision and development to ensure we are breeding ducks that are appropriate for the market.

The development of Cherry Valley's breeding programme is continually reviewed and in order to satisfy the markets in the 21st Century the company consider all aspects and ensure an appropriate use of technology to improve the performance, health and welfare of stock. ■