Dual-purpose breeding from a broiler and a layer perspective

In the past, hens were kept for both meat and egg production. However, the current poultry sector is divided into the following sub-sectors: breeding (parent stock), keeping laying hens for egg production and growing broilers for chicken meat production.

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Through improved genetic selection, breeds were obtained with a focus on egg production (laying hens) or a focus on meat production (broilers), resulting in improved results for each category (500 eggs per hen housed in 100 weeks for laying hens, and broilers that can reach 2.3kg in five weeks). It was therefore cheaper for poultry farmers to specialise in either egg or meat production.

Dual-purpose chickens are chickens that can serve both purposes. The females (the laying hens) of these dual-purpose breeds are reared and kept for the production of eggs. The males are kept for the production of meat.

As growth and egg production are characteristics that collide with each other, a compromise must be found between them for the dual-purpose birds. This article looks at the perspective from both a laying hen breeding company (Hendrix Genetics), as well as a broiler breeding company (Cobb).

The laying hen perspective

Dual-purpose breeds can offer a solution for the gassing of day-old male chicks (the brothers of the laying hens). Every year, millions of day-old cockerels are gassed in hatcheries shortly after hatching. Cockerels do not lay eggs and are therefore of no economic value to the laying hen industry.

In today's modern laying hen breeds, growing cockerels for their meat is not economically viable. The cockerels do not grow as fast as today's broilers, nor are they able to reach feed conversion rates that are even close to the FCRs of broilers (currently around 1.5, whereas dual-purpose cockerels do not even reach FCRs below 3.0).

The idea of gassing day-old cockerels originates from the second half of the 20th Century. In those days the general public's focus was more on the affordable production of food and less on the ethical aspects of food production.

At the same time, sustainable solutions were found for the culled day-old cockerels (sold as animal feed for zoos, pet shops, mink farms, etc) which are still in use today, and have even resulted in companies that are fully specialised in the trade of culled day-old chicks, like Kiezebrink International BV.

In Europe, when keeping laying hens the largest revenue comes from egg sales. Hardly any revenue comes from the sales of the spent hens. Therefore, the focus for us, as a breeding company, has always been on the improvement of the amount of first quality eggs per hen housed.

As for the negative correlation between body weight and egg production, laying hens have become leaner over the past decades. The breeders' philosophy has always been clear: energy that is not needed for the birds' maintenance can be used for egg production or does not even need to be consumed.

Both traits have a direct impact on the birds' feed efficiency. As the hens became leaner as a result of direct genetic selection, it also affected the confirmation of the cockerels. If you grow the cockerels, they are not able to deliver the expected yields compared to broilers. The breast fillet yield is much lower compared to that of broilers, which makes sense as meat confirmation and quality traits have not been part of the selection programmes for laying hens.

As we did not want to compromise too much on egg production, and heritabilities of bodyweight are larger compared to the heritabilities of egg production, our strategy is to increase the body size of pure lines used for the production of eggs.

Crossing elite lines of laying hens with broilers results in poor egg production and the egg quality goes down drastically. As the majority of the revenue still needs to come from the sale of eggs, the quality and the amount of saleable eggs is the driving force of our dual-purpose birds.

When looking at the dual-purpose birds, special attention needs to be given to the females as they can easily become too fat on a regular laying hen diet. This will negatively impact the hens' productivity. Providing the birds with a diluted diet (with the use of fibre) could help to overcome dual-purpose hens becoming too fat, and will also help to reduce the cost of the feed, thereby slightly reducing the cost of production in order to compensate for the reduced egg income.

The broiler perspective

The emphasis on dual-purpose breeds from the broiler breeding industry is small. This is mainly due to the fact that nearly all chicks

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(males and females) are utilised from hatch. Within a broiler breeding programme, excess chicks not utilised for parent stock use are generally sold as by-product broilers for meat production.

The separate focus in breeding programmes, for either laying hens or broilers, is caused due to the need to reach optimal efficiency in final products, for example, focusing on more eggs with laying hens causes losses in growth and efficiency traits in broilers, and the other way around.

Within a broiler breeding programme the characteristics of efficient broiler chickens are key selection criteria, but a strong emphasis on reproduction performance is critical to maintain population size, and provide a broiler breeding product that is economical. As a consequence, chicks sold as a by-product are worthy enough to be sold to the meat markets.

Nevertheless, broiler breeding programmes are not intended to target dual-purpose breed programmes.

In the past, the well-balanced broiler breeding selection programme has had a considerable positive effect on bird production traits, animal welfare and on the environmental impact of production.

Certain niche markets do specialise in dual-purpose breeds. The use of dual-purpose breeds may also add value to lower-income countries with geographical regions that rely on more extensive management resources. In these management environments, commercially bred chickens (broilers or layers) may not be managed in such a way that optimise bird health and protein production.

When dual-purpose breeds prove to be able to fit better in those environmental management conditions, stakeholders from these areas can benefit from dual-purpose breeds as they can use their birds for both egg and meat production in a more optimal and efficient way.

The conservation of genetic variance is important for sustainable development for any breeding programme. Consequently, broiler breeding companies need to maintain rich and diverse genetic backgrounds. Therefore, many non-commercial lines of broilers are maintained that are currently not selected under commercial broiler selection indices. The purpose of maintaining these lines is to have genetic resources for diverse environments.

Conclusion

Various projects have shown that a dual-purpose breed will effectively produce fewer eggs than a regular laying hen, and will produce less meat than a regular broiler chicken. This could be partly made up for with a different feed composition (feeding them a cheaper diet), although it has to be said that the dual-purpose cockerels take almost twice as long to reach a slaughter weight of 2kg.

From available consumer studies, we are not convinced that the majority of the consumers are prepared to pay more for the eggs or the meat that comes from dual-purpose breeds. However, we do see the opportunity for a niche market, certainly as far as cockerel meat is concerned.

Introducing dual-purpose is not the solution to ending the culling of day-old cockerels, the environmental price to pay is big, as the feed efficiency is drastically decreased due to lower productivity levels. Especially in today's world where there is an increasing interest in a lower carbon footprint from the food industry (more and more western European supermarkets are moving towards increased white egg sales), the aforementioned does not fit with the sustainability goals.

However, the fact that we cannot always predict the future can be made clear by a Dutch example: the majority of the Dutch retailers moved away from offering conventional broiler meat all within one year of each other as a result of an impressive campaign from the Dutch animal activist group Wakker Dier. ■

References are available from the authors on request.