

Successful duck breeding – progress through technology

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Since its establishment more than 50 years ago Cherry Valley Farms has been a fully integrated company, with primary breeding, commercial growing, slaughter and primary processing, producing fresh, frozen, and cooked meat products and co-products, all under one roof.

The company is unique in allowing the genetics and R&D department unlimited access to the entire production chain and all users of Cherry Valley breeding stock profit from the feedback and technical development that this delivers. Due to the rapid growth and development in recent years of the Chinese and South-East Asian duck industry Cherry Valley established a parallel multi-strain breeding program in China in 2003, moving to a full individual pedigree program in 2006.

Pedigree breeding

Pedigree breeding requires a significant and long term financial commitment to enable the continual improvement in breeding stock to be maintained.

The investment provides a return in terms of progress towards more meat from less feed, while maintaining a balance of traits



that best fit market conditions. Large numbers of ducks are screened for multiple traits throughout their lifecycle, and just a small percentage of the best are selected for breeding of the next generation.

Pedigree breeding involves the recording of individual bird performance – growth rate, feed conversion, meat development, egg production, fertility and health status, which can then also be related to siblings and families.

Drawing all of this information together is a complicated task that requires a dedicated team led by skilled geneticists. It allows historic family performance to influence the breeding value of the individual, so that fast progress can be made in growing traits – growth rate, feed conversion and meat yield – without the risk of compromising reproductive traits – duckling numbers, cost or quality.

The lower cost option of ‘mass selection’ does not offer such benefits.

Cherry Valley commercial strains are pro-

duced by crossing four elite pure lines. Cross breeding ensures quality traits can be balanced to meet the requirements of the market and also each stage of the overall production process, as well as providing the performance benefits of hybrid vigour in the commercial product.

In addition to the lines which make up current products, development lines that have a different balance of traits are included in the breeding programme and may feature in the commercial strains of the future.

Cherry Valley’s approach is to establish, maintain, develop and improve a genetic portfolio that allows the requirements of novel markets to be addressed by a new mix of strains as quickly as possible.

The company has made a commitment to achieving its breeding objectives using selection testing and husbandry methods that are acceptable to the consuming public and without compromise to the duck’s innate metabolic and immunological systems.

Continued on page 9

Fig. 1. Agricultural performance of SM3 ducks between 1988 and 2012 at Cherry Valley Farms, UK.

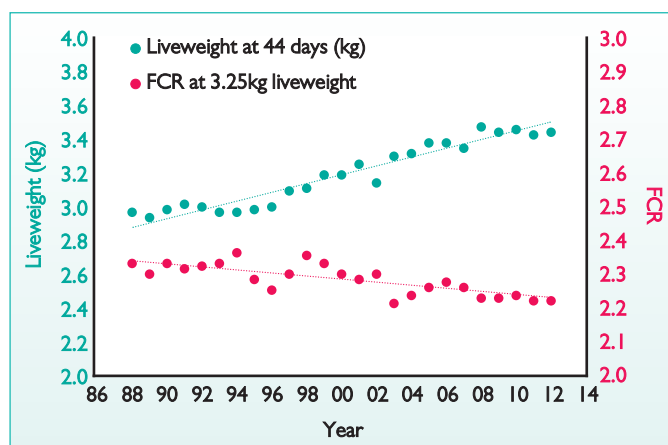
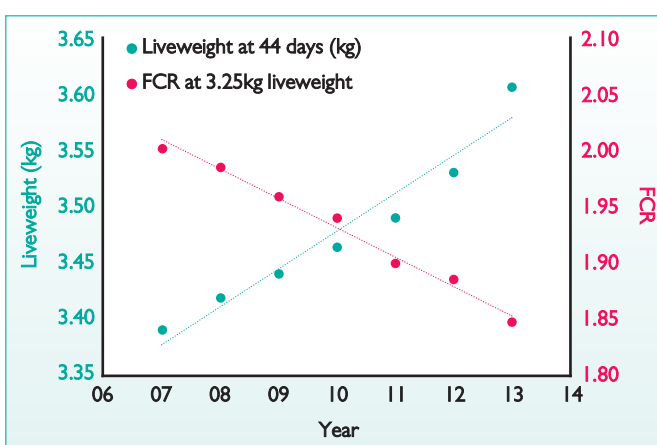


Fig. 2. Estimates of genetic gain For SM3 ducks between 2007 and 2013 based on breeding values.



Continued from page 7

Feed efficiency data

Cherry Valley Farms was established by Sir Joseph Nickerson to turn cereals into duck meat as efficiently as possible, and that focus on feed efficiency remains central to the company's business strategy.

Feed is the biggest single cost for every kilogram of duck meat and reducing the feed conversion ratio in all livestock generations has a major impact on improving its profitability. All livestock companies face the same pressures and in emerging markets, where the population aspires to eat more meat, the amount of duck produced per kilogram of feed used drives the development of the local industry.

Furthermore, improving feed efficiency also reduces the amount of manure, in particular nitrogen, in the form of ammonia, and phosphorus per unit of duck meat produced. Reducing the impact of the duck meat production on the environment and lowering its carbon footprint.

Feed station technology

Accurate feed intake information for large numbers of individual ducks is crucial to an effective pedigree selection programme when aimed at improving feed efficiency.

Historically this was done by housing the birds in individual cages for 1-2 weeks close to selection age. However, measuring feed efficiency by housing and feeding ducks in this way stops the birds exhibiting many of their normal behaviours, including interactions with other ducks. The introduction, more than 10 years ago now, of a computerised feed station system which enables individual feed intake recording in open group pens has significantly increased the numbers of individuals which can be measured. At the same time the system allows natural feeding behaviour under conditions similar to the commercial environment, resulting in more accurate selection.

Cherry Valley invested in innovative feed station technology to allow the electronic capture of every meal eaten by each pedigree bird in the selection programme.

The system consists of state of the art RFID-technology for contactless identification of each duck and industrial high-tech weighing equipment to accurately and reliably record individual feed intake.

Each duck in the breeding program has a unique identification that allows it to be traced and all feed and trait data associated to that bird, enabling assessment of the bird for further breeding and improvement. The use of automated feed stations has resulted in increased selection intensity due to better use of floor space, better mobility, and longer testing periods, resulting in 15-20% rate increase in genetic improvement.

Cherry Valley Farms started the feed station work initially in the UK, but now also

uses this technology in its China Based breeding programmes.

Figs. 1 and 2 show the improvement in growth rate (liveweight (kg) at 44 days) and feed conversion (FCR at 3.25 kg liveweight) of Cherry Valley SM3 growing stock.

The estimated genetic gain is calculated from the performance of the elite breeding stock and gives an indication of the value of the pedigree program.

Additional advantages

The quantity and quality of feed data collected using automated feed stations is much higher than previous methods. Data sets in six figure numbers can be recorded for a flock over the test period.

In addition to overall feed intake, the data can be used to assess feeding behaviour such as the number and duration of meals and feeding rate which leads to a better understanding of how these behaviours might influence feed efficiency.

Genetic improvement

The Cherry Valley breeding programme has resulted in large, robust ducks with good liveability that can be killed at different ages to meet the market weight range. The high reproductive performance of GPS and PS results in low chick cost at each genetic level.

Each generation of selection in pure lines has produced a 1-2% improvement in all traits for which selection takes place.

The agricultural performance data was collected from approximately eight million ducks per year grown and processed by the Cherry Valley integration in the UK. The

commercial data follows the same long term trend as the estimated genetic gain, which is currently calculated to be worth 0.4 days' growth rate and 0.024 FCR points to 3.25kg liveweight per generation. The company's internal research projects include:

- Regular comparisons of elite strain generations.
- Carcase analysis – meat yield, carcase quality for pure lines and commercial crosses.
- Automation of bird weight data capture.
- Understanding sexual development in pure lines and commercial crosses.

Cherry Valley's research collaborations with academic institutes include:

- External funding for postgraduate research into skeletal strength and mobility.
- Feed efficiency and behaviour.
- Molecular basis of resistance of ducks to avian influenza.
- On-going assessment of the use of genomics for genetic improvement

Summary

Cherry Valley has successfully applied a disciplined and sophisticated pedigree selection programme to its Pekin stock lines for more than 50 years.

The programme has resulted in the production of a range of hybrid commercial birds that are very efficient in terms of FCR and also very robust in terms of their liveability under normal commercial growing conditions. The programme is ongoing but with the incorporation of new technologies that allow greater accuracy and with higher populations under selection which in turn enables faster progress. The search for an incorporation of further new and innovative selection technologies is also ongoing. ■

The company and its history

Cherry Valley Farms was established in 1959 by Sir Joseph Nickerson, a leading agriculturalist operating a large farming business in North Lincolnshire. From this base Sir Joseph created the Nickerson group of companies, all of which focused on agricultural development; including new modern cereal and potato varieties, a pig genetics company and the Cherry Valley duck operation. Cherry Valley remained in the hands of the Nickerson family until 2010, when it was bought by Navis Capital Partners, who were particularly interested in its worldwide breeding activities. The duck breeding enterprise grew out of Sir Joseph's vision of adding value to the increased cereal production he was generating through his agricultural activities.

The pedigree duck breeding program started shortly after Cherry Valley Farms was established. It has concentrated its work on the Pekin type, a white feathered, hardy and fast growing duck the origins of which is a migratory Chinese Mallard, domesticated centuries ago from the Beijing region. Pekin ducks were first imported to the Western world (Europe and North America) during the 19th century and in its traditional form the breed is widespread throughout the world. The selective breeding programme undertaken by Cherry Valley over the last 50 years has resulted in massive improvements in its productivity, growth rate, feed conversion and meat yield.

Cherry Valley Farms was the first company to produce oven-ready duckling in the UK and has been the foremost integrated duck producer in the country for many years. The primary pedigree breeding enterprise has become the dominant supplier of breeding stock in all markets where there has been an involvement (China, South East Asia, Europe and Australasia).