Impact case study (REF3)

Institution: University of Edinburgh / Scotland's Rural College		
Unit of Assessment: 6		
Title of case study: C: Incorporating novel data-driven approaches into cattle genetic improvement programmes leads to better animal performance and overall economic gains		
Period when the underpinning research was undertaken: 2011 – 2018		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Eileen Wall	Chair of Integrative Livestock Genetics	2002 – present
Mike Coffey	Chair of Livestock Informatics	1998 – present
Tracey Pritchard	Researcher, Integrative Animal Sciences	2008 – present
Georgios Banos	Chair of Computational Biology, Animal Breeding & Genomics	2011 – present
Raphael Mrode	Chair of Quantitative Genetics and Genomics	2003 – present
Period when the claimed impact occurred: 2014 – 2020		

Is this case study continued from

In addition, AHDB provide individual herd reports for 65% of the national dairy herd, i.e. to 800,000 milking cows at any one time [5.2a], enabling farmers to see the genetic potential of the cows in their herd to select the best individuals for breeding. Thus, at these farms, information from genetic evaluations informs the selection of both the males (predominantly through AI) and females for breeding.

Another demonstration of the uptake of our tools comes from a recent increase in sire recording in beef cattle passports. Historically, only 23% of beef cattle passports contained a record of the animal's sire (its biological father). Without this information, genetic evaluations cannot be done. In 2019, AHDB launched a campaign called "Shout About the Sire", with the explicit purpose of increasing sire recording so that farmers can reap the benefits of the national beef evaluations, which incorporate our data-enabled tools. After just 1 year, sires were recorded in approximately 32% cattle passports. The AHDB Beef Breeding Projects Manager notes that: *"This demonstrates the growing importance commercial beef farmers are placing on incorporating breeding information into their animal management."* [5.2b].

Impact on cattle performance and productivity
The above described widespread uptake of the data-driven genetic evaluations in both beef and dairy cattle has resulted in improved rates of genetic gain in breeding. The impact of faster rates of genetic gain is most clearly observed in the dairy industry, as in the beef industry the generation interval of 8 years creates time-lag between a breeding decision and an improved carcass. In dairy cattle, uptake of our data-driven tools has led to the following improvements:

> **Dairy cow survival** has improved such that in 2019 cows were producing milk for an average of 4-6 months longer than in 2013 (corresponding to 0.3 of a lactation), as they were less likely to be culled for non-production reasons such as poor health or fertility [5.9].
> **The overall value of each bull to the production system** can be derived from the trends in £PLI since 2013 to quantify the overall economic benefit of the ongoing genetic change **(Figure 1**, [5.9]). The current value of £PLI indicates that each daughter of a bull available in 2020 was approximately GBP313 more profitable than a daughter of a bull available in 2013.

The value of this impact has been recognised in prestigious national awards for our unit [5.10a, b] with the Royal Association of British Dairy Farmers citing our research as "*invaluable in helping our farmers produce cows that are productive, profitable, healthy and providing a product the consumer wants."*

5. Sources to corroborate the impact
[5.1] Amer, P R., Wall, E., Nühs, J., Winters, M. and Coffey, M. P. Sources of benefits from genetic improvement in the UK dairy industry and their impacts on producers and consumers. *Interbull Bulletin* No. 44. Stavanger, Norway, August 26 - 29, 2011.
[5.2] Evidence for industry incorporation of our tools in their services a. Letter of Support from AHDB Head of Animal Genetics b. Letter of Support from AHDB Beef Breeding Projects Manager c. BLCS article in Somerset Country Gazette, 10th February 2018
[5.3] AHDB Dairy: Dairy Breeding and Genetics website
[5.4] AHDB/Signet promotion of our data-enabled tools a. AHDB website on National Beef Genetic Evaluations b. AHDB Guide "Choosing bulls for Better Returns", 2019
[5.5] Dairy Carcase Index factsheet, AHDB Dairy (published in 2019)
[5.6] Lifespan Index factsheet, AHDB Dairy (published in 2019)
[5.7] New Limousin Genomic Breeding Values (gEBVs) brochure by Limousin Breed Society (2017); including new gEBVs for survival and dam fertility.
[5.8] Tweet by AHDB Head of Animal Genetics showing 70% young bull inseminations (June 2018)
[5.9] UK Genetic Evaluation results on AHDB Dairy website (screenshot from Holstein breed page in December 2020 provided as an example)
[5.10] Awards in recognition of impact a. Queen's Anniversary Prize 2017 b. Princess Royal Award, 2020