A Study 'Exploring Suckler Farmer's Attitudes towards the Beef Data Genomics Programme in the North-West'

A Thesis Submitted to the University College Dublin in Fulfilment for the Degree of Masters in Agricultural Extension and Innovation

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Statement of Original Authorship

I hereby certify that the embodied is my own, was completed while registered as a candidate for the degree stated on the title page, and I have not obtained a degree elsewhere on the basis of research presented in this submitted work.

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1. Introduction

1.1. Introduction

The beef industry is the dominant enterprise on the majority of Irish farms and a vital part of the agri-food sector; in excess of 77,762 farms have a beef enterprise specialising in cattle rearing or finishing representing 55.6 % of the whole population of holdings (139, 860) in 2010 (europa, 2018). These farmers continue to face challenges on many fronts i.e. profitability (cattle farms on average are loss making when direct payments are not taken into consideration) and sustainability, never the less the Department of Agriculture, Food and Marine (2015) Food Harvest 2020 report targets a 20% increase in the value of output in the beef sector (€300 million) due to a predicted global population increase (9 million) by 2050. Some form of genetic improvement is required as the production of specific genomic phenotypes allow smaller suckler herds the opportunity not only to survive but thrive, for example increasing average daily gains (ADG) and also reinforcing the need to optimise the productivity of animals in the national suckler cow herd i.e. 0.95 calves/cow/year (Kelly, 2017) through such programmes as the Beef Data Genomics Programme.

1.2. Study aims and objectives

The Beef Data Genomics Programme was rolled out in 2015 by the Department of Agriculture, Food and Marine (DAFM) for Suckler Herds with the objectives to improve the quality, efficiency and genetic merit of the national beef herd leading to a reduction in the intensity of GHG emissions (DAFM, 2015). This study aimed to 'explore suckler farmer attitudes towards the Beef Data Genomics Programme in the North-West'. Few studies have examined the correlation between farmer attitudes and beliefs towards such programmes. This study aimed to address three important research objectives relating to farmers participation in the Beef Data Genomics Programme, study questions:

I. To determine the level of participation within the programme amongst farmers and the reasoning for non-participation,

II. Recording farmer attitudes toward outcomes resulting from farmer participation and

III. To determine whether or not farmers would continue to participate if the financial incentive currently available to encourage scheme participation was removed.

1.3. Structure of the thesis

Chapter two of the thesis presents a background to the Irish beef sector the challenges the sector faces and the Beef Data Genomics Programme. Chapter three of the thesis presents a review of relevant literature relating to farmer behaviour, decision making and participation in schemes. The fourth chapter details the research methods used to collect data which comprised of questionnaires and semi-structured interviews administered to suckler farmers in the North-West. The study sample collected information from 170 suckler farmers based on background, decision making factors and innovation and supports. From this five were selected to carry out semi-structured interviews along with a Teagasc beef specialist. The interviews provided an opportunity to delve more deeply into farmers and advisor perceptions. Chapter five presents the studying findings of the research carried out while chapter 6 presents the conclusions and recommendations which can be drawn from this study.

1.4. Findings

The study found that farmers enrolled in the BDGP to improve the quality and efficiency of the national beef herd, accuracy of breeding data and to avail of additional financial support payments. Conversely non-participation and withdrawal was revealed to be due to the level of commitment and record keeping (paperwork) required with scheme participation. The programme encourages farmers to use higher merit bulls and suckler cows when breeding and the adoption of ICBF technologies to deepen farmer understanding of an animal and/or herd's performance, however it was found that farmer characterisation; age, level of education and discussion group involvement was an imperative factor on adoption. Finally it was found that if the payment was removed participation would likely diminish, stressing

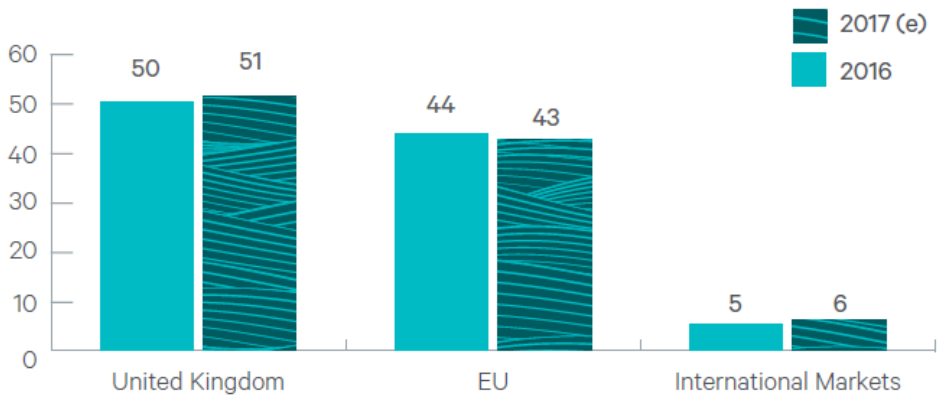
the need for more simplified record keeping, policy (actions) together with an increase in the value of the financial payment. Farmer profile had little bearing on continued participation but moving forward it was suggested there is a need for additional actions similar to those in the Suckler Cow Welfare Scheme and also a refresher course; updating farmers on the BDGP and similarly encouraging farmers to discuss and share thoughts and/ or strategies encountered.

2. Background

2.1. Irish Beef Industry

The beef industry in Ireland is a key part of the agri-food sector and one of the country's most important indigenous industries. Comprising of over 1 million suckler cows (in 75,854 herds) and in excess of 100,000 Irish farms operate some form of beef enterprise on their farm, comprising predominately of offspring from the suckler herd and surplus progeny from the dairy herd (CSO, 2016). Healey (2018) describes the suckler herd in Ireland 'as a vital national asset', as 'the suckler herd is the foundation of the beef trade; it's also the foundation of our live export trade which is so important to this country'. Approximately 1.74 million cattle were slaughtered in Irish meat processing plants in 2017 which accounted for 29.5% (€2.4 billion) of the Gross Agricultural Output (GAO) (CSO, 2017). Over 90% of Irish beef is exported, and so despite the relatively small herd size Ireland is one of the largest net exporters of beef in the northern hemisphere, and the 4th largest beef exporter in the world. Some 480,000 tonnes were exported per annum, processed in 32 major slaughtering facilities; the vast majority of this beef is distributed in over 75 high-end retail chains across EU marketplaces (Teagasc, 2018) under the supervision of the Department of Agriculture, Food and the Marine reflecting the success of Bord Bia's 'green image' differentiation and premiumisation strategy i.e. traceability for farm to fork (DAFM, 2009).

Figure 2.1: Distribution of Irish Export Exports (% in value terms)



(Bord Bia, 2018)

2.2. Returns to beef production in Ireland

The prices of animals sold and income from sources such as the agri-environmental schemes and Basic Payment Scheme (BPS) have a dramatic effect on family farm income. Many farms in the beef sector have the scope to dramatically improve profitability and technical efficiency as returns remain consistently poor (Martinez-Cillero et al, 2017). When direct payments, such as BPS and Area of National Constraints are excluded profitability at farm level is extremely low with average family farm income (FFI) in 2016 for suckler to weanling/ store[1] farms at -€36/ha and suckler to beef[2] and non-breeding[3] farms at €185/ha and €128/ha respectively (Teagasc, 2017). Table 2.1 below compares National Farm Survey (NFS) results for cattle rearing farms returns over multiple years 2000-2017 (Dillion et al, 2018) (Teagasc, 2018).

Table 2.1 National Farm Survey Results for Cattle Rearing Farms 2000-2017

Year	2017	2013	2009	2005	2000
Gross Output (€)	27298	23960	12292	12289	7846
Total Costs (€)	29011	30130	19122	16055	9070
Net Profit (€)	-1713	-6170	-6830	-3766	-1224
Direct/ sub payments (€)	14242	14946	13396	16495	7244
Direct Payments Contribution to FFI	112%	141%	151%	123%	117%

With continued low levels of farm profitability cattle rearing farmers remain highly dependent on direct payments to remain viable with the average direct payment in 2013 of €14,946 on cattle-rearing farms accounting for 141% of farm income (Teagasc, 2016). With consistently low returns to cattle production there is a need for such breeding schemes as the BDGP to support farmers financially and to improve the quality and efficiency of the national beef herd leading to increasing levels of output at farm gate. The Teagasc (2016) NFS further illustrates that farmers that deploy better technical performance i.e. stocking

[1] Cattle reared and sold at 8-12 months years of age (300-500kg live-weight)
[2] Cattle reared and took to slaughter within the same farm
[3] Cattle purchased at 300-500kg and either sold following summer grazing or slaughtered

rate and breeding (kg/ LU) can achieve better gross margins on cattle rearing farms (Teagasc, 2016) as illustrate in Table 2.2.

Table 2.2 Profit per hectare for Top, Middle and Bottom one-thirds of farms in 2016 on cattle rearing farms

	Top	Middle	Bottom
Stocking Rate (LU/ Ha)	1.76	1.40	1.08
Gross Output (€/ Ha)	1312	877	562
Total Costs	553	461	432
Gross Margin (€/ Ha)	759	416	130

The Teagasc Better Beef Farm Programme outlines that breeding targets such as; 0.95 calves/cow/year, <2.5% mortality at birth, <5% at mortality at 28 days and a calving interval of 12 weeks is achievable. It further elaborates positive financial returns under various systems of production, for example a gross output of €2500/ha and a gross margin of €1464/ha is achievable in a suckler to finishing system using under 16 month bulls and a gross margin of €1220 is achievable in suckler to under 20 month bulls. However success is dependant in maximising Kg/LU, maintaining the correct stocking rate and focusing on the basics; grass, herd health and breeding the corner stones of production (Dillion et al, 2016).

2.3. The evolution of cattle breeding programmes

Selective breeding systems were non-existent up until the 1700's (Bullock, 2010) as breeding occurred naturally, in later years this moved towards mating animals with animals within the neighbourhood that they liked. Simpson (2000) outlines Sir Robert Bakewell promoted the idea 'breed the best to the best' done by keeping accurate records of animal's performance, so that objective selection became possible selecting traits for maximum economic importance (Barwick and Henzell, 1993), optimising the reproductive performance in the next generation of parents and animal growth from offspring leading to increased profitability (Berry, 2014). Conversely genetic selection or genetic marker technologies move away from the conventional mating of the most popular beef breeds,

but rather to the development of specialized sire and dam lines which have been said to have damaged continental breeds such as Charolais and Limousin and the quality of beef cattle (McKiernan, 2018) due to maternal traits outweighing terminal traits i.e. dam milking ability and/ or fertility Vs carcass weight and/ or confirmation (ICBF, 2016). Nevertheless all livestock breeds should benefit from advancements in animal breeding, Biscarini et al (2015) illustrates that each farmer should carry out a SWOT analysis on their herd identifying logical breeding strategies, for example not compromising on fertility over production (yield) as many dairy farmers' did in the past.

2.4. Role of cattle breeding programmes in Ireland

Breeding programmes like the BDGP and Economic Breeding Index (EBI) in the dairy industry predict the economic impact of genetic markers on a given animal. Supporting selection decisions at an earlier age, deepening farmer's awareness, knowledge and understanding of both a calves or animals DNA profile at birth commonly known as genomic profiling e.g. marker-assisted selection (MAS). Providing the opportunity for previously difficult to measure traits to be predicted; traits that may not have formed part of the selection criteria previously e.g. daughter milking ability; however the accuracy of these values varies due to technological developments (Goddard and Hayes, 2007). The generation of increased quantity and quality of information e.g. weaning weights leads to increased prediction of accuracy (Davis and DeNise, 1998) as when multiple technologies are applied in close proximity i.e. dairy farmers using both EBI and milk recording it can centralize decision-making as optimal selection criteria are apparent. Adopting sophisticated breeding models; compensating on terminal for maternal traits creating populations of animals that contain complementary levels of performance, length of reproductive life and/ or age at first breeding (Lund et al., 1995). Farmers would appear to remain optimistic to the euro-star index but Teagasc and ICBF have defined the benefits of using a five-star cow over a one-star cow in a trial (Cummins, 2017) consisting of 46 spring-calving commercial herds (6000 heifers) managed under similar conditions. Females where examined under a weight and recording initiative with five-star females proving a few of the following advantages; females calved down almost 40 days earlier and progeny produced were 42kg heavier at

weaning, 10kg heavier at slaughter (Cummins, 2017). Initially returns can go relatively unforeseen in the breeding sector except for higher sales and cattle prices but are widespread commercially when improved genes are expressed.

The first ever beef index in Ireland was launched in 2007, commonly known as the 'Suckler Breeding Value' (SBV) indicating the expected profit (€) per progeny from a breeding animal (male or female). However the index was plagued with problems from the offset due to low reliability and dubious data i.e. limited data recorded and poor weightings of traits, leading to regressing levels of reduced output i.e. calves/cow/year and Kgs per livestock unit and secondly profitability i.e. FFI (€) (Cromie, 2011). Breeding programmes such as BDGP aim to improve secondary traits without creating energy demands that cannot be fulfilled within a grass based diet, positive returns on investment can be high on a cost per animal basis in small herds if no government subsidies are provided to participate in such schemes or programmes (DAFM, 2009).

2.5. Incentivised cattle breeding programs in Ireland

With up to 52% of European Union (EU) territory predominantly classified as rural the Common Agriculture Policy (CAP) accounts for one of the largest shares of expenditure within the EU budget aimed at protecting the viable production of food, sustainable management of natural resources and finally supporting rural vitality (European Commission, 2014). CAP consists of two 'pillars':

1. Direct payments and market measures: Basic Payment Scheme.
2. Rural development policy; aimed at achieving balanced territorial development, sustaining a farming sector that is environmentally sound, innovative and competitive.

It has been the responsibility of the government to incentivise the provision of animal welfare and husbandry standards as a public good through the following measures:

- Animal Welfare, Recording and Breeding Scheme for Suckler Herds

Most commonly known as the 'Suckler Cow Welfare Scheme' fully funded by the National Exchequer was rolled out by Department of Agriculture, Fisheries and Food (DAFF) on the 1st January 2008 for a five year period. Participants within the scheme received an annual payment of €80 per eligible suckler cow up to a max of 100 eligible suckler cows. The objectives of the scheme were to:

- Enhance welfare standards and genetic quality of the National suckler herd.
- Improve husbandry standards at weaning time and improve the competitiveness of the Irish beef industry.
- Provide education and knowledge building among farmers on best practice (DAFF, 2008).

- Beef Data Programme

The Beef Data Programme was rolled out for Suckler Producers with animals born between the 1st January and 31st December 2013. Successful participants received €20 per calf for the first 30 calves and €10 euro per calf afterwards up to a max of 50 calves. The objectives of the scheme were as follows:

- Improve the genetic quality of the National Suckler herd through the collection of essential breeding and production information.
- Improve the competitiveness of the Irish Beef Industry and the quality of the beef produced (DAFM, 2013).

- Beef Data Genomics Programme

Lastly the BDGP was launched by the DAFM in 2015 to run over a six year period injecting up to €52m per annum into the Irish Suckler Herd. Dependant to the number of calved cow's payment is equivalent to €95 for the first 10 cows in the herd and €80 for each cow afterwards. The main objectives of the Scheme are:

- Improving the quality and efficiency of the national beef herd thus lowering the intensity of GHG emissions.
- Enhancing the genetic merit of the national beef herd through the collection of genotypes and data from selected animals allowing the application of genomic selection in the Irish beef herd (DAFM, 2016).

The BDGP targeted 35,000 participants, however <25,000 farmers signed up to the programme. Approximately 44% of suckler farmers within the North–West applied to participate in the scheme, however 5% withdrew sometime afterwards application (Moran, 2015).

- Irish Cattle Breeding Federation (ICBF)

Set up in 1988 as a non-profit organisation providing cattle breeding information services with a mission statement focused on improving the genetic gain (in profit terms) for Irish beef farmers, through the application of science and technology to make the most profitable and sustainable decisions ensuring the next generation are genetically superior to their contemporaries (ICBF, 2018). ICBF and its subscription service HerdPlus provides various different reports, profiles and applications, some of which include:

- Breeding Reports – Analysis of a herd through Key Performance Indicators.
- Animal Search – Allows users to search for males and females €uro-Star and genetic index figures in HerdPlus/ BDGP Herds.
- Stock Bull Finder – Online bulls sales section that have been independently weighed and scored by ICBF from Whole Herd Performance Recording (WHRP) herds.
- Active Bull List – Facility displaying all available AI bulls across all AI companies, ranked on a single and the opportunity to filter and sort bulls on various criteria.
- Terminal/ Replacement Index – Facilitates the Euro-Star Indexes across different farming systems (ICBF, 2018).

3. Literature Review

3.1. Introduction

This section will look in detail at the literature pertaining to those factors influencing participation in agricultural schemes, as well as providing an in-depth review of farmer's attitudes towards incentivised breeding programmes, adoption of innovations, how decision making occurs and how innovations are later communicated and/ or discussed among the farming community.

3.2. Factors influencing participation in agriculture schemes

It is vitally important for advisory services and the wider agricultural industry to fully understand the manner in which farmers make decisions to support farmers in order to maintain and improve participation; how farmers are influenced by regulations and policy or market protections and why they choose one innovation over another (Ohlmer, et al., 1998). It has been evident from previous studies that the adoption of agriculture schemes is dependent on the attitudes, behaviours and farming position of farmers, for example Emerson and Gillmor (1999) uncovered a pattern that part-time farmers in the west of Ireland found the Rural Environmental Protection Scheme (REPS) much more attractive as it provided additional financial income for tasks that had little or no influence on production as opposed to full-time farmers in the mid-lands farming much more intensively and as a result the financial benefits from REPS participation were less significant when compared with the potential return on production. Murphy (2013) concluded that participation would grow in such schemes as REPS by means of maintaining payments as they were but also to reduce restrictions in scheme measures i.e. organic nitrogen production (170 kg/ha restriction). Great care is required not to compromise on scheme effectiveness over participant type or levels as it was noted that as payment rates increased in later years the type of participant may not have been the ideal type in meeting the scheme objectives. Likewise reducing scheme restrictions may increase the effectiveness of the type of participant but may come at a cost of reducing the effectiveness of the scheme. Mann

(2005) stated that 'environmental schemes must suit the type of farming taking place for farmers to adopt such schemes' as farmer's attitudes play a huge role in the adoption of innovations. Kuehene et al (2017) elaborates that the success of adoption is dependent on costs, riskiness, ease/ convenience of practice and finally observability from neighbouring farmer's success. The higher the upfront costs the lower the relative advantage, but more importantly if the cost is irreversible meaning if it cannot be fully recovered following dis-adoption it consequently leads to poor participation. The agricultural sector in terms of Common Agricultural Policy is defined by resistance to measures outside of common farming practises (Burton, 2004) (Lapple, et al., 2015). Whether a farmer is happy to continue with present practises due to a comfortable lifestyle or motivated to expand and adopt new innovations as underlined by their farm income (Howley, 2015) (Vanclay, 2004). Millar and Curtis (1997) found that farmers valued discussion groups as they generate discussion through different goings-on i.e. nature and purpose of groups, facilitating the emergence and use of farmer knowledge to deepen learning by means of local and scientific knowledge consequently supporting decision making and problem solving on farm. Success is dependent on having effective facilitation and allowing time for dialogue to draw out farmer knowledge. Factors such as in-formal settings, unfamiliarity with scientific jargon and lack of confidence from unfamiliarity with group members were noted as reasons for poor or non-participation. Christensen et al (2011) stated amongst the conditions that will encourage a farmer to show interest in any subsidy scheme includes where the payment is above and beyond the direct costs of participating in the scheme, where the scheme offers less restrictive scheme measures and where the opportunity to be released before expiry and/ or contracts with shorter time horizons are available.

3.3. The role that incentivised programmes/ schemes has have on farmers

The Irish Governments FoodWise 2025 strategy and EU's CAP aims to increase sustainability on farms, but this has been met with conflicting competition between environmental and economic targets i.e. slowing down the effects of global warming and feeding the rapidly growing world population (Lapple, et al., 2015). In order to help farmers meet the defined targets, work needs to be done to uncover the symbolic meanings associated with traditional farming practises by means of identifying farmer's personal victory over everyday farming tasks (Burton, 2004). Schemes rolled out through CAP undoubtedly hold an income supplement to encourage participation; arguably if a schemes terms and conditions are not fully understood they can otherwise be perceived easily and cost participants dearly via financial penalties. Burton et al (2013) stated 'the importance of how schemes are considered needs to be kept as unpretentious as possible so that farmers are able to understand their implementation'. Zhang et al (2015) found that farmer's willingness to participate in rural agriculture infrastructure projects is affected by their farm business types and personal opinions; he discovered that farmers seek a co-operative process when implementing schemes or programmes. For example a programme should be open and transparent i.e. bottom-up over a top-down approach is necessary in the implementation stage of a programme as farmer's needs should be considered with real respect as Murphy (2013) noted that viable farmers wish for a scheme that fits with their farm business plans whereas non-viable may prefer a scheme that fits with farming as a lifestyle. However few studies do measure the impact of government-incentivised schemes on farm (Kauppinen et al., 2010) as the success of a programme is dependent on many factors e.g. level of support from producers, ease of implementation and management. Dwane et al (2013) found that the volume of paperwork in the Suckler Cow Welfare Scheme was an issue for farmers as many perceived the animal events recording too detailed and difficult to complete, but Hynes and Garvey (2009) did note that once enrolled in a scheme farmers are inclined to complete its total duration i.e. the Suckler Cow Welfare Scheme payment was reduced sometime afterwards following being released, conversely it did not disincentive participation as farmer's wishing to withdraw were subject to a penalty or non-payment for non-completion of all measures (Cullen et al., 2017). Dwane et al (2013) also discovered

that such schemes do increase farmer's awareness and attitudes towards best practices as noted by ICBF (2016) under an Economic Breeding Index (EBI) review it took up to six years for the EBI to have a worthwhile noticeable impact on breeding data.

3.4. Uptake of innovations based on farmer profile

Fisher (2010) and Easterlin (2003) explain that people with a connection with their job are happier and feel more in control, resulting in increased profits, superior performance and positive personal factors i.e. marriage and lifestyle (Easterlin, 2003). However access to credit, scale of farm, intensity and agricultural education were amongst the factors found to motivate farmers, while off-farm employment and increasing age were found to be 'barriers to innovation' (Lapple et al., 2015). McDonald et al (2013) found that the level of education has a positive impact on farm productivity. Vanclay (2004) and Lapple et al (2015) both concluded that stage of life determines the amount of risk an individual is willing to take on an investment as it is dependent on the disposable income required for the family. For example a young farmer with a young family and at an earlier stage of life is in a positive position to take risks and invest with the view of reaching targets and attaining disposal income for the family in the future Vs an older farmer with a less dependent mature family may be happier to continue practices he/she are comfortable with and not look at increasing or changing production (Vanclay, 2004). Younger farmers according to McDonald et al (2013) are 11 times more likely to adopt new technologies and profit making activities as opposed to older farmers as they envisage themselves working on the farm in the future, the realisation that profit must be generated to ensure preferable lifestyle and financial security are safeguarded (Lapple, et al., 2015) (Hansson, 2013). Vanclay (2004) did note that decision making was influenced by succession as it was discovered that one of a farmers main aims is to develop the farm as an attractive option for his/her children to work in the future.

3.5. Decision making among farmers

According to Mofakkarul Islam et al (2014) innovations can develop rapidly, however the farming sector can be slow to fully understand the full potential and implement these 'modernisations' on farm (Avolio et al., 2014). As uptake varies between farming systems (Lapple, et al., 2015) the agriculture industry is failing to fully grasp the potential of new innovations, for example competency with the use of mobile phones is a form of implicit knowledge for some farmers but we must remember it is not implicit knowledge for the entire farming community. The use of technology/ computers no doubt has an impact on farmer decision making in terms of uptake of certain innovations, but factors such as education, age, occupation and the presence of others in the household working in sectors other than agriculture are also closely related to internet and computer usage (Büyükbay, 2011). Farmers tend to base decisions around current economic factors and policy (Willock, et al., 1999), but it is important to look at why and how farmers make decisions on their farms. It has been noted that farmers who engaged with advisory services and farming social networks can strengthen a farms position to make more informed decisions. This study aims to explore what technologies and practices farmers have utilised to assist in the management of breeding on farm. Howley (2015) and Creighton (2011) found that farmers may be reluctant to change a farming practice even if financial benefits are favourable if it means losing their current desirable lifestyle. Loss making exercises to attain non-pecuniary benefits is supported by farmers in the later stage of their lifecycle compared to farmers in the early stage who focus on the pecuniary measures in an attempt to feel the benefits of the non-pecuniary measures in the future i.e. work satisfaction (Easterlin, 2003).

3.6. How innovations are communicated

Many farmers consider new innovations exaggerated; expensive, technical and complex, although when innovations are personalised, correctly disseminated and displayed farmers become much more enthusiastic and involved i.e. EBI in dairy farming (The World Bank, 2006). By far the simplest way is salient messages, meaning messages that farmers feel able and willing to respond to, encouraging control and involvement in innovations (Goodwin, 2011). According to Rogers (2010) the innovation-decision process occurs through a four step decision making process: awareness, interest, evaluation and trial. One of the key findings of Lave and Wenger (1991) was that farmers are suspicious of formal knowledge e.g. organisations or companies as they feel that they have little or no interest in the success of their farm and in many cases it is the less formal knowledge and practical advice provided by personnel within organisations or companies that they trust, credit and respect. For example whether it is an advisor or education officer it's their role to replace product innovations with process innovations that are of value to farmers, providing long term sustainable agricultural practices. Breaking down and disseminating it's highly 'relative advantages' to farmers, removing non-adoption reasons as listed by Vanclay (2004) i.e. complexity, profitability and flexibility to one's farming enterprise. However adoption among the farming community can be increased by disseminating innovations whether new or old over a period of time via a series of communication channels i.e. discussion groups, one-to-one advisory and/ or social media to a distinct population (farmers). Rogers (2010) further elaborated that adoption among the farming community is not parallel but rather horizontal and adopters can be known as the following; innovators, early adopters, early and late majority and laggards. It has been establish that farmer profile has an enormous role in adoption but the use of a social system to communicate information i.e. marts or discussion groups plays a vital role in the adoption and implementation process. Black (2000) elaborated that no single extension method is sufficient to convey an important matter or topic, similarly Muchdar et al (2013) outlines that farmers in particular don't learn from others randomly but they use social adaptive learning mechanisms e.g. national farm walks. Rogers (2010) stated that 'innovation is communicated' through the farming community in a socially structured way by means of sharing beliefs, perspectives and the reasoning for participation or non-participation thus encoding a deeper understanding and

meaning. Farmers own personal experiences play a huge role in stimulating farmers decisions into sustainable management practices, although highly credited and influential advisors can persuade farmers behaviour as opposed to authoritarian approaches i.e. criticism (Ingram, 2008).

Conclusion

The decision to participate in agriculture schemes is dependent on farmer's attitudes, behaviours and farming position and its success is reliant on riskiness, ease/ convenience of practice and a payment above and beyond the direct costs. Access to credit, scale of farm, intensity and agricultural education were amongst the factors found to motivate farmers, while off-farm employment and increasing age were found to be 'barriers to innovation'. Farmers may be reluctant to changing a farming practice even if financial benefits are favourable if it means losing their current desirable lifestyle. Innovations are communicated through the farming community in a socially structured way but highly credited; trusted and respected influential personnel can persuade farmers over organisations or companies. Finally a bottom-up over a top-down approach is necessary in the implementation stage of a programme as farmer's needs should be considered with real respect.

4. Methodology

4.1. Introduction

The literature review provides an in-depth look into the factors affecting farmer's attitudes towards the adoption of new innovations. The methodology chapter builds on the findings of the literature to identify appropriate research methods in order to 'explore suckler farmer's attitudes towards the Beef Data Genomics Programme in the North-West of Ireland'. The aim of this research is to gain a deeper understanding of commercial suckler[4] and pedigree beef[5] farmer's attitudes towards the programme. The study's core research aims and objectives being:

1. To determine the level of participation within the programme and the reasoning for non-participation,
2. Recording farmer attitudes toward outcomes resulting from farmer participation and
3. To determine whether or not farmers would continue to participate if the financial incentive currently available to encourage scheme participation was removed.

4.2. Data Collection

The target population for this study was farmers in the North-West (Sligo, Leitrim, Donegal, Longford and Roscommon) accounting for 17.37% of National Cattle Herd (104,843) in 2016 (DAFM, 2016). Both commercial suckler and pedigree farmers were surveyed in order to gain a true representation of both the commercial and pedigree sectors as both in turn will drive forward the wheels of science and the acquisition of genetics. The research methods I intend to adopt can be broadly divided into two types of categories including;

1. Quantitative i.e. questionnaire and
2. Qualitative i.e. semi structured interviews.

[4] Cross between different breeds of cattle, generally without any type of documented pedigree sold as beef
[5] Registered, pedigree documented cattle raised to produce breeding stock for other purebred producers and for commercial cattlemen

4.2.1. Quantitative: Questionnaires

A questionnaire was deployed as it can be easily disseminated to a large number of people, as well as being an economical method of data collection; providing quantifiable answers to a relatively complex research topic. The questionnaire was designed in conjunction with the study objectives and literature review, later piloted to a group of part-time green cert students (12) who were actively farming. Leading to additional questions being added and the clarification of some questions that student's did not understand or found unclear and these questions were rephrased accordingly.

Pilot questionnaires were carried out to ensure high quality data was achieved as well as undertaking a research design that provides a framework for the collection and analysis of data (Bryman, 2015), adding clarity and order in the process and an explanation to the research methodology (Sarantakos, 2012).

In total the questionnaire consisted of 24 questions broken into three sections:

1. Farmer Profile (Background)
2. Decision Making Factors
3. Innovations and Support

The majority of the questions asked were quantitative, gaining a clear and concise response in a non-complicated manner, however there were a small number of open-ended questions included that provided participants an opportunity to elaborate on specific areas in order to gain a deeper understanding of the participant's opinions and motivations. Self-completion questionnaires were disseminated to farmers, as they can be distributed in large quantities simultaneously, as a team of interviewers would be required if face to face interviews were to be conducted. Self-completion questionnaires also minimise personality clashes and bias results (Bryman, 2016). There were a small proportion of farmers (<10%) with literacy issues that required assistance in the completion of questionnaires and as a consequence additional time and resources were required.

The questionnaire was designed from the objectives of the study and literature review and distributed to an adequate sample population in the North-West of Ireland via multiple routes:

- Animal Breeding Events
- KT discussion groups
- Part-time green cert courses
- Livestock marts
- Pedigree Society's

A consent letter was disseminated prior to each event, stating the questionnaires purpose and an accompanied consent letter requesting permission to undertake the research on pre-agreed dates and locations, providing participants the right to participate if they wish to do so or not. A total of 170 questionnaires were completed, it was acknowledged that 'convenience sampling' selection could be a limitation due to the availability of farmers (Hully et al., 2011). As Magnani et al (2015) outlined that 'sampling bias can pose a risk that the sample obtained is not adequately representative of the larger population from which it was sourced'. To remove any bias in the sampling, upon arrival at one of the above listed venues potential participants were asked if they were a suckler or pedigree farmer and if they answered 'yes' they were given the option to complete a questionnaire. Selection bias was not totally eliminated due to resource limitations as well as the nature of the methodology, but steps were taken to minimise it wherever possible (Hammersley and Gomm, 1997). A copy of the full survey is included in the appendix of this thesis.

4.2.2. Qualitative : Semi-Structured Interviews

Semi-structured interviews allow the interviewer to become more competent and prepared during the interview by asking questions prepared ahead of time. However it also allows the farmer freedom to express their views in their own terms and the interviewer the opportunity to follow topical trajectories within the conversation when it seems appropriate. An interview guide of questions was developed beforehand although a large proportion of these questions were developed based on the questionnaire. Encouraging two way communication as those being interviewed can also ask questions similar to an extension tool as not only can answers to questions be provided but reasons and

explanations in sensitive areas to gather feelings, words, sound, and emotions among other non-numerical and unquantifiable elements and gain an understanding underlining motivations, reasons and opinions for ideas or hypotheses (Padgett, 2016).

A small number of semi-structured interviews (5) were carried out with farmers within the North-West. Suitable candidates were chosen by liaising with advisors in the Teagasc Sligo, Donegal and Leitrim and Roscommon/ Longford advisory region selecting farmers engaged in suckler and/ or pedigree beef production with a range of experience in relation to the BDGP i.e. participating or non-participants. In total 12 candidates were written to with a letter of invitation with 5 agreeing to participate. Table 4.1 outlines the profiles of the interviewees.

Table 4.1 Profiles of farmer's interviewed

Farmer	1	2	3	4	5
BDGP Relationship	Participating	Non-Participant	Participating	Non-Participant	Participating
Location	Donegal	Sligo/ Leitrim	Donegal	Sligo/ Leitrim	Longford/ Roscommon
System of Production	Sucklers	Sucklers	Pedigree	Pedigree	Sucklers
Age	51-65	21-35	21-35	36-50	36-50
Level of Farming	Full -Time	Full-Time	Part-Time	Part-Time	Full-Time
Education Level	None	Green Cert	Junior Cert	Leaving Cert	BSc in Agriculture Science
Area Farmed (acres)	80-40	40-60	80-100	60-80	60-80

A sixth interview was conducted with Aidan Murray, a highly credited and sought after Teagasc Beef Specialist with over 25 years' experience working with cattle farmers, Teagasc Business and Technology drystock advisors and the wider beef industry to increase the adoption of technology at farm level and the physical and financial performance on farms.

4.3. Data Analysis

Quantitative: Questionnaires

Once questionnaires were completed and collected, the data was then organised and analysed. The results were coded with a numeric code and inputted into SPSS (Statistical Package for Social Science) for analysis. A frequency statistical analysis was initially conducted to describe the survey data followed by correlations and t-tests to achieve a deeper interrogation of the data. Themes and relationships were identified; summarised and clearly evident data displayed i.e. extracts collected and its significance to the research question being asked (SPSS LTD, 2017). A bivariate Pearson Correlation was adopted to produce a sample correlation coefficient, r, which measures the direction and strength of linear relationships between pairs of continuous variables. Evaluating whether there is statistical evidence for a linear relationship between pairs of variables in the population, correlations are statistically significant if it's 'Sig. (2-tailed)' <0.05 (Kent State University, 2018).

Qualitative: Semi-Structured Interviews

Ritchie et al (2013) outlines that when analysing qualitative data there are no clear-cut rules unlike quantitative data. Quantitative data identifies key reoccurring themes while qualitative data gathers data/information until no further results exists (Tashakkori and Teddlie, 1998).

4.4. **Ethical Risks and Anonymity**

A researcher has to exhibit the ethical principles of objectivity, confidentiality, honesty, responsibility, and to fulfil legal requirements when carrying out research even when farmers do not express concern (Resnik, 2011). Prior to partaking in the questionnaire the opening page outlined a brief to the study's purpose and that all information provided was anonymous and confidential (Atkinson and Flint, 2001). An information leaflet and consent form was also provided to all participants ensuring that they fully understood the study's aims and objectives and are entitled to decline participation at any time (Homan, 1991). Anonymity was used throughout the study, ensuring all participants' identities' remained anonymous and any data recordings collected were secured under password in the researcher's laptop.

5. Study Findings

One hundred and seventy farmers (response rate of 85% from the population of 200 farmers) returned completed questionnaires within the time frame allocated. The data was analysed and the results section broken down into three sections based on the three research objectives that were identified;

1. To determine the level of participation within the programme and the reasoning for non-participation,
2. Recording farmer attitudes toward outcomes resulting from farmer participation and
3. To determine whether or not farmers would continue to participate if the financial incentive currently available to encourage scheme participation was removed.

5.1: Level of participation within the programme and the reasoning for non-participation

The work of Magne et al (2004) aimed to look at ways to guide and help farmers in everyday and long-term decision making; they identified farmer motivation as an important factor to be considered when deciding on the approach to be taken with farmers. Therefore the farmer questionnaire used in this study aimed to explore farmer beliefs and attitudes towards the various levels of participation within the programme, simply meaning why some farmers where motivated to enrol in the programme and why others weren't. The results is presented in two sub-sections, the first section deals with why farmers joined the programme and the second looks at the reasoning for non-participation within the programme. The farmer questionnaire surveyed 170 farmers; 138 (81.2%) farmers participating within the programme and 32 (18.8%) farmers who have withdrawn or never participated. It was identified that (93.8%) of respondents who indicated that they enrolled in Suckler Cow Welfare Scheme and (96%) who indicated that they enrolled in the Beef Data Program similarly enrolled in the BDGP possibly highlighting the fact that farmers may have realised that such schemes do increase farmer's awareness and attitudes towards best practices as suggested by Dwane et al (2013), for example in such areas as breeding and post weaning management leading to improved animal performance. Farmers were asked whether improving the productivity of their suckler herd, the availability of the additional

financial incentive, the opportunity to improve the carbon footprint of their farm or fulfilling BDGP criteria had any contribution towards the level of influence for participation within the programme. The results are illustrated in Table 5.1.

Table 5.1: Factors contributing towards participation within the programme

	No Influence (%)	Minor Influence (%)	Major Influence (%)
Improving the Productivity of Suckler Herds (n=133)	12.8	30.8	56.4
Financial Incentive (n=131)	9.9	43.5	46.6
Reducing Carbon Footprint/ Improving Environment (n=128)	39.1	43	18
Fulfilling BDGP Criteria e.g. replacement strategy (n=130)	16.2	43.8	40

More than half of the farmers surveyed (56.4%) stated that the potential to improve the productivity of the suckler herd was a major factor in their decision to participate, this result is largely consistent with the programmes objectives of improving the quality and efficiency of the national beef herd. This is supported by interviewed farmer 1 who stated that 'suckler farming has come under huge pressure in recent years with poor returns, we need to do everything we can to increase output at farm gate' similarly farmer 5 stated ' farmers serious about staying in sucklers went into the scheme to increase the productivity of their herd while on the other hand farmers not planning on staying in sucklers or messer's didn't' as Teagasc (2016) outlines by improving animal performance/ efficiency and reduced production costs can all contribute to increased profitability.

Almost half of the survey respondents (46.6%) stated that the financial incentive associated with participation in the BDGP was a major influencing factor in their decision to participate, similarly Aidan Murray elaborated 'first and foremost it would be the payment' as the main reason for participation. The importance of the direct financial incentive in a farmers decision to participate is not surprising given the low returns on suckler beef production systems as Teagasc (2017) illustrates the average suckling to weaning/ store farm net profit

excluding premia in 2016 was €-36/ ha. From this based on the 2014 reference year the average suckler herd would receive a payment of €2455 per annum for a herd comprising of 26.9 suckler cows (DAFM, 2014).

Tzemei et al (2016) outlines that farmers believe that global warming is taking place but (43.8%) respondents did indicate in this study that reducing carbon footprint was a minor influential factor for enrolment as when one questionnaire respondent was asked do you feel Global Warming or GHG Emissions are relevant to Suckler farmers? he replied 'cows are only part of the problem, all fuel running machinery, factories produce gases' likewise a further questionnaire respondent noted 'there are far more higher polluting things going on in the world'. The Environmental Protection Agency (2018) does state 'Ireland's greenhouse gas emissions per person are amongst the highest of any country in the world' with agricultural accounting for 29.2% of GHG emissions in 2009. The argument that we are too small of a country holds no ground; climate change is a global problem requiring a global solution but the study did find participation in the programme from farmers of the opinion that GHG emissions are of relevance to suckler farmers had no statistically significant correlation in relation to farmer profile; age (P=0.407), education level (P=0.397), level of farming (P=0.548) and area farmed (P=0.851). Similarly Hartigan (2017) found in the Mayo/ Roscommon region (89%) of non-participants in the BDGP did not know what a carbon navigator was and likewise only (62%) of participants knew the meaning of a carbon navigator even-though they undergone four hours of training explaining the purpose of a carbon navigator and how it calculates a farms carbon footprint. Raising the question if adopters do not think GHG emissions are relevant to suckler farmers, how will they take the lowering the intensity of GHG emissions component of the BDGP objectives seriously? Stressing the need in moving forward that more work is required to increase farmer's awareness of the programmes purpose and to increase farmer's awareness of GHG emissions; encouraging farmers to take responsibility for their actions in order to reduce the GHG emissions severity.

Likewise (43.8%) of respondents outlined that fulfilling BDGP criteria as a minor influential factor for participation i.e. meeting the replacement strategy targets, completing a carbon navigator and attending the one day training. Some questionnaire respondents did highlight that they did enrol to 'improve the quality and accuracy of breeding data' which will in turn

augment genetic gain (Berry, 2015) essentially meeting the programmes objectives of improving the genetic quality of the National Suckler herd through the collection of essential breeding and production information will increase the competitiveness of the Irish Beef Industry and the equally quality of the beef produced. Conversely factors influencing non-participation within the programme are illustrated in table 5.2.

Table 5.2: Factors influencing non-participation within the programme

	No Influence (%)	Minor Influence (%)	Major Influence (%)
6 Year Commitment (n=18)	22.2	27.8	50
Record Keeping (n=17)	23.5	29.4	47.1
Financial Incentive (n=18)	22.2	33.3	44.4
Fulfilling BDGP Targets (n=17)	23.5	41.2	35.3
Poor Understanding of Programme (n=17)	23.5	47.1	29.4

In total there were 32 farmers who indicated that they either didn't participate or withdrew from the programme. No one major factor would appear to have caused farmers to not participate, however the study did note that (56.3%) of farmers (n=18) whom did respond saw the 6 year commitment as a major influence in their decision, as resignation from the programme leads to all money received to be repaid infill (DAFM, 2015). According to Karali (2014) farmers nearing retirement with no identified successor are less willing to change their land use or management style in practice, conversely farmers keen to pass on successful businesses were more open to making decisions that might increase the profitability of the farm, however in this particular study there was no significant relationship between farmer age and the 6 year commitment as the chi-square significance value of the test was P=0.463. Poor or lack of financial incentive did have some bearing with (44.4%) of respondents indicating it as a major influence; on talking to farmer 3 he did comment 'for the amount of time and effort required he didn't feel the rewards were sufficient', surprisingly fulfilling the BDGP criteria wasn't an influential factor with (64.7%) of farmers highlighting it as having non or minor influence. However (47.1%) of farmers saw the record keeping element of the programme an issue which would be in line with Hartigan (2017) who similarly found that (47%) of non-participant's in Mayo/ Roscommon region also

saw record keeping a major reason for non-participation in the programme as Falconer (2000) does suggest that a farmers attitude towards record keeping can influence non-participation in agri-environmental scheme participation as farmers can see record keeping difficult and time consuming leading to decision not to participate in many cases.

Some (76.5%) of respondents did indicate that a poor understanding of the programme was a contributor to withdrawal and non-participation, similarly (21.8%) of respondents had limited or no understanding of the programme which is similar to the Mayo/ Roscommon region with (13%) of respondents not knowing what the BDGP was about (Hartigan, 2017). Hartigan (2017) also found that in the Mayo/ Roscommon region even though (87%) respondents say that they knew what the BDGP was; however when asked what the 'BDGP' stood for only (65%) of farmers could provide the correct answer, highlighting the need for more clarity when disseminating these programmes at farm level. Jack and Tobias (2017) stated that 'traditional models used to spread advice to farmers, such as agricultural extension services, are expensive and often ineffective', information should be new, accurate, provided from credible sources and tailored to individual farmers and/ or targeted populations specific to their situations such as considering how weather conditions, market prices and other aspects of local context may affect the profitability of a technology.

5.2. Outcomes from the programme

Questionnaire participants where asked 'in your opinion has the BDGP encouraged farmers to use higher merit bulls when breeding?' (94.1%) of BDGP participants responded yes, similarly (90.6%) of non-participants responded yes also. When asked 'is there any notable BDGP outcomes?' Aidan Murray responded that 'AI companies have more available 4 and 5 star bulls across all breeds maximising the genetics with a potential breed that was not otherwise there before'. He later outlined that 'more and more farmers are taking into account what star rating an animal has', likewise farmer 5 elaborated 'farmers are thinking more carefully about what bulls they are using and the adoption of AI also' as according to Heley and AbacusBio (2018) higher merit bulls produce offspring that are smaller, more fertile, more efficient and milkier (producing higher volumes of milk for their young). Similarly (67.6%) of participants acknowledged a 5 star cow is a more productive animal

over a 1 star cow as farmer 5 did state 'the star rating system looks at the bigger picture rather than just how an animals looks in appearance'. Similarly 'five star cows are producing calves that are heavier and worth a bit more' due to 'increased efficiency; age at first calving or days to slaughter' says Aidan Murray but as one questionnaire respondent acknowledged 'it is ambitious as it is dependent on a lot of accurate information coming from farmers which can be a problem'. A total of (42.3%) of participants felt that farmers didn't accurately complete BDGP calving survey reports, when asked why not? They outlined that they felt that farmers were putting down easy calving figures to keep their animal's stars up and a poor/ lack of education on fulfilment of documentation was another component. Aidan did comment on the matter elaborating 'there is potential to improve, the big thing is to improve the indexes by more weighing of the suckler herd is needed to increase the quantity and quality of information' as Su et al (2010) stated that 'genomic selection can greatly improve the accuracy of preselection for young bulls compared with traditional selection based on parent average information' simply meaning it is hope it increase that accuracy of a bull doing what its meant to do. However, farmer 4 did comment that 'the BDGP has been of benefit to the pedigree man with quality rated bulls' conversely he did also comment 'bulls on the other end of the scale are there because they weren't bred from high starred animals and farmers for whatever reason don't want to buy them, possibly due to no reassurance or reinforcement aid' leading farmers optimistic to weather the will perform and do the job its meant to do.

For the farmers who didn't consider a one star cow a more productive animal commonly commented 'some of my one star cows are away ahead of my 5 star cows' but when farmer 1 was asked why do you think some of your best cows are one star he did openly state that 'my lower stared animals maybe an animal with poor back breeding or poor progeny in her pedigree breed therefore reflected in a poor index whereas the performance of that animal on the ground will only boost her index to a limited degree as she will only ever have a relatively small number of progeny recorded to significantly boost her records' reinforcing the necessity for qualitative data on an and animals ancestry.

Farmers were asked whether they have adopted ICBF technologies including; breeding reports, animal search, stock bull finder, active bull list, terminal and/or maternal indexes. The results are illustrated in table 5.3.

Table 5.3: Adoption of ICBF technologies

ICBF Technologies	Relationship with BDGP			
	Participating (n=138)		No Involvement (n=32)	
	Yes (%)	No (%)	Yes (%)	No (%)
Breeding Reports	74.6	25.4	31.3	68.7
Animal Search	50.7	49.3	34.8	65.2
Stock Bull Finder	47.1	52.9	31.3	68.7
Active Bull List	37	63	21.9	78.1
Terminal Index	66.7	33.3	56.3	43.7
Replacement Index	72.5	27.5	59.4	40.6

Farmers participating within the BDGP were identified to have had a higher rate of adoption of available ICBF technologies, for example (47.1%) of BDGP participants have adopted ICBF technologies such as the Stock Bull Finder and (37%) the Active Bull List as opposed to non-participants (31.3%) and (21.9%) respectively, with the hope it leads to a deeper understanding of an animal and/ or herds current performance and consequently bringing about improvement (ICBF, 2018). As stated by farmer 5 ‘we wouldn’t buy or use an AI bull without using the animal search to check its replacement or terminal graphics, certainly not’ moving forward these technologies will hopefully become a commonly used ‘decision support tool’ similar to PastureBase Ireland in grazing management for identifying significant trends in grass dry matter (DM) production (O’Leary, 2018). According to Finnerty (2018) ICBF’s ‘Animal Search’ in the first seven months of 2018 alone has had over 2.5 million searches, a jump of 177,000 hits compared to the same period of 2018 and is anticipated to reach records in 2018 with 4 million hits. In the first seven months of this year alone 607,293 beef AI bulls have been searched and 380,241 females from the beef sector in comparison to 414,708 dairy AI bulls and 38,570 females from the dairy sector really showing the value of the tool in the beef sector and it is hoped likewise that similar ICBF technologies will perform equally as good or better.

Table 5.4 illustrates whether a farmer's background has any bearing on level of adoption; age, level of education and discussion groups participation. All questionnaire participants were asked whether they have used any of the defined ICBF technologies with all responses as follows.

Table 5.4: Adoption of ICBF technologies based on farmer profile

	Age			Education				Discussion Group	
ICBF Technology	<35 (n = 43)	36-50 (n=66)	51+ (n=61)	< Junior Cert [6] (n=54)	Leaving Cert [7] (n=51)	Green Cert [8] (n=49)	Advanced Cert and BSc in Agriculture [9] (n=16)	Participating (n=103)	No Involvement (n=67)
Breeding Reports	65.1	65.2	68.9	57.4	64.7	69.4	93.8	68	64.2
Animal Search	41.9	59.1	39.3	35.2	45.1	57.1	68.8	52.4	40.3
Stock Bull Finder	48.8	50	34.4	35.2	49	44.9	56.3	45.6	41.8
Active Bull List	27.9	36.4	36	29.6	27.5	36.7	68.8	36.9	29.9
Terminal Index	72.1	60.6	63.9	48.1	76.5	63.3	87.5	65	64.2
Replacement Index	74.4	63.6	73.8	57.4	72.5	71.4	100	68.9	71.6

While farmer age had a minor influence on adoption, it was predicted in this study that the higher the level of education the greater the rate of adoption of ICBF technologies. Likewise Aidan outlined 'the more switched on farmers have seen the benefits of such technologies' as Mwangi and Kariuki (2015) outlined that the education level of a farmer increases his/ her ability to obtain; process and use information relevant to the adoption of a new technology. For example (57.4%) of farmers with an education level <junior cert responded that they used ICBF technologies such as ICBF Breeding Reports, possibly due to the fact that there widely available in paper format as opposed to only (29.6%) of the same group of farmers adopting the ICBF's Active Bull List as it is predominately only available online (ICBF, 2018) highlighting that the fact that as education level increases so does technology adoption.

[6] Examination of high-school children aged 13-16 following three years study in a secondary school
[7] Final examination of the Irish secondary school system - students are typical aged 16-20
[8] A list of land based courses, duration is typical 2-2.5 years on a part-time basis with students aged 18-35
[9] The first undergraduate degree awarded by university faculty of agriculture and agriculture colleges

Specifically in the case of the ICBF's 'Breeding Reports' it was found that farmer age and level of participation in a discussion group had minor influence on adoption but it was similarly noted that as the education level of a farmer increased so did the level of adoption of breeding reports.

In relation to ICBF's 'Animal Search' and 'Active Bull List' farmers in the age bracket 36-50 had the highest rate of adoption as the majority of these farmers in a lot of cases are actively farming, whereas farmers aged <35 have yet to inherit the farm holding, consequently have little or no say on what happens on farm. Farmers aged 51+ had poor adoption levels as it is anticipated to be due to technology difficulties i.e. computer literacy. As the education level of a farmer increased so did his rate of adoption and similarly farmers participating in discussion groups where noted to have had higher rates of adoption as according to Bogue (2014) farmers participating in groups have more knowledge on breeding, financial analysis and grassland.

Farmers aged <35 and 36-50 where noted to have increased levels of adoption to ICBF's 'Stock Bull Finder' in comparison to farmers aged 51+ as these farmers are expected to have a greater level of exposure to smart phone apps and computer literacy. Similarly farmers participating in discussion groups and with higher levels of education statuses where noted to have higher levels of adoption also.

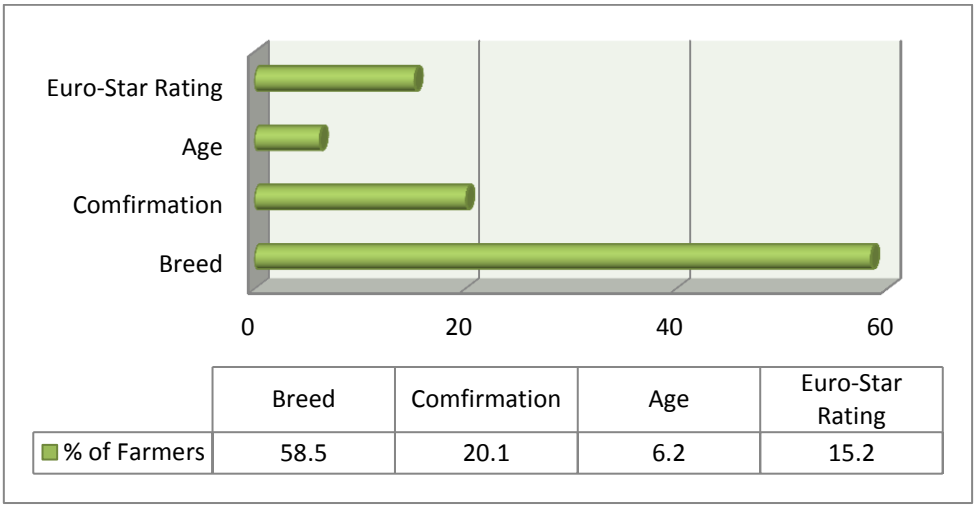
Finally in relation to the 'Replacement Indexes' and 'Terminal Indexes' farmer age had little effect on adoption nor did the level of discussion group participation but similar to the other ICBF technologies listed above the education level of a farmer was differential factor in adoption.

Iddings and Apps (1990) conclude that many farmers believe that 'you can't teach an old dog new tricks' or 'I'm too old to learn' as barriers for non-adoption, but they did emphasis the call for farmers to farm smarter; as gaining access to information must remain a priority for farmers and quality management is an important determinant of profitability. With the availability of Wi-Fi in public places, relatively low-cost of smartphones the prolificacy of agricultural based 'apps' all serve to transform farmers exposure to internet based technologies and farm services (Hennessy, 2016) such as ICBF and HerdPlus.

If was found also that social groups (discussion groups) enhance social capital allowing trust, idea and information exchange. Respondent's thoughts and attitudes are questioned making them more open; influencing learning from each other, equipping them with the rational to analyse the benefits of new technologies which ultimately strengthens the adoption process (Waller et al, 1998) evident in table 5.4 from farmers participating in discussion groups. Bogue (2014) similarly outlined that farmers participating in beef discussion groups achieved on average an additional €174 hectare of a gross margin. For example (52.4%) of discussion group participants have adopted ICBF's Animal Search Vs (40.3%) of non-discussion group participants. Bogue (2014) found that the level of knowledge increases among discussion group members with the number of years involved in a discussion group, they are also said to be more financially aware and engaged in planning, open to exploring solutions to problems while non-participants are said to be the opposite and are less efficient and/ or open to technology change and slower to change; they may be perceived by others as having 'given up' on achieving efficiencies on the farm or improvements.

Next farmers were asked to rank the sought after characteristics in maiden heifers, they were given a list of four different characteristics and asked to rank from the highest to the lowest in priority (weighted score). The list included breed, confirmation, age and euro-star rating. The results are illustrated in Figure 5.3.

Figure 5.1: Characteristics sought in maiden heifers



	Breed	Comfirmation	Age	Euro-Star Rating
% of Farmers	58.5	20.1	6.2	15.2

The most popular answer was given a ranked score of five and in ascending order to a score of one (least popular answer). Breed by far was the most sought after characteristic (58.5%) followed by confirmation (20.1%) and euro-star rating (genetic prediction) at (15.2%). Farmers in general prefer specific breeds over others whether it be a breeds physical appearance, genetic traits or performance i.e. Charolais Vs Fresian. Secondly farmers seek confirmation in an animal as it is simply the desirable and undesirable muscular and skeletal structures of an animal covering legs, hind quarters, spine (or top line), head and neck. Cows to be suitable for breeding are to be in good body condition and confirmation in order to be seen as good, solid and highly productive (Croushore, 2011). Thirdly genetic prediction has become and will continue to remain a powerful breeding tool – maximising the proportion of desirable traits of economic importance e.g. herd fertility, docility and growth (Miller, 2010). Finally farmers remain optimistic to the age of first calving of heifers with the mean calving age of 31.5 months in 2016 as opposed to the targeted 22-26 months as some farmers feel that they aren't big enough and they can use a better bull if they leave them that little bit longer (Cummins, 2017) leading the age factor of breeding a heifer a deferential factor on breeding.

In relation to the euro-star indexes McKiernan (2018) did state 'the indexes are only a guide and a guide is all they can be' likewise Aidan Murray stated 'the BDGP and euro-star index overall is to be used to manage risk; it you go buy a particular animal your improving your chances of it doing what it's supposed to do'. Similar to the EBI in the dairy industry the euro-star index has been meet with agitation from farmers (Mc Cormack, 2018) regarding the makeup and weighting of indexes and/ or values, as farmer 2 stated 'the quality of cattle being sold is deteriorating over the programme' but Aidan Murray did elaborate 'the programme did make out that there would be winners and losers' and later said 'you have to like the look of an animal and hope the stars add up'. Similarly farmer 4 did illustrate 'farmers are being forced to keep more dairy cross animals', the DAFM does outline there was an increase of 4.5% in the % of O and P grade across the steers, heifer and young bull categories and a reduction in the % of E and U grades in 2017 (DAFM, 2017). However this may be predominately due to the additional 121,221 dairy calves born in 2017 Vs 2015 and 34,828 less beef calves born in the same period (DAFM, 2015) (DAFM, 2017).

Coughenour and Swanson (1992) concluded that farmers see farming as a way of life; striving to achieve a desirable farming lifestyle with little priority on increasing profit, although Penrose and Penrose (2009) outline that visual appraisal i.e. breed, carcass confirmation and weight) of an animal was fundamental over profitability in the past i.e. terminal over maternal traits and in many cases it continues to remain too this present day. Questionnaire respondents did state that 'one star cows can produce just as good calves as five star cows' but Daly (2018) noted results since the introduction of the BDGP 2014-2017 i.e. BDGP participants average suckler herd calving interval has reduced by 14 days and the percentage of heifers calved at 24 months has increased by 9%. Furthermore (47.1%) of survey respondents indicated that they always take the euro-star rating into consideration when purchasing or selecting replacement stock (females and/ or stock bulls) and a further (45.3%) said they do sometimes, from this the BDGP does hold a role going forward as a breeding tool alongside animal appearance and age. As stated by farmer 3 'the star rating provides a deeper understanding of animals based on its milking ability and predicted performance that was not otherwise there before' strengthening the likelihood of a farmer selecting more profitable breeding animals.

5.3. Would participation continue if financial incentive was removed?

Table 5.5 outlines the number of farmers who would continue participation within the BDGP if payment remained in place or removed. It also illustrates whether a farmer's profile has any bearing based on level of participation; age, level of farming, land farmed and system of production.

Table 5.5: Would participation continue if financial incentive was removed

	Payment Removed	
BDGP	**Yes (%)**	**No (%)**
Continue Participation (n=138)	36.9	63.04
Age	**Yes (%)**	**No (%)**
<35 (n=30)	33.3	76.7
36-50 (n=54)	33.3	72.7
51+ (n=54)	42.6	62.3
Level of Farming	**Yes (%)**	**No (%)**
Full Time (n=65)	36.9	63.1
Part Time (n=73)	37	63
Land Farmed (Acres)	**Yes (%)**	**No (%)**
<40 (n=22)	36.4	63.6
41 – 80 (n=57)	35.1	64.9
81 – 100 (n=23)	34.8	65.2
100+ (n=36)	41.7	58.3
Level of Education	**Yes (%)**	**No (%)**
<Junior Cert (n=46)	23.9	76.1
Leaving Cert (n=41)	43.9	56.1
Green Cert (n=39)	35.9	64.1
Advanced Cert and BSc in Agriculture (n=12)	66.7	33.3
System of Production	**Yes (%)**	**No (%)**
Commercial Sucklers (n=103)	33	67
Pedigree (n=35)	48.6	51.4

It was also detected that if payment was removed (63.1%) of farmers would withdraw from the programme; factors such as participants level of education (P=.121), age (P=.774), level of farming (P=.721), land farmed (P=.936), system of production (P=.838) or future cow numbers (P=0.91) had little effect on their decision as there was no statistically significant correlation with participation. Neither did participation within a discussion group (P=.334) although acquaintance with an agricultural advisory service (P=.017) showed to have a

statistically significant correlation with participation as Kelly (2017) outlined that agricultural advisors support farming under two equally important agendas: on-farm development and rural development (direct payments) under the Agricultural Knowledge and Innovation System (AKIS) i.e. exchange of knowledge and supporting services between diverse factors from the first, second or third sector in rural areas (Prager et al., 2017).

Aidan Murray did outline that 'farmers who have received exposure and have seen the benefits will continue participation, for instance if an animal was purchased with a high index and done well for them they will have more trust in the programme'. Bogue (2014) outlies that based on the facilitator experiences groups of farmer's range from those farmers who are really keen to learn and improve; those who are taking some things on board; and those whose motivation to participate is based solely or largely on the payment. Developments are required to encourage farmers to move to a level that they are comfortable to share more information to learn, expand and improve their farm profitability and management as it was said by farmer 5 'where the programme is working for them and are serious about staying in sucklers will continue participation whether payment is kept or not'. Table 5.5 below outlines further factors influencing non-participation.

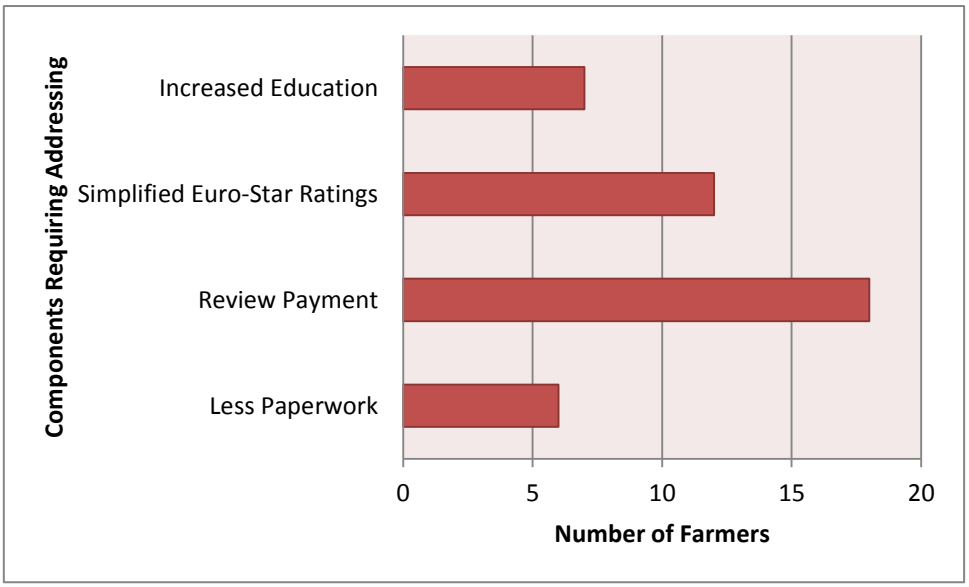
Table 5.6: Reasoning for non-participation in the Beef Data Genomics Programme

	No Influence (%)	Minor Influence (%)	Major Influence (%)
Paperwork or Record Keeping (n=87)	12.6	40.2	47.1
Fulfilling BDGP Criteria e.g. Replacement Strategy (n=85)	9.4	49.4	41.2
Cow Star Ratings (n=85)	16.5	45.9	37.6
Other – Financial Incentive (n=4)			100

Farmer attitudes and underlying values play a key role in farming with up to eighty-seven percent of responding famers outlining paperwork/ record keeping as a minor-major influence for non-participation and a further (90.5%) of farmers expressing similar views towards fulfilling the programmes criteria i.e. genotyping and/ or replacement strategy. The National Adult Literacy Agency (2018) illustrates that (17.9%) or about 1 in 6; Irish adults are

at or below the level 1 on a five level literacy scale leading many persons unable to understand basic written information. On speaking to farmer 3 he stated 'I'm having great difficulty in interpreting the BDGP euro-star reports, to see if I will have enough cows to meet the 20% and 50% replacement strategy by 31st October 2018 and 2019', consequently we must remember this leads the 'lifestyle' component of farming very important rather than purely financial in nature as many farmers see farming as a way of social cultural practice or a way of life, a lifestyle rather than a business and not just totally financial in nature (Vanclay, 2014) which lead to the decision not to participate or withdraw from the scheme sometime afterwards. Farmer 3 later stated 'I don't know if I'll continue in the scheme after finishing it, as I am not getting any younger, my sons have little interest in farming and I don't know for all the money I get is worth the hassle' leading the succession component particular important as Vanclay (2004) did note that decision making was influenced by succession as it was discovered that one of a farmers main aims is to develop the farm as an attractive option for his/her children to work in the future. It has become critically important that farmer decisions are understood and that a 'you can do it' positive attitudes are encouraged, increasing understanding and supporting the farming community in the adoption of new innovations (Willock et al, 1999). Unexpectedly cow star ratings did not discourage farmers to participate with (46%) of farmers outlining it as having none or minor influence on their decision, as Aidan Murray did state 'initially farmers automatically thought that by having a number of one star cows that they'd have to get rid of them' but that was not the case as he later says 'that's not what the scheme was about, it was more about the breeding of the future females and how to upgrade them' looking ahead into the future and breeding stock that are productive, fertile and durable they'd have 4+ cales in their lifetime. Figure 5.4 does display components of the BDGP that suckler farmers feel require addressing or improving.

Figure 5.2: Components of the BDGP that suckler farmers feel require addressing or improving



The main areas of concern outlined by farmers were to review payment (18), simplified euro-star ratings (12), and increased education surrounding the BDGP (7) and less paperwork (6). With the average suckler to weanling farmer 100% reliant on direct payments (Teagasc, 2017) it is no surprise that farmers seek increased payment and likewise less or simplified record keeping and policy. We must remember the payment brings a momentum to the development of the BDGP as it was said to be the 'icing to the cake' by interviewed farmer 2 as payment is seen by some farmers as a critical factor, highlighting that in the event of the payment being discontinued participation would cease for many farmers. Some questionnaire respondents did make some valid points when asked why they didn't join, responses included 'that not all farmers are the same' as each has different goals in farming, business and in life (Bogue, 2014). Some may not be 'the type to participate', 'the programmes objectives or actions may not suit' or 'some may not have yet discovered what the programme has to offer'. More needs to be done to convince farmers of the benefits of participating in the programme and overcome fears. It was noted from the interviews that future similar breeding programmes should incorporate terms and conditions or actions similar to the Suckler Cow Welfare Scheme i.e. disbudding of calves within 3 weeks of birth and introducing concentrates to calves a minimum of 4 weeks before weaning as it was said by farmer 2 'something like GLAS where you receive different payments for selecting and completing different actions that may suit your farm'. Also

farmer 5 did state 'there should be a tiered payment for farmers meeting and exceeding the schemes ambitions' later he provided an example 'farmers with lots of 4 and 5 star cows should get more and farmers with lots of 1-3 star cows should get less which will encourage farmers to do better'.

As stated by Aidan Murray 'at this stage nobody else has put forward an alternative to the BDGP' likewise he stated 'we can't keep doing what we've always been doing, it's going to take a bit of time before farmers have a bit of confidence to use it solely as a way of selection because of the amount of variation and lower reliabilities'. From speaking to participants benefits have emerged from learning information received and changes in practices adopted in areas, it's hoped those who are have experienced or experiencing benefits or predicting to experience benefits in the near future are to say involved even if payment was to be removed. The benefits are primarily derived from improving the quality, genetic merit and efficiency of the national beef herd a key element of the BDGP (DAFM, 2015). Hartigan (2017) found in his study that (29%) of respondents (n=100) in the Mayo/ Roscommon region also saw the BDGP as an overall good programme, one questionnaire respondent in this study did state the BDGP was an 'excellent scheme' but suggested 'maybe a course to update farmers' with a similar (6) other farmers in this study suggesting more education on the BDGP in order to discuss the evolution of the programme and to encourage farmers to share thoughts and strategies on difficulties, as Millar and Curtis (1997) outlined that groups assist in the process of collectively solving problems, sharing of experiences and application of local knowledge to develop and encode common understandings. Finally in relation to the 6 year commitment, Aidan Murray elaborated 'it may have been better if farmers had the opportunity to commit for three years followed by a review of their situation' and also an increased payment option as 'if the payment was increased farmers would be prepared to do a bit of extra work if it meant more guaranteed money' leading for the need for a better common understanding between policy makers and farmers as to what is acceptable and unacceptable in a scheme or programme.

6. Conclusion and Recommendations

6.2. Conclusion

It was found that farmers enrolled in the programme to set out to improve the quality and efficiency of their herd which collectively contributed to the programmes objective of improving the national beef herd. Likewise a large proportion enrolled to avail of the additional financial support payment offered to incentivise farmer participation and fulfil the programmes criteria such as the replacement strategy and calving survey reports with a view to increasing the reliability and accuracy of the breeding data being gathered. Finally, only a small proportion of farmers stated that their main reason for enrolling was to set out and reduce their carbon footprint and/ or improve the environment. Conversely it was identified that the 6 year commitment was an influential factor for non-participation as on withdrawal from the scheme prior to completing the full 6 years would lead to all money received having to be repaid in full. Similarly it was found that some farmers believed that for the level of time and effort required to fulfil the scheme records and documentation the rewards were insufficient and equally a poor understanding of the programme was an influential factor for non-participation and withdrawal.

The programme holds many positive outcomes, with many farmers in agreement that it encourages the use of higher merit bulls for breeding and likewise selecting or purchasing high starred maternal suckler cows for breeding. It was also found that participants participating in the programme are more likely to avail of ICBF technologies; gaining a deeper understanding of their herd's current performance and a means to increasing productivity. However it was identified that age, education status and discussion group involvement is detrimental on adoption. The overall lower level of adoption of these technologies by those farmers who do not participate in the BDGP highlights the potential technological improvements that could be achieved by these farmers. As there is variation in farmer profiles and as no two farmers are the same it may possibly highlight the fact that it such programmes such as the BDGP may not totally lead to significant improvements on some farm holdings, nevertheless potential is available.

Farmers commonly link the adoption of farm practices with financial benefits, however with participants at the early stages (year 3) in a six year commitment tangible benefits in terms of profitability/ productivity have not yet in many cases been realised at farm level as it takes time to improve genetics. Furthermore if payment was removed participation is very likely to drop as payment does bring a momentum to the development of farmers learning information and changes being implemented at farm level. Finally if payment was removed farmer profile i.e. level of education, age, level of farming, system or production, discussion group would have little bearing on continued participation although farmers in acquaintance with an advisory service showed to have a statistically significant correlation with participation as advisory services supports farming under two equally important agendas: on-farm development and rural development (direct payments).

Looking back the key message is that there is a lot of work being done on suckler farms to increase productivity and efficiency per livestock unit and likewise the reduction of GHG emissions, but nevertheless moving forward there remains a lot more to be done. Messages and services need to be tailored in a manner to help facilitate this widespread improvement both across Teagasc and the entire beef sector to help facilitate the productivity and efficiency of the national suckler herd.

6.3. Recommendations

To conclude there is a need for a refresher course (ongoing training) as a component of the BDGP moving forward to inform farmers on scheme evolvements in such areas as the euro-star indexes and to deal with new and weaker participants in such areas as the fulfilling of the calving survey reports and meeting the replacement strategy's; with the view to increasing participation in similar schemes moving forward and similarly reducing or eliminating future withdrawal from programmes or schemes. Simply by encouraging farmers to discuss, share thoughts and strategies on difficulties as groups at BDGP training courses it can assist in the process of collectively solving problems e.g. what bulls are performing on the ground, the sharing of experiences and the application of local knowledge hence developing and encoding common understandings among farming communities moving forward.

As this study has noted that increased education levels, discussion group involvement and farmers in acquaintance with an agricultural advisory service are more likely to adopt ICBF technologies or similar technologies a service is required to support agricultural advisors and discussion group's facilitators by means of addressing time specific problems throughout the year i.e. genotyping of cattle or timely distribution of euro-star reports to assist professional bodies in providing farmers the most fair, professional and ethical advice. Done by scheduling an annual set of events and training days that should be strictly adhered too so that facilitators, advisors and education officers are up to date on topics in order to facilitate discussion groups and/ or local training or open days. Farming can be a lonely occupation, we must remember it is not totally technical and financial in nature; groups provide an opportunity to meet other likeminded farmers, providing emotional support (pressure and stress) and share problems (trust) in the management and development of their farm business and livelihoods. Furthermore we must remember that no other alternative has been put forth to the BDGP and we can't keep doing what we always done, ICBF technologies and the euro-star indexes are breeding tools and breeding tools they may ever remain. More needs to be done to display to farmers the benefits of participating in the programme and overcome fears, if disseminated correctly i.e. both with and outside of Teagasc (Farmers Journal) through a series of communication channels (regionally and nationally) the programme can be adopted and used to manage risk by improving your chances of an animal and/ or herd doing what it's supposed to do increasing output per Kgs per livestock unit or Kgs per hectare. Moving forward the development of similar breeding programmes requires the move away from the common top-down approach and the adoption of a bottom up approach i.e. accessing and liaising farmers in the development process; fulfilling farmer's needs and requirements to strengthen the farm as a whole providing them with a sense of ownership and responsibility; producing more efficient, durable stock and lastly a greater return and lifestyle.

Further research should be undertaken to better understand participant's farms and personal goals and aims. Hartigan (2017) found that (77%) of farmers where informed about the BDGP via the Farmers Journal, Teagasc and other farmers; highlighting the need for Teagasc to continue liaison with industry to meet and exceed those needs of the farmers in the dissemination of updates, answers to common questions and resolved. How if possible

they farmers could be encouraged and supported to continue participation if payment was removed from the BDGP or similar programmes. This could be done by means of assisting participants in there every day needs by:

- ✓ Tailoring advice to their farming practices i.e. cow type
- ✓ Knowing their farm and technical requirements i.e. Kgs per livestock unit
- ✓ Understanding the farmer and their farm/ household situation i.e. succession
- ✓ Understanding their plans and ambitions i.e. future goals(Bogue, 2014)

Considerable effort should be made to convince both present and future participants of the benefits of participating in such cattle breeding programmes as BDGP if they have not yet realised the benefits already by means of highlighting the advantages of a five starred animal over a one starred animal. Simply by taking on one-to-one and group advisory efforts or public promotion via general media i.e. local papers or Facebook may not be enough. The strategy needs to consider increasing the level of participation weather maintaining existing current participants or the inclusion of new members although care should be taken not to damage current dynamics i.e. building current participation but not damaging cohesion between them.

6.4. Limitations of the research

As this study was completed as part of a minor thesis of a post graduate study programme, meaning time and scale limited its scope. A follow up project with less time constraints on national or provincial scale could potentially for the Teagasc Advisory Services produce extremely beneficial guidance in terms of the development and dissemination of breeding programmes on suckler farmers. With the project timeframe limited it meant surveys were disseminated to farmers in spring, during a busy calving period which may have skewed some findings of the study. Although there are numerous studies carried out towards other agri-environmental schemes there are few carried out towards the BDGP as it is a relatively new scheme specifically to farmer's beliefs and attitudes towards the programme.

6.5. Areas for further research

There is obviously much need, and abundant scope, for additional study in this area. For example this study could be up-scaled to explore farmer's attitudes towards the BDGP on a national basis. Similarly a follow-up study, exploring how many of the participants actually intend on continuing implementation of the programmes objectives come its completion in year 6 would be insightful. I anticipate there will be a continued focus on building on the programme in the coming years with beef prices looking to remain low and Dairy X Beef calves set to increase within FoodWise 2025 a study possibly looking at exploring farmers attitudes and conceptions towards the first cross dairy X beef females in the sucker herd would be intuitive.

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8. Biography

Appendix A: Letter of Invitation to participate Questionnaire

Letter of Invitation

04/12/17

Re: Research Study: 'Sucker farmer's attitudes towards the Beef Data Genomics Programme in the North-West of Ireland'.

Dear

My name is Gavin Doherty. I am student on the UCD/ Teagasc Walsh Fellowship Masters in Agricultural Extension and Innovation programme. As part of the Masters I am required to complete a research study. I have chosen to undertake a descriptive qualitative study 'exploring Sucker farmer's attitudes towards the Beef Data Genomics Programme in the North-West of Ireland'.

The questionnaire targets both pedigree and suckler farmers with experiences surrounding the programme, both participates and non-participants. I hope you will agree to participate in this study.

The questionnaire is anticipated to take between 10 and 15 minutes. Participation in this study is strictly voluntary and you have the right to withdraw at any time without consequences. Through the use of pseudonyms and appropriate secure data storage, I can assure confidentiality and anonymity.

I hope by carrying out this study it will lead to increased knowledge in cattle breeding programmes, will improve participation and create the opportunity for positive changes in subsequent programmes. The findings will assist policy makers to create best practice guidelines. Thank you for taking the time to read this letter and for your consideration.

If you have any questions or require any additional information, please contact me at 0879437426 or email me at gavin.doherty2@ucdconnect.ie.

Should you wish to take part in the study please complete the enclosed form and return it to me in the stamped envelope by **29/01/2018**.

Yours Sincerely,

Gavin Doherty

Appendix B: Questionnaire

Questionnaire No: ____

This Research Questionnaire is part of a thesis for MAgrSc Extension and Innovation

Programme in association with UCD and Teagasc.

The topic of the research is:

A Study: "exploring suckler farmers attitutes towards the Beef Data Genomics Programme in the North-West"

All information given will be treated confidentially.

Your responses to this questionnaire are anonymous and cannot be linked to any individual.

Background

1. **What farming enterprises are you engaged in?**

Dairy ☐

Beef ☐

Sheep ☐

Tillage ☐

Other (Please Specify) _____

2. **What age are you?**

<20 ☐ 21 – 35 ☐ 36 – 50 ☐ 51 – 65 ☐ 66+ ☐

3. **How much land do you currently Own and Farm (Farm = Owned + Rented in or out)?**

	OWN	**FARM**
Under 20 acres	☐	☐
Between 20 – 40 acres	☐	☐
Between 40 – 60 acres	☐	☐
Between 60 – 80 acres	☐	☐
Between 80 – 100 acres	☐	☐
Over 100 acres	☐	☐

4. **How many cows do you have?**

	Number
Suckler Cows	
Pedigree Cows	

5. **Are you farming?**

Full Time ☐ Part Time ☐

If working off farm how many hours per week approximately do you work? _____

6. **How many (if any) of the following are working on your farm?**

	Full Time	**Part Time**
Parent/ Spouse	☐	☐
Child/Children	☐	☐
Hired Labour	☐	☐
Other (Please Specify) _____	☐	☐

7. **What formal education do you hold?** (Tick all relevant boxes)

None ☐

Completed Junior/Inter Certificate ☐

Completed Leaving Certificate ☐

Specific Purpose Certificate in Farm Administration (Green Cert) ☐

Advanced Certificate in Agriculture (Drystock or Dairy Management) ☐

BSc in Agriculture Science ☐

If other, please specify _____

8. **Do you receive advice from?**

Teagasc ☐ Private Agri-Consultant ☐ Neither ☐

9. **Are you participating in a KT Discussion Group?**

Yes ☐ No ☐

10. **How would you describe your level of understanding towards the Beef Data Genomics Programme**?

High ☐ Good ☐ Limited ☐ None ☐

11. In relation to the Beef Data Genomics Programme are you?

Participating ☐ Withdrawn ☐ No Involvement ☐

If you are participating within the programme complete **Section A** otherwise **Section B**

Section A: What level of influence did the following play in why you joined the programme?

	No Influence	Minor Influence	Major Influence
Improving the Productivity of Suckler Herds			
Financial Incentive			
Reducing Carbon Footprint/ Improving Environment			
Fulfilling BDGP Criteria e.g. replacement strategy			
Other (Please Specify)			

Section B: What level of influence did the following play in why you didn't join the programme?

	No Influence	Minor Influence	Major Influence
6 Year Commitment			
Too Much Record Keeping			
Poor Financial Incentive			
Fulfilling BDGP criteria e.g. replacement strategy			
Poor Understanding of Programme			
Other (Please Specify)			

12. In your opinion please rank what you feel to be the most and least beneficial benefits of the BDGP? 1= Most Beneficial 4 = Least Beneficial

Improving the genetic merit of herds ☐

Improving traceability and reliability of breeding data ☐

Additional financial income ☐

Reducing carbon footprint ☐

Other (please specify) _____

13. Where you involved in following programmes in the past?

	Yes	**No**
Suckler Cow Welfare Scheme		
Beef Data Programme		

Decision Making Factors

14. When purchasing or selecting replacement stock (females and stock bulls), do you take the Euro-Star Rating into consideration?

Always ☐ Sometimes ☐ Never ☐

If never why not?

_____

_____

15. When selecting Maiden heifers, please rank the sought after characteristics?

1= Most Important 4 = Least Important

Breed ☐

Conformation ☐

Age ☐

Euro-Star Rating ☐

16. Have you ever used any of the following ICBF technologies? (Tick where applicable)

Breeding Reports i.e. suckler cow report or euro-star report ☐

Animal Search ☐

Stock Bull Finder ☐

Active Bull List ☐

17. Have you ever used any of the following Euro-Star Indexes?

	Yes	No
Terminal Index i.e. carcass weight or carcass confirmation	☐	☐
Replacement Index i.e. calving difficulty or daughter milk	☐	☐

18. Would you consider a 5 STAR cow a more productive animal over a 1 STAR cow?

Yes ☐ No ☐

If No, why not?

_____

_____

19. In your opinion has the Beef Data Genomics Programme encouraged farmers to use higher merit bulls when breeding?

Yes ☐ No ☐

20. In your opinion do you feel that farmers accurately complete BDGP calving survey reports?

Yes ☐ No ☐

If No, why not?

_____

_____

Innovation and Supports

21. Would you avail of the BDGP scheme if?

		Yes	No
(i)	Payment continued to be paid	☐	☐
(ii)	Payment was removed	☐	☐

If answered No to either, what level of influence would the following have had?

	No Influence	Minor Influence	Major Influence
Paperwork or Record Keeping			
Fulfilling BDGP Criteria e.g. Replacement Strategy			
Cow Star Ratings			
Other (Please Specify)			

22. Do you feel Global Warming or Greenhouse Gas Emissions are relevant to Suckler farmers?

Yes ☐ No ☐

Why?

_____

_____

23. In the next 5 years what do you intend on doing with your cow numbers?

Increase ☐ Decrease ☐ Keep the same ☐

24. Is there any component of the BDGP you feel requires addressing or improving?

_____

_____

Appendix C: Letter of Invitation for Semi–Structured Interview Participant

Letter of Invitation

04/12/17

Re: Research Study: 'exploring sucker farmer's attitudes towards the Beef Data Genomics Programme in the North-West'.

Dear

My name is Gavin Doherty. I am student on the UCD/ Teagasc Walsh Fellowship Masters in Agricultural Extension and Innovation programme. As part of the Masters I am required to complete a research study. I have chosen to undertake a descriptive qualitative study 'exploring Sucker farmer's attitudes towards the Beef Data Genomics Programme in the North-West of Ireland'.

I intend to interview between 6 and 12 farmers regarding their experiences surrounding this topic. Both farmers who are and who are not actively participating within the programme. I hope you will agree to participate in this study.

The interview schedule is anticipated to take between 15 and 20 minutes in a classroom at Teagasc Letterkenny. Participation in this study is strictly voluntary and you have the right to withdraw at any time without consequences. Through the use of pseudonyms and appropriate secure data storage, I can assure confidentiality and anonymity.

I hope by carrying out this study it will lead to increased knowledge which will subsequently improve participation within the programme and create the opportunity for positive changes within the programme. The findings will assist policy makers to create best practice guidelines. Thank you for taking the time to read this letter and for your consideration.

If you have any questions or require any additional information, please contact me at 0879437426 or email me at gavin.doherty2@ucdconnect.ie.

Yours Sincerely,

Gavin Doherty

Appendix D: Semi-Structured Interview Information Sheet

Title of research project: A study 'exploring suckler farmer's attitudes towards the Beef Data Genomics Programme in the North-West'.

This research project investigates the Beef Data Genomics Programme in the North-West of Ireland in order to determine the level of participation within the scheme and the reasoning for non-participation, outcomes of the programme and to determine if financial incentive was removed would farmers continue participation.

The research forms part of my MAgrSc Agricultural Extension and Innovation at University College Dublin. Part of the research involves interviewing individuals who have knowledge with the particular programme and for this reason; I would like to invite you to take part. If you agree, you will be asked to participate in an interview of about 15 -20 minutes. During the interview I will ask you questions on your opinions and experience towards the BDGP, its goals and future role on Irish Suckler.

With your permission, I would like to audio record the interview and take notes for later analysis. Your identity will remain confidential and will not be included in the final report.

Your identity will not be included in the final report. You can choose not to answer any particular questions and you are free to withdraw from the study at any time. The data will be kept securely and destroyed securely after the completion of the project.

A copy of the completed Minor Thesis will be available on request.

The project has been subject to ethical review in accordance with the procedures specified by University College Dublin's Human Research Ethics Committee - Sciences (LS).

If you have any further questions about the project, please feel free to contact me at the email address below.

Name of researcher: Gavin Doherty **Email address:** gavin.doherty2@ucdconnect.ie

Date: 04/12/17

Appendix E: Consent Sheet for participant Semi-Structured Interview

PARTICIPANT CONSENT FORM

Title of study 'exploring suckler farmer's attitudes towards the Beef Data Genomics Programme in the North-West'

UCD Ethics /Ethics Exemption reference no.....

By signing and returning this consent form you are indicating your agreement with the following statements:

- I have read and understood the attached *Participant Information Leaflet* for this study.
- I have had the opportunity to ask questions and discuss the study. (Note you can contact me by email me at gavin.doherty2@ucdconnect.ie).
- I have received satisfactory answers to all my questions, where I have had a query.
- I have received enough information about this study.
- I understand that the interview/focus group will be audio recorded
- I understand I am free to withdraw from the study at any time until the transcripts are anonymised.
- I understand anonymised data will be archived for future research
- I agree to take part in the study.

Participant's Signature: _____

Date:

Participant's Name in Print: _____

Contact Email: _____

RETURNING THE CONSENT FORM: I would ask you to please return the attached consent form to: Gavin Doherty, Carnamuggagh Lower, Knocknamona, Letterkenny, Co. Donegal (a scanned copy can be sent to the email address below).

CONTACT DETAILS: You can contact me on 0879437426 or email me at gavin.doherty2@ucdconnect.ie.

Appendix F: Semi - Structured Interview Questions

Below is a list of questions which I tend on asking each of the farmers:

1) What is your opinion of the Beef Data Genomics Programme?

2) In your opinion what are the main reasoning for participants participating within the programme?

3) In your opinion what are the main reasons for non-participation or withdrawal from the programme?

4) What do you feel are the outcomes of the programme?

5) Do you think there is a need for breeding programmes such as the BDGP when selecting female progeny? For example ICBF Technologies and euro-star indexes?

6) Do you feel financial incentive is an influential factor on participation?
7) Would participation continue if financial incentive was removed?

8) What components of the BDGP do you think works well and don't?

9) Do you feel the BDGP or similar programmes have a role moving forward?

10) Finally thank you for your time. Do you have any questions that you would like to ask me?