Systemic Barriers to the Uptake of Estimated Breeding Values (EBVs) for Genetic Selection and Improvement in the Scottish Sheep Sector

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Key Findings

- Estimated Breeding Values (EBVs)\(^5\) are widely perceived to be effective tools for improving animal traits through selective breeding. However, the uptake of this technology has been slower in the Scottish sheep sector than in the dairy, pig and poultry sectors. This study explored the reasons for this slower uptake.

- The EBVs/selection indexes provided by Signet Breeding Services – the sole provider of sheep and beef EBV services in the UK – are promoted as a means to increase farmers’ profits\(^6\). However, uptake of EBVs does not always result in increased profitability due to a variety of factors, including for example, the seasonality of lamb prices and market volatility.

- A number of barriers to the uptake of EBVs exist across the sheep supply chain:
  - In auction markets, a farmer’s decision to purchase an animal may be based on commercial knowledge and experience, which may be built up over generations, and on the aesthetic looks of an animal, e.g. in the case of Scottish Blackface the valued criteria are: bonny (pretty) heads, curved horns, black nose, etc. Animals with EBVs - expressed in numbers - have little demand in this market.
  - Traditional breeders selling rams based on their appearance can make significant profits, sometimes selling a ram for as much as £30-35K for a single animal. These breeders are seen by their communities as role models and other farmers often seek to emulate them.
  - A large number of crossbred lambs are sold, in particular in the North of Scotland, on store markets. Consequently, the breeders do not know how their lambs are eventually valued further down the chain (e.g. at abattoirs, supermarkets, etc.) where the benefits of EBV uptake (e.g. higher price for leaner meats) are expected to be recognised.
  - Abattoirs assess carcass quality subjectively and use a feedback system that does not allow assessment of the performance of individual animals. Therefore, producers do not know how well indexed lambs perform (e.g. whether they produce leaner meat or not).

- Varying levels of enthusiasm in breed societies: Breed societies can have considerable influence over farmers and while some are very enthusiastic about EBVs, other are less so. Our research indicated that this could be partly due to the leadership of these organisations changing frequently (every two to three years), making it difficult for new ideas to gain a strong foothold. The views of sheep society leaders may also play a role. If they don’t see a strong need for the uptake of EBVs then that can influence their members.

- Reduction in advisory support services: EBV adopter farmers, especially the beginners, require one-to-one advice/support during the EBV adoption process. However, following the devolution of the Meat & Improvement practices (EBVs) in the Scottish sheep sector. The full report, which was presented at a European conference in September 2012, can be downloaded from: [http://ageconsearch.umn.edu/handle/135769](http://ageconsearch.umn.edu/handle/135769). SRUC receives support for knowledge transfer and exchange from the Scottish Funding Council and the Scottish Government Rural Affairs and the Environment Portfolio Strategic Research Programme 2011-2016.

\(^1\) This briefing summarises the main findings of a case study on the uptake of modern Genetic Selection and Improvement practices (EBVs) in the Scottish sheep sector. The full report, which was presented at a European conference in September 2012, can be downloaded from: [http://ageconsearch.umn.edu/handle/135769](http://ageconsearch.umn.edu/handle/135769). SRUC receives support for knowledge transfer and exchange from the Scottish Funding Council and the Scottish Government Rural Affairs and the Environment Portfolio Strategic Research Programme 2011-2016.

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\(^5\) EBVs are numerical figures assigned to animals for certain traits – such as growth rate, muscle yield, maternal ability, prolificacy, etc. – and are used to predict the genetic merits of animals, e.g. a ram with an EBV of +4kg scan weight means that the ram’s progeny are expected to be 2kg heavier at 20/21 weeks compared to the progeny of a ram with an EBV of zero. EBVs are estimated from pedigree and performance data and by using computer-based advanced statistical methods.

\(^6\) Visit the Signet website at: [http://www.signetfbc.co.uk/sheepbreeder/index.aspx?section=5anditem=58](http://www.signetfbc.co.uk/sheepbreeder/index.aspx?section=5anditem=58)
Livestock Commission (MLC), free advisory support is no longer available. Existing consultancy services are driven by market demand and with their skills now frequently required in other areas, there are only a few consultants with expertise in EBVs.

- **Challenging policy environment:** Direct farm payments (subsidies) under the CAP are currently strongly linked with the maintenance of good environmental conditions (e.g., farmers are paid for keeping permanent pastures, buffer strips, etc. within farms). Such incentives are widely perceived as slowing the uptake of technologies that could improve productivity, such as EBVs.

- **Manual data recording and management systems:** The manual data entry system of Signet is perceived by many farmers as time-consuming and uneconomical to larger producers as rates do not take size of flock into account. For example, in Scotland, farmers with 50 sheep pay the same rate as farmers with 800 sheep unlike in New Zealand and Australia where the cost depends on size of flock. The system is also seen as inflexible as it does not allow recording data for crossbred lambs, such as EasyCare.

**Background and Rationale**

The application of modern genetic selection and improvement (GS&I) technologies – such as EBVs – offers unique opportunities to enhance the productivity, profitability, and competitiveness of the livestock industry in Scotland. However, there is a concern that the uptake of EBVs has been slower in the sheep and beef sectors in comparison to the dairy, pig and poultry sectors. At the same time, Scotland’s research into farm animal genetics is widely perceived as excellent and genetic improvement using EBVs is generally accepted as effective for enhancing productivity and profits. Research based on ‘Innovation Systems (IS)’ theories suggests that technological transformation is not just about getting the science and advisory services right, but also about changing policies and institutions (e.g., regulations, cultural norms/values/beliefs, etc.) and developing collaborations with other relevant groups, such as agricultural associations, those working in the supply chain, NGOs, and so on. This research applied an IS perspective to identify the barriers to EBV uptake in the Scottish sheep sector. Data for this case study was collected from a review of literature relating to EBVs, approximately 10 in-depth interviews, and a stakeholder workshop involving 20 participants.

**Policy Messages for Improving the Uptake of GS&I Technologies**

- **Key Policy Message -** This case study provides evidence that innovation is not just about getting the science and technology right, but also about changing policies, rules/regulations, and culture at various levels. Moreover, those who can influence innovation success are not only scientists and agricultural consultants, but also farmer associations, politicians, and those working in the supply chain. Policies for technological innovation should take a holistic approach, supporting knowledge exchange and collaboration.

- **Improving objectivity in carcass quality assessment** as well as the way feedback is provided to all types of farmers is important. Use of Video Image Analysis (VIA) and Electronic ID (EID) technologies could help this process. The ongoing work of QMS and the Scottish Government (e.g., through the Scott EID project\(^7\)), are useful steps towards this.

- **A clearly defined system of knowledge exchange** - between breed societies, advisory services and EBV experts - should be established. This will ensure the benefits of EBVs are promoted as widely as possible and could help counter some of the more negative perceptions found in some sectors.

- **[Re] introducing one-to-one free or subsidised advisory support for EBV adopters.** Since genetic improvement can benefit the general public (e.g., by improving food security or tackling climate change), public investment in advisory services can be justified. However, to lower costs, experimentation with innovative extension models (e.g., farmer-led or farmer-to-farmer extension) may be useful.

- **Combining environmental payments with farm profits and productivity** under the CAP and/or developing selection indexes that provide environmental benefits, such as reducing greenhouse gas emissions of ruminant origin. Ongoing R&D work at SRUC aims to develop such indexes and continued government and industry support for such activities will be beneficial.

- **Update the Signet data recording system,** while at the same time acknowledging that further IT training may be required for some farmers. Signet is already in the process of developing an automated system and this work needs to be supported.

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\(^7\) For more information please visit [http://www.easycare sheep.com/](http://www.easycare sheep.com/)

\(^8\) Details about this project can be found at: [http://www.scoteid.com/](http://www.scoteid.com/)