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Next steps
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This is a Morrisons Farming Programme publication
Morrisons – Closer to Farming and Food
Crossbreeding is very common in animal production, as it provides three main benefits. Firstly, it increases the genetic resources available to the breeder, which creates a far greater genetic pool to select from.

The second and most important benefit is from what is known as heterosis or hybrid vigour. When two purebred animals are crossed, the interaction of their genes produces an offspring that will generally show higher performance than the average of the parents. It must be noted that this effect only occurs in the first generation; it is not transferred to subsequent generations. This is why crossbreeding programmes require a planned approach using a combination of at least three breeds rotated over time.

The final benefit is known as complementarity. This simply means that a farm can select a breed that is very strong in one trait and can quickly transfer that trait into their breeding programme.

Crossbreeding is very common in pig and poultry farming systems, where the management of the genetics is easy to control. Specialist pig and poultry breeding companies have very advanced techniques that allow the benefits of crossbreeding to be easily available to the commercial producer.

In the UK, most lamb production involves a three-way crossbreeding system, where the breeder purchases crossbred ewes and then crosses these with a third breed to produce the final product. Crossbreeding in beef cattle is also common.

However, with the difficulty in managing a number of different breeds on one farm, a number of techniques have evolved.

Crossbreeding in the dairy industry is relatively uncommon and this is mostly due to the superior milk yields from the dominance of Holstein genetics in the industry. Historically the market has increasingly demanded and paid for more milk, and the Holstein cow, better than any other breed, has supplied that volume of milk. However, as the genetic improvement further increases milk yields, and makes these high-producing dairy cows ever more productive, it comes with associated problems.

The report also discusses the debated issues around the relationship between increased milk production and deterioration of functional traits, such as fertility, longevity, mobility and disease resistance. This raises the issue of sustainable production and, in particular, the public perception of so-called “ethical” issues around the welfare of dairy herds. A number of the authors cited have challenged the current breeding systems along the lines of: “Do we have to change our system to suit the cow or can we change the cow to suit the system?” Under these circumstances of increased health, production and management problems, and welfare issues, farmers are looking for options in their breeding programmes. Crossbreeding is one option to address these concerns, as differences between breeds are much greater than differences within one breed, plus there are the extra benefits to be gained from heterosis.

Conclusions from the report

The report conclusion indicates that any potential gain or loss due to crossbreeding is dependent on a number of factors, including:

- Traits considered
- Breeds selected
- Level of hybrid vigour expressed for a trait
- The farm environment
- Management and nutrition
- Milk payment conditions

Research from Europe, the USA, Canada, Australia and New Zealand has shown that crossbreeding:

- Improves reproductive and health performance
- Improves the components of milk
- Increases survivability
- Eliminates inbreeding in the first cross
- Improves maternal calving ease
- Increases robustness
- Can result in an increase in overall profitability

Background

Dairy cattle of all breeds have, in the past 30 years, increased in productivity from around 3,000 litres per year to over 6,000 litres per animal. These high-producing cows have become increasingly more difficult to manage, with reported higher incidence of disease and lower reproductive performance.

While the high-producing dairy cow is one of the key success stories of the world’s dairy industries, there are situations where the genetic profile of the cow may not best suit the system that she is in, particularly in the UK. Examples are organic dairy herds or smaller farm operations that have a number of farm enterprises within their business. In these situations, questions have been asked as to whether other breed alternatives exist that could reduce labour and input costs while maintaining a reasonable level of profitability. Crossbreeding is one tool that could be available to a broad range of farmers, to help in their business.

Dairy farmer group meetings have been held as part of the wider Morrisons Farming Programme. Attending these, farmers have raised concerns about a lack of concise, impartial, farmer-friendly information on the range of renewable options available that they could consider before making any investment in these technologies for their own business.

This led to Morrisons commissioning Newcastle University to produce a report to meet farmers’ needs.

Morrison’s Farming Programme

To better understand the role of crossbreeding in dairy cattle, the Arla Foods Milk Partnership requested a comprehensive review of the latest information available globally. Its aim was to provide a report for its farmer members that relates this information to the UK dairy sector.

The publication, prepared by Wes Bluhm, reviewed research work from sources in many countries to try to bring together the latest information on the benefits and risks of crossbreeding in a commercial herd.

UK increase in Holstein breed and increase in inbreeding

The chart illustrates how the increase in dominance of the Holstein breed is also increasing the level of inbreeding within it.
Crossbreeding and its role in animal production

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<th>Meat production</th>
<th>Still birth</th>
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Breed comments

Consider size variation.
Check individual sires for Holstein content. Is there sufficient genetic distance between “Scandinavian Breeds” for hybrid vigour? Watch individual sires for Holstein content.
Check individual sires for Holstein. Is there sufficient genetic distance from Holsteins for Hybrid Vigour?

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