Progress in layer genetics

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Many articles are written, and a lot of research is done to describe the necessary components of a successful and profitable breeding programme for layers.

This is also the basis for the Bovans, DeKalb, Hisex, ISA, Shaver and Babcock breeds. In this article we will give an outline of a practical breeders' perspective on topics varying from genetics, biotechnology, logistics, veterinarian issues and biosecurity.

For a breeding company a few items are vital:

- Rate of genetic product improvement should be in the right direction and as high or higher than the improvement competitors achieve.
- Produce what the market needs, so information from customers is important.
- Keep continuity and invest in the breeding programme.
- Protect genetic material.

Product improvement

The basis for the Hendrix Genetics' breeding programme are the pure line farms in France, The Netherlands and Canada, the broad gene pool and the biosecurity.

Layer breeding company's breed fourway crossbred hybrids, which give producers the highest economical merit and the goal is maximum heterosis.

Most of the time this means laying hens which are able to produce as many eggs as possible in the lifetime of a laying hen with the desired egg size and egg quality and the highest economical merit.

The main factors determining the rate of product improvement are:

- The number of birds you can use for selection purposes, and how many birds you need to make the next generation (selection intensity).
- How the information on which the selections are based, is gathered (accuracy).
- The way observations are spread over a scale (variation).
- The time which is needed to see the effect of improvement on pure line level emerge in the final products (generation interval). Factors that determine whether the rate of product improvement is in the right direction are:
- The way the breeding goal is defined (information from the market is very important).
- How well the selections reflect the breeding goal.

Determining potential

Layer genetics is all about determining the genetic potential of the bird for all the traits at interest.

Finally, the birds with the highest genetic potential will most likely perform the best.

In order to know the genetic potential of each bird, all pure line birds should be housed in individual cages. In combination with the desire for high selection intensities this gives need for huge pure line housing capacities.

Other issues that occur in layer breeding are, for instance, the late moment own performance is known (especially mortality, laying persistency and shell quality at end of lay). This performance is needed for selective decisions.

For the Hendrix Genetics breeding programme the selection priorities are as follows:

Selection for egg production is very important. There is no selection for increased early maturity. Peak production is almost at its maximum, so only little improvement can be expected.

Importance of persistency

Huge selection focus lies on laying persistency. Egg size and bodyweight are optimal, so no changes are to be expected, but high selection priority on several egg quality traits (like shell strength, colour and internal egg quality).

As livability is an important trait, continuous high selection pressure is placed on livability.

Genetic improvement on feed conversion takes place through additional egg mass output, and not through decreasing feed intake. Because the strategy is to have a balanced focus on parent stock traits and final product traits, there is room reserved for selection on PS traits such as hatchability.

All previously mentioned measurements are all taken under the ideal circumstances of the pure line facilities with the stringent biosecurity measures of FAPP-houses, high quality feed and water in order to create for each individual the same environmental conditions for a fair genetic evaluation, and to produce (great) grand parent stock free of diseases.

Different test conditions

In order to breed for birds that produce under field conditions with sometimes high disease pressure, different climates, higher stocking densities, varying feed and management quality, it is also necessary to test birds under a wide range of different field conditions all over the world.

Males do not lay eggs, but as a geneticist you still want to know what genes those males possess which will result in the performance of their offspring, gives that huge numbers of crossbred, pedigreed offsprings are tested under field conditions.

Another advantage of this so-called recurrent testing and reciprocal recurrent testing is the fact that the 'combining ability' or 'heterosis' of individual pure line males is also measured.

All the collected data have to be handled and evaluated into breeding values for each individual for every trait under consideration.

This gives the need for a huge database and data handling computer. Data entering therefore requires a sophisticated infrastructure. BLUP (Best Linear Unbiased Prediction) is used in the breeding programme of Hendrix Genetics.

This is to evaluate all the pure line and crossbred data into individual breeding values for each trait. This statistical technique allows the breeder to correct for multiple non-genetic effects (such as hatch week, farm and row) and to take complete pedigree structures into account.

Hendrix Genetics is investing in its breeding program and research project has started on breeding for robustness. This is a cooperation between Hendrix Poultry Breeders, Wageningen University Research Centre, Nutreco Breeding Research Centre and Service XS.

The objective of the project is to develop new techniques, which can be used to increase robustness of laying hens by breeding.

Robustness is the ability of a laying hen to maintain normal functioning, even when housing, climate, nutrition or biosecurity are not optimal. For this purpose physiological, ethological and immunological research is carried out on a range of pure lines and crossbreds.

Pure line to parent stock

From pure line birds, (great) grand parent stock birds have to be made and hatched in a separate hatchery, housed in separate farms and transported in separate trucks.

From GPS birds the hatching eggs have to be transported, hatched and housed separate from the GPS and PL-facilities. As a consequence very strict biosecurity is needed.

In general, big production capacity is needed to be able to supply large customers and key accounts with the right product, the right numbers and the best quality.

Conclusions

High investments are necessary to run a breeding programme and strict biosecurity is a key factor for delivering products of the right quality.

The right breeding goals and genetic improvement are key for a successful breeding programme.

Hendrix Genetics has an up to date, scientific, but also practical breeding programme for all their products with full focus on egg production (especially laying persistency), livability, shell quality, internal egg quality and feed conversion with good appetite. ■