**Application**

The production of dairy-beef crossbred (DBX) calves, bred by the dairy sector and reared by the beef sector, has increased in recent years (Berry, 2021). This study investigates the complexities of DBX production, with a focus on how breeding decisions are made in both open and integrated markets. By understanding these decision-making dynamics, the dairy and beef sectors can better align their objectives to enhance the efficiency, profitability, and sustainability of DBX systems.

**Introduction**

DBX production has become increasingly important in the UK cattle industry, driven by the increased use of sexed semen in dairy herds and the need to improve the economic value of dairy calves. However, bull selection decisions in DBX systems are complex, requiring a balance between the often-conflicting breeding objectives of dairy and beef producers. This study addresses the knowledge gap identified by Berry (2021) on how farmers navigate these complexities in both open and integrated markets. Specifically, it investigates the breeding objectives, information sources, and breed preferences that drive decision-making in the UK DBX sector.

**Materials and Methods**

Qualitative data was collected through semi-structured interviews with 47 individuals involved in DBX production in the UK, including dairy and beef farmers, advisors, and industry stakeholders. Participants were recruited through a two-stage purposeful sampling approach. The initial cohort was identified through convenience sampling at the Royal Highland Show in 2022. Further participants were identified through targeted snowball sampling. The final sample size was determined by the point of data saturation, where no new themes were emerging from the interviews.

Semi-structured interviews were conducted either in-person or via telephone, depending on the participant's preference and COVID-19 regulations at the time of data collection. In-person interviews were conducted as "walking interviews," allowing the interviewer to observe the participant's farm or workplace and utilize the surroundings as prompts for questions.

The interviews were transcribed using NVivo transcription software, and the interviewer checked the accuracy of the transcriptions against the audio recordings. A theoretical framework based on the interview schedule was used to develop a set of codes for the analysis Thematic analysis was selected to identify key themes and patterns related to breeding decisions, information sources, and stakeholder interactions in DBX production.

**Results**

The study reveals that dairy farmers prioritize two main breeding objectives: maternal calving efficiency, focusing on traits like calving ease and short gestation, and marketable calf production, aiming for calves with strong growth potential and desirable carcass characteristics. These objectives often conflict, as traits associated with easy calving may negatively impact the calf's growth potential and carcass value. This leads to a balancing of breeding objectives as highlighted in figure 1 below.

Figure 1 The balancing of the conflicting breeding objectives in combination with the associated traits.

 The choice between open and integrated systems significantly influences decision-making and stakeholder roles (Crespi and Saitone, 2018). Within the two systems of the farm decision making unit (FD-MU), we can see that the actors involved are not the same. The open market system is much closer to the work of Ferreira (1998) in that the decision-making process is much smaller. However, it is important to note that the dairy farmer is still using the knowledge of a variety of trusted peers to guide the decision-making process. Integrated FD-MU systems prioritize coordination and information flow across the supply chain, potentially limiting farmer autonomy but ensuring more aligned breeding decisions roles (Crespi and Saitone, 2018). The study highlights the growing importance of artificial insemination (AI) and genomic selection tools in DBX breeding programs. However, mistrust in the reliability of genomic data for DBX systems persists.

**Conclusions**

This study reveals that DBX production involves navigating conflicting breeding objectives and complex decision-making processes influenced by both open and integrated market systems. The findings emphasize the need for greater collaboration and communication across the dairy and beef supply chains to optimize breeding strategies and enhance the long-term sustainability of this evolving sector. Developing standardized breeding objectives, improving information sources, and addressing mistrust in genomic data will be crucial for ensuring the efficiency and economic viability of DBX production. By understanding these complex dynamics, the DBX industry can better align its objectives and contribute to a more sustainable and profitable food production system.

**References**

Berry, D. P. (2021) 'Invited review: Beef-on-dairy—The generation of crossbred beef × dairy cattle', Journal of Dairy Science, 104(4), pp. 3789-3819.

Crespi, J. M. and Saitone, T. L. (2018) 'Are Cattle Markets the Last Frontier? Vertical Coordination in Animal-Based Procurement Markets', Annual Review of Resource Economics, 10(Volume 10, 2018), pp. 207-227.

Ferreira, G. 1998. Evolutionary approach to farming decision making on extensive rangelands. Research Gate: Universidad de la Republica de Uruguay.