



**An Roinn Talmhaíochta,  
Bia agus Mara**  
Department of Agriculture,  
Food and the Marine

## Research Stimulus Fund

### Final Report

*'Profitable dry stock enterprise development: Pathways to growth'*

DAFM Project Reference No: 11/S/146

Start date: 01/11/13

End Date: 30/09/16

Principal Coordinator and Institution: Dr David Meredith, Teagasc

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**Collaborating Research Institutions and Researchers:** Dr James Breen (UCD), Dr Caroline Crowley (Independent Researcher), Dr Maria Martinez Cillero (PhD Researcher - Teagasc funded Walsh Fellow), Dr Stefanie Duesberg (Independent Researcher), Dr Thia Hennessy (Teagasc), Ms. Anne Kinsella, Dr David Meredith (Teagasc), Dr. Geraldine Murphy (Post Doc Researcher - Teagasc), Dr Daniel O'Callaghan (PhD Researcher - Teagasc/UCD), Prof. Cathal O'Donoghue (Teagasc), Dr Francis Ryan (PhD Researcher - Teagasc/UCD).

Please place one "x" below in the appropriate area on the research continuum where you feel this project fits

Basic/Fundamental	→	Applied	→	Pre Commercial		
1	2	3	4	5 X	6	7

Please specify priority area(s) of research this project relates to from the National Prioritisation Research Exercise\* (NRPE) report;

<b>Priority Area (s)</b>	Sustainable Food Production and Processing, Research for Policy
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**Key words:** dry stock cattle enterprise, farmer and enterprise heterogeneity, efficiency, competitiveness

## 1. Rationale for Undertaking the Research

The economic, social and environmental significance of cattle production is substantial. The sector accounted for the largest portion (39% or €2.68 billion) of Ireland's Gross Agricultural Output in 2016 and 20% of the total value of food and drinks exports in 2017 with a value of €2.5 billion (Bord Bia, 2018). In 2014 most farms had some form of a beef enterprise and beef and sheepmeat accounting for about 10,000 jobs across processing, distribution and transport (Meat Industry Ireland, 2015). Extensive beef production is commonly associated with farmland with a higher nature value.

There are a number of fundamental challenges to the future of this sector arising from the small scale of many farms (in the context of contemporary supply chains) and consequently, low returns from beef enterprises. Cattle farmers consistently have some of the lowest average farm incomes. Applying the Teagasc National Farm Survey classification system, the majority of beef enterprises are classified as economically sustainable or vulnerable. This is particularly true of cattle rearing farms where only 1 in 5 enterprises were classified as economically viable in 2017 (Dillon et al., 2018). In most instances, the costs of producing cattle are greater than current market returns. As a result most farm income is entirely attributable to, and therefore dependent on, direct payments (Breen and Hanrahan, 2012).

These challenges manifest themselves in relatively low levels of technology adoption, low levels of productivity and efficiency, later succession and consequently an elderly age profile of farmers with specialist cattle enterprises. Despite the significance of cattle production in Ireland and the persistence of the challenges facing the sector, socio-economic research examining the variability in the enterprises that make up the sector, their costs of production and their adoption of technology has been largely limited to the annual situation and outlook analysis produced by Teagasc (Breen and Hanrahan, 2012).

The **Profitable dry stock enterprise development: Pathways to growth (ProDSE)** project undertook multi-disciplinary socio-economic research generating new knowledge and insights. This research, by improving understanding of the structure, composition, competitiveness and extent of technology/knowledge adoption amongst beef enterprises facilitates the development of policies and services designed to enhance the functioning of Ireland's beef sector. This knowledge is particularly valuable in the context of recent developments, i.e. the decision of the UK to quit the EU and likely reductions in the EU budget allocation to fund the CAP.

## 2. Research Approach

The research approaches used in the project were multidisciplinary and included literature reviews of policy, economic and technological developments shaping the dry-stock sector. Econometric analysis was used to develop a medium term outlook for the Irish cattle sector and evaluate the impact of possible changes to agricultural policy on the

profitability of the Irish cattle sector. Further econometric analyses were applied to benchmark the competitive position and assess the impact of a number of external shocks on beef producing enterprises; estimate the efficiency and productivity of beef enterprises, evaluate the socio-economic and structural heterogeneity of beef enterprises; and assess the rate of technology adoption and participation in extension schemes by cattle farmers and measure the impact of technology and extension on farm profit.

### **3. Research Achievements/Results**

#### **Agriculture Policy**

Analysis of the 2013 CAP reform agreement (and the implementation options open to Ireland) examined the potential impact of the introduction of a coupled direct payment linked to suckler cows that would be financed from the CAP Pillar I budget. This research established that the maximum level of payment per cow would be insufficient to transform the profitability of suckler cow production.

#### **International competitiveness of Irish beef production**

Thorne *et al.* (2016) compared the costs and returns for beef production in Ireland with a number of key competitors in the EU - France, Germany and the UK. Their analysis found a lack of competitiveness, especially when land and labour opportunity costs are accounted for in total economic costs of production<sup>1</sup>. And while cost to output ratios in *all* the EU competitors assessed exceeded 100 (which is the break-even point for farm businesses and shows the financial pressure on farmers to exit the beef sector), "that market signal was stronger in Ireland than it was elsewhere" (Thorne *et al.*, 2017).

#### **Understanding Heterogeneity: Farm enterprises, efficiency and technological adoption**

The research found that a wide variety of factors are responsible for heterogeneity in Irish beef production. Research undertaken by the project further developed the National Farm Survey enterprise classification system to take greater account of differences between farms. Martinez Cillero *et al.* (2016) classified enterprises in terms of technological heterogeneity and identified three broad types of farms based on differences in genetics, feeding systems, and uptake of technology, to a focus on different stages of the beef production cycle, to differing intensity of production and the influence of diverse local environmental conditions on grass-based beef. Murphy and Meredith (2016) identified eight types based on analysis of farm structure, degree of specialisation and the extent to which farmers combine on and off economic activities.

#### **Technology Adoption**

Government policy has placed a focus on the role of knowledge and technology transfer to help improve the economic performance of cattle farms (DAFM, 2011). The Beef

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<sup>1</sup> Includes cash costs plus depreciation and opportunity costs for family labour, equity capital and owned land (Thorne *et al.*, 2017).

Technology Adoption Programme sought to address the poor technical performance and low levels of innovation on Irish beef farms by focusing on key performance areas of the cattle enterprise. An evaluation of the impacts of the BTAP programme indicates that there was no significant effect on farm performance for the period of the study in the two economic outcome indicators (O'Callaghan et al., 2016).

#### **4. Impact of the Research**

This research project has provided economic and other social science based insights into the structure and performance of the dry stock sector in Ireland and how it compares to key international competitors. New typologies of beef producing enterprises provide detailed insights into the farm structures, enterprise mixes, the socio-economic profile of farmers and the economic performance of cattle enterprises. This research has informed engagement with policy stakeholders, industry, farm advisors, farmers and the wider research community.

The 2020 Food Harvest report recommended that given the losses currently being made on beef farms "DAFF, Teagasc and the farm organisations should consider the best route to viability for the largest possible number of beef farmers" (DAFF, 2011). Given the importance of the cattle sector and the current low levels of profitability there is a need for focused research that can address the sector's competitiveness and productivity challenges. Research undertaken as part of this project addressed the issues of costs, efficiency and competitiveness, all of which are key to improving the economic performance of the sector. Furthermore, the issue of improving efficiency through technology adoption and utilisation was considered by way of evaluating the role of such innovations in supporting profitability and viability.

The research contributes to each of the objectives set out by the Department of Agriculture, Food and the Marine for its research programmes by increasing human capacity through the training of a graduate student and further development of the capabilities of a Post-Doctoral Candidate recruited to the project.

The interdisciplinary and trans-disciplinary nature of the research consolidates existing expertise through the establishment of a network of researchers, industry and policy stakeholders thereby enhancing critical mass in this research area and developing a greater understanding of the economic performance and viability of cattle enterprises in Ireland.

The project also engages directly with the challenge, outlined in SSAPRI of enhancing the returns to dry stock farmers through research identifying potential improvements in productivity and consideration of new ways of organizing production processes.

Finally, the research highlights the degree and extent of variability amongst cattle enterprises in terms of their structures and performance. The results point to the need for policy initiatives to be targeted at particular groups within the large and heterogeneous population of cattle producers in Ireland (See Table 3).

Table 3: Issues and Options for Irish cattle farmers.

Type of beef enterprise	Issues and options
<b>Low-earning bachelors selling stores</b>	<ul style="list-style-type: none"> <li>• Neither profitable nor optimising environmental/HNV farmland potential.               <ul style="list-style-type: none"> <li>◦ Highlight benefits of participation in GLAS and Locally Led Schemes</li> </ul> </li> <li>• Vulnerable to isolation and succession in question.               <ul style="list-style-type: none"> <li>◦ Target with Rural Social Scheme (RSS), SICAP or ERS<sup>2</sup>.</li> </ul> </li> <li>• Fragmentation.               <ul style="list-style-type: none"> <li>◦ Target with land mobility/swop scheme.</li> <li>◦ Highlight benefits of leasing arrangements</li> </ul> </li> </ul>
<b>Highly extensive suckler farmers</b>	<ul style="list-style-type: none"> <li>• Very vulnerable to changes in CAP where no off-farm job.               <ul style="list-style-type: none"> <li>◦ Encourage participation in Teagasc Options programme to foster interaction with the RSS and SICAP.</li> </ul> </li> <li>• High Nature Value Farmland potential.               <ul style="list-style-type: none"> <li>◦ Highlight benefits of participation in GLAS and locally led schemes</li> </ul> </li> </ul>
<b>Cattle farming enthusiasts</b>	<ul style="list-style-type: none"> <li>• Farms in ways complementary to off-farm job.               <ul style="list-style-type: none"> <li>◦ Support engagement with local and regional Education and Training Boards to support skills development.</li> </ul> </li> <li>• Less environmentally friendly               <ul style="list-style-type: none"> <li>◦ Encourage engagement with advisory services</li> <li>◦ Target advice re use of organic fertilisers and management of ecosystems through participation in GLAS or locally-led schemes.</li> </ul> </li> <li>• Fragmentation.               <ul style="list-style-type: none"> <li>◦ Target with land mobility/swop scheme.</li> <li>◦ Highlight benefits of leasing arrangements</li> </ul> </li> </ul>
<b>On- and off-farm diversifiers</b>	<ul style="list-style-type: none"> <li>• Younger, educated, efficient, professional continuing to farm in ways environmentally friendly and complementary to off-farm job.</li> </ul>

<sup>2</sup> Banovic *et al.* (2014) advised that in order to make retirement a more appealing option for low-income farmers, solutions will need to include adequate pensions, activities to replace farm work and social inclusion.

	<ul style="list-style-type: none"> <li>○ Support engagement with local and regional Education and Training Boards to support skills development.</li> <li>• This profile suggests high level of innovation. <ul style="list-style-type: none"> <li>○ Encourage engagement with farm advisory services.</li> </ul> </li> </ul>
<b>On-farm diversifiers</b>	<ul style="list-style-type: none"> <li>• Opportunistic farmers optimising production potential despite structural and resource challenges.</li> <li>• Untapped High Nature Value Farmland potential. <ul style="list-style-type: none"> <li>○ Highlight benefits and encourage participation in GLAS and locally led schemes</li> </ul> </li> </ul>
<b>Mid-earning elderly finishers</b>	<ul style="list-style-type: none"> <li>• Pathways to farm succession unclear but earnings and ongoing land investment indicate potential. <ul style="list-style-type: none"> <li>○ Encourage participation in events that include a 'planning for the future' element/theme.</li> <li>○ Target with ERS or land leasing scheme.</li> </ul> </li> </ul>
<b>Dairy farmers</b>	<ul style="list-style-type: none"> <li>• Likely to face significant challenges in the face of increasing dairy herd sizes with consequent higher demand for pasture. <ul style="list-style-type: none"> <li>○ May wish/have to exit beef production raising questions about the management of the 900,000 male calves born annually on dairy farms.</li> <li>○ Ensure key calf management strategies are implemented on dairy farms in the early stages to ensure healthy calves.</li> <li>○ Explore the potential for partnerships to rear calves to beef.</li> </ul> </li> </ul>
<b>Finishing with tillage farmers</b>	<ul style="list-style-type: none"> <li>• High climate change / environmental impacts, very vulnerable to market challenge. <ul style="list-style-type: none"> <li>○ Ensure engagement with farm advisory services to maximise returns from concentrate feeding and management of waste streams.</li> </ul> </li> </ul>

#### 4(a) Summary of Research Outcomes

##### (i) Collaborative links developed during this research

Collaborative links with researchers across the EU working in the area of dry-stock enterprises or economic modelling has been supported by this project through the funding

of travel to and participation within organised and contributed paper sessions at international conferences.

The presentation of the finding of the results has supported Teagasc involvement in European research networks focused on issues of data, farm efficiency/competitiveness/profitability, generational renewal and agricultural policy. The project's activities underpinned the leadership of a H2020 consortium RENEW 2050.

- (ii) Outcomes where new products, technologies and processes were developed and/or adopted

The typology of beef enterprises and farmers represents a new way of segmenting the dry stock sector. This enables greater understanding of the key characteristics, issues and drivers shaping sub-sectors within the population of beef enterprises and the development of targeted initiatives supporting farm level change through adoption of relevant knowledge or technologies.

- (iii) Outcomes with economic potential

Greater understanding of how a) agricultural policy affects the distribution of income within the dry-stock sector; b) the segmentation of the dry-stock sector along socio-economic, demographic and system characteristics; c) levels of technology adoption and impacts on farm efficiency and productivity should allow for better design of policy designed to support farming and the rejuvenation of Irish agriculture.

- (iv) Outcomes with national/policy/social/environmental potential

The alternative policy analysis conducted related to the implementation options available to Ireland within the CAP reform agreement that was reached between the European Council, European Parliament and European Commission in June 2013. These options were summarised by the Department of Agriculture, Food and the Marine paper published in 2013.

The nature of the agreement (involving changes to farm specific direct income support entitlement levels) was more sensibly analysed using databases and models developed in cooperation with DAFM (based on data from the SPS and AIMS databases) and the Teagasc National Farm Survey rather than FAPRI-Ireland Aggregate sector model; see O'Neill and Hanrahan (2012) and Hanrahan (2014) and Hanrahan, Hennessy and Thorne (2014) for details of the alternative policy scenarios analysed.

A total of 5 alternative policy scenarios were analysed, the design of these scenarios was guided by the DAFM publications on CAP reform and by discussions with officials of the DAFM Economics and Planning Division.

The scenarios analysed largely focused on the impact of implementing (or not implementing) coupled direct payments associated with beef cattle production. The other scenario analysed involved the implementation of redistributive payment option allowed for in the reform without any coupled direct payments.

The issues and options matrix (See Table 3) has been discussed with a number of specialist beef advisors and farmers to explore whether this could be developed into an effective planning tool supporting different types of cattle producer / beef enterprises with targeted advice.

#### **4 (b) Summary of Research Outputs**

- (i) Peer-reviewed publications, International Journal/Book chapters.

Martinez Cillero, M., Thorne, F., Wallace, M., Breen, J. and Hennessy, T., 2018. The Effects of Direct Payments on Technical Efficiency of Irish Beef Farms: A Stochastic Frontier Analysis. *Journal of Agricultural Economics*, 69(3), pp.669-687.

Martinez Cillero, M., Thorne, F., Wallace, M. and Breen, J., 2018. Technology heterogeneity and policy change in farm-level efficiency analysis: an application to the Irish beef sector. *European Review of Agricultural Economics*. 46(2), pp.193-214.  
<https://doi.org/10.1093/erae/jby028>

Meredith, D. and Crowley, C. 2017. Continuity and Change: the geodemographic structure of Ireland's population of farmers. *Irish Geography*, 50(2), 111-136,  
<https://doi.org/10.2014/igj.v50i2.1318>

- (ii) Popular non-scientific publications and abstracts including those presented at conferences

Martinez Cillero, M., Breen, J., Thorne, F., Wallace, M. and Hennessy, T., 2016, April. Technical efficiency and technology heterogeneity of beef farms: a latent class stochastic frontier approach. In 90th Annual Conference, April 4-6, 2016, Warwick University, Coventry, UK (No. 236351). Agricultural Economics Society.

Meredith, D. 2016. The ProDSE Project: An introduction and overview. Presentation at a Special Session of the AESI Annual conference, January 7<sup>th</sup> 2016 - National Botanic Gardens.

Meredith, D. and Murphy, G. 2016. Creating a typology of beef producers using a Latent Class Cluster model. Presentation to the AESI Annual Conference, January 7<sup>th</sup> 2016 - National Botanic Gardens.

O'Callaghan, D., Hennessy, T. and Breen, J., 2016, April. Factors Associated with Extension Programme Participation: The case of discussion groups for Irish cattle farmers. In *90th Annual Conference, April 4-6, 2016, Warwick University, Coventry, UK* (No. 236329). Agricultural Economics Society.

O'Callaghan, D., Hennessy, T. and Breen, J., 2017, April. An Investigation of Conditional Cash Payments in Agricultural Extension: Evidence from Beef Discussion Groups in Ireland. In *91st Annual Conference, April 24-26, 2017, Royal Dublin Society, Dublin, Ireland* (No. 258651). Agricultural Economics Society.

Martinez-Cillero, M., Breen, J., Thorne, F., Hennessy, T and Wallace, M. 2015 Addressing technical efficiency and technology heterogeneity in the Irish cattle sector: Exploring the effects of the Single Farm Payment on different cattle farm types. Paper presented to the 4th European Workshop on Efficiency and Productivity Analysis (Helsinki). 15 - 18 June 2015.

O'Callaghan, D. J., Breen, J., Renwick, A., Li, C., Hennessy, T. & Thorne, F. 2015. An economic evaluation of discussion groups for cattle farmers in Ireland: Quantifying the returns using an endogenous switching regression model. 6th EAAE Workshop, Rome.

O'Callaghan, D. J., Breen, & Thorne, F. 2015. Farmer discussion groups: Impacts on efficiency, productivity and profitability. Agricultural Economics Society Annual Conference, University of Warwick, 13 - 15<sup>th</sup> April 2015.

Hanrahan, K (2014a) "CAP 2014: Analysis using Administrative Data" Paper presented at the Joint AESI/Teagasc Seminar *CAP 2014: Impetus, Impact and Implementation*, Teagasc Ashtown, Dublin. March 2014. <http://www.aesi.ie/aesi2014/khanrahan.pdf>

Hanrahan, K., T. Hennessy and F. Thorne (2014) "CAP Reform Outcome: Teagasc National Farm Survey Analysis" Paper presented at the Joint AESI/Teagasc Seminar *CAP 2014: Impetus, Impact and Implementation*, Teagasc Ashtown, Dublin. March 2014. <http://www.aesi.ie/aesi2014/fthorne.pdf>

A summary article relating to the ProDSE Project entitled "Sustainable Beef Production" with Project Coordinator Dr David Meredith was published in the Summer issue of TRResearch  
<https://www.teagasc.ie/media/website/publications/2016/TRResearch-Summer-2016.pdf>

A summary of the project and research results targeting farmers was published in Today's Farm (September/October 2016).  
<https://www.teagasc.ie/media/website/publications/2016/TF-Sept-Oct.pdf>

(iii) National Report

Hanrahan, K (2014b) "Impact of beef production in the Irish economy" Chapter in *Beef 2014: The Business of Cattle*, O'Keily, P., McGee M. and A. Moloney (eds.). Available to download at [http://www.teagasc.ie/publications/2014/3205/BEEF2014\\_web.pdf](http://www.teagasc.ie/publications/2014/3205/BEEF2014_web.pdf)

Murphy, G. and Meredith, D. 2014. "Types of cattle farms" Chapter in *Beef 2014: The Business of Cattle*, O'Keily, P., McGee M. and A. Moloney (eds.). Available to download at [http://www.teagasc.ie/publications/2014/3205/BEEF2014\\_web.pdf](http://www.teagasc.ie/publications/2014/3205/BEEF2014_web.pdf)

Meredith, D., Hanrahan, K., Ryan, F. and Murphy, G. "Improving our understanding of cattle enterprises in Ireland" Chapter in *Beef2016 Profitable Technologies*, McGee M. and Crosson, P. (eds.). Available to download at: <https://www.teagasc.ie/media/website/publications/2016/Teagasc-Grange-2016.pdf>

(iv) Workshops/seminars at which results were presented

Breen, J. (2015) Efficiency and profitability of the drystock sector in Ireland, an overview. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

Hanrahan, K. (2015) Contemporary and potential drivers of change and their implications for dry stock sector market. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

Martinez-Cillero, M., Thorne, F. and Breen, J. (2015) An examination of technical, allocative and economic efficiency in Irish cattle production. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

Murphy, G. (2015) A typology of dry stock enterprises. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

Murphy, G., Meredith, D. (2015) The development of a typology for Irish cattle farm households: a latent class cluster model approach. Presentation to the Post Doc researcher forum. Athenry 28<sup>th</sup> October 2014.

Thorne, F., Murphy, G., Hanrahan, K. and Kinsella, A. (2015) Assessing the international competitiveness of the Irish beef sector. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

Ryan, F., Breen, J., Thorne, F. and Hennessy, T (2015) An Examination of the Variability of Production Costs in the Irish Cattle Sector. Presentation to the ProDSE Stakeholders Group, University College Dublin, 20<sup>th</sup> July 2015.

(v) Intellectual Property applications/licences/patents

N.A.

(vi) Other

N.A.

## 5. Scientists trained by Project

Total Number of PhD theses: 0\*

Total Number of Masters theses: 0

\*The student recruited to undertake the research was awarded a leave of absence on compassionate grounds (his father became very ill and unfortunately passed away, leaving the student to take up the running of the family farm). The student has not returned to the research.

## 6. Permanent Researchers

Institution Name	Number of Permanent staff contributing to project	Total Time contribution (person years)
Teagasc	6	0.949
UCD	1	0.23
<b>Total</b>	<b>7</b>	<b>1.179</b>

## 7. Researchers Funded by DAFM

Type of Researcher	Number	Total Time contribution (person years)
Post Doctorates/Contract Researchers	1	1.62
PhD students	1	2.5
Masters students	0	0
Temporary researchers	0	0
Other	0	0
<b>Total</b>	<b>2</b>	<b>2.62</b>

## 8. Involvement in Agri Food Graduate Development Programme

Name of Postgraduate / contract researcher	Names and Dates of modules attended
Dr. Geraldine Murphy	2014 Induction Programme 2014 Project Management 2014 Science Writing and Presenting Skills for the Agri-Food Researcher 2014 Media & Communication skills 2014 Innovation and Creative thinking 2014 Career Planning & Development 2015 Writing Successful Grant Applications 2015 Leadership

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## 9. Project Expenditure

Total expenditure of the project:	€159,278.14
Total Award by DAFM:	€186,414.15
Other sources of funding including benefit in kind and/or cash contribution(specify):	€0

### Breakdown of Total Expenditure

Category	Teagasc	UCD	Total
Contract staff	0		0
Temporary staff	0		0
Post doctorates	71,452.92		71,452.92
Post graduates	0	35,333.26	35,333.26
Consumables	0		
Travel and subsistence	11,424.12	3,815.01	14,709.13
<b>Sub total</b>	<b>82877.04</b>	<b>39148.27</b>	<b>121,495.13</b>
Durable equipment	177.83		
Other	24.56		
Sub-contracting	7,206.61		
Overheads	20,744.26	9,629.57	30,373.83
<b>Total</b>	<b>111,130.30</b>	<b>48,147.84</b>	<b>159,278.14</b>

### 10. Leveraging

Two additional PhD students were funded, €176,000, through the Teagasc Walsh Fellowship Scheme to undertake research on enterprise efficiency and technology adoption arising from participation in Beef Discussion Groups.

### 11. Future Strategies

The permanent Teagasc staff involved in the project have continued to work in this research area via their involvement in the annual Review and Outlook series and engaging in analyses of the potential impacts of BREXIT for the beef sector.

The project leader (Dr David Meredith) lead the RENEW 2050 H2020 Consortium, and drew on this research to inform the development of the project concept and the project team.

**12. Consent to Publish Final Report on the DAFM Website and/or Through Other Dissemination channels**

I consent to this report being made available to the public, through the Department's website and other dissemination channels.

Yes  No

**13. Declaration**

I declare that the information contained in this final report is complete and true to the best of my knowledge and belief.



Signed: \_\_\_\_\_ Project Coordinator

Date: 15/02/2019

## **Selected References**

Bord Bia. (2018) *Meat-and-Livestock-Review-and-Outlook-2015-2016*. Bord Bia, Dublin.

Breen J. and Hanrahan K. (2012) "Situation and Outlook for Cattle 2011/2012" In *Outlook 2012: Economic Prospects for Agriculture*. Teagasc Oak Park.

Dillon, E., Moran, B., Lennon, J. and Donnellan, T. (2018) *Teagasc National Farm Survey 2017 Results*. Teagasc, Athenry.

DAFM (2011) *Food Harvest 2020*. Department of Agriculture, Food and the Marine, Dublin.

Hanrahan, K (2014) "CAP 2014: Analysis using Administrative Data" Paper presented at the Joint AESI/Teagasc Seminar *CAP 2014: Impetus, Impact and Implementation*, Teagasc Ashtown, Dublin. March 2014. <http://www.aesi.ie/aesi2014/khanrahan.pdf>

Hanrahan, K., T. Hennessy and F. Thorne (2014) "CAP Reform Outcome: Teagasc National Farm Survey Analysis" Paper presented at the Joint AESI/Teagasc Seminar *CAP 2014: Impetus, Impact and Implementation*, Teagasc Ashtown, Dublin. March 2014. <http://www.aesi.ie/aesi2014/fthorne.pdf>

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Meat Industry Ireland, 2016. *Irish Beef Sector - Delivering Growth*. IBEC, Dublin.

Meredith, D. and Murphy, G. 2016. *Creating a typology of beef producers using a Latent Class Cluster model*. Presentation to the AESI Annual Conference, January 7<sup>th</sup> 2016 - National Botanic Gardens.

O'Callaghan, D., Hennessy, T. and Breen, J., 2016, April. *Factors Associated with Extension Programme Participation: The case of discussion groups for Irish cattle farmers*. In *90th Annual Conference, April 4-6, 2016, Warwick University, Coventry, UK (No. 236329)*. Agricultural Economics Society.

O'Neill S. and Hanrahan K (2012) "Decoupling of agricultural support payments: the impact on land market participation decisions" *European Review of Agricultural Economics*, 39(4) 639-659.

Thorne, F., Hennessy, T., Donnellan, T., and Kinsella, A. (2016) *The relative competitiveness of Irish agriculture. End of Project Report*, Teagasc, Athenry. <https://www.teagasc.ie/media/website/publications/2016/6107-Competitiveness-of-Irish-Agriculture.pdf>

Thorne, F., Gillespie, P.R., Donnellan, T., Hanrahan, K., Kinsella, A. and Läpple, D. (2017) *The Competitiveness of Irish Agriculture*. Teagasc, Athenry.