

## Organically Farmed vs Locally Produced: Revolution and Reality

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The green organic food revolution is emerging in Ireland out of growing concern for environmental and social issues. In its efforts towards a sustainable food and farming system the Irish government have made a commitment to organic producers and growers to support the organic sector under Harvest 2020 (DAFF, 2010). The Irish government have set a target of 5% of agricultural land under organic production by 2020. Teagasc and Bord Bia have been heavily involved in promoting and developing export markets for the Irish organic sector. Multiple retailers as well as discounters have thrown their weight behind the organic revolution too by endorsing the 'buy local' and organic movement, to differentiate themselves from competitors. Restaurateurs, chefs and owners play an important role in promoting the use of organic foods and supporting the producers. Individual chefs will form a part of a producers sales, ie, Darina Allen of Ballymaloe, Enda McEvoy of Loam and J.P McMahon of Aniar.

Organic agriculture is characterized as a system of farming, which focuses on the use of renewable resources and preservation of the environment, but avoids or largely excludes the use of synthetically-produced chemicals or fertilizers, herbicides, insecticides, fungicides, or any other pesticides, growth hormones or growth regulators (Codex Alimentarius Commission, 2001). In order to sell organic produce in Ireland, it must be certified as such. Multiple retailers currently dominate the organic retail sector accounting for seventy-five percent of the 99.1 million euro market value (Bord Bia, 2016a). Seventy percent of organic produce on shop floors of the Irish retail market is imported (Western Development Commission, 2016). Despite the well-publicised benefits of organic produce, Irish retail sales dropped slightly from 104 million euro in 2010 to 99.1 million euro market value in 2014 (Bord Bia, 2016a). This could be attributable to the fact that is organic revolution is considered elitist and is only a lifestyle choice for those you can afford it (Alexander, 2014).

Roger Cohen (2012) echoes Alexander's sentiments in a scathing attack on the organic revolution.

Organic has long since become an ideology, the romantic back to nature obsession of an upper middle class able to afford it and oblivious, in their affluent narcissism to the challenges of feeding the planet whose population will surge to 9 billion before the end of the century and whose poor will get a lot more nutrients from two regular carrots they can buy for the price of one carrot. (Cohen, 2012).

Organic food is a major trend and it is also a multi-million euro business. Advertisers would have Irish consumers believe organic produce comes from idyllic small farms, from rugged farmers using traditional farming methods (Levitt, 2016). However for the most part this is far from the truth. Lund et al. (2013) have coined the term 'conventionalisation' of the organic food market, as a result of organic produce becoming part of the globalisation process when demand increased and could not be met by national supply alone. Local food has gained attention as an alternative to the current globalised food system. It is, by contrast, an opposition trend, leading to more proximity in food production and local food should be consumed as close to the point of origin as possible (Hempel and Hamm, 2016). Local food, reflects a desire to bypass conventional agriculture and return to small scale production, while growing a connection with land and its producers through concern for provenance for the food that is eaten (Ricketts-Hein et al., 2006). Bord Bia (2015b) reported seventy percent of Irish consumers believe buying local is important, while fifty percent admit to purchasing local produce at least once a week. This move towards shortening the food supply chain challenges the notion of the imported organic produce on the supermarket shelves. The rationale behind shortening the supply chain for food produce relates to the concept of food miles (Seyfang, 2008). By doing this, the distance food travels between being produced and consumed is significantly shortened, and thereby, one might expect a reduction in energy and pollution associated with transporting food around the world. In a study conducted by Bord Bia (2015b), sixty percent of Irish consumers were aware of the term food miles, yet only 11% of those people surveyed believed it maybe be an indicator for environmental impact. Yet in a study conducted by Nielsen (2007), 7 in 10 people surveyed believe local food to be of a higher quality, feel more confident in the safety of locally produced food and know the source of their food.

It is clearly evident that there are two significant trends emerging here, an increased demand for local produce and an increased availability of organic. This paper examines the motivations and values that Irish consumers may hold around the ideas of organic and local food.

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### Availability

Organic products are increasingly been sold through mainstream distribution channels in the retail sector (Tobin et al., 2011). The following list shows multiples

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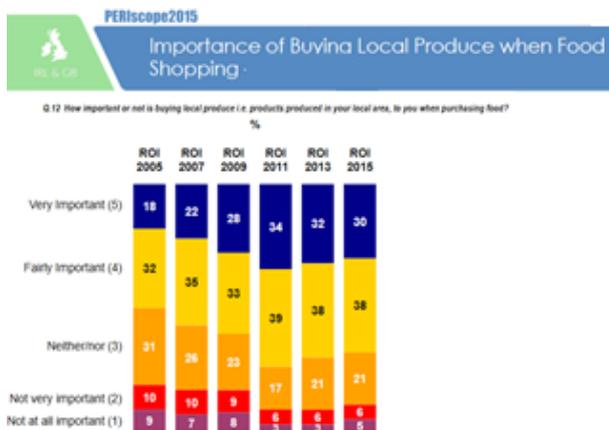


Fig. 1: Importance of buying local produce when food shopping (Adapted from Bord Bia, 2015b)

accounted for seventy-five percent of the 99.1 million euro market value, discounters eight percent and independents two percent (Bord Bia, 2015a).

- Multiple Retail accounts for €74million
- Discounters accounts for €13.9 million
- Symbols account for €7.9 million
- Independents account for €2 million

Several of Ireland's supermarket chains have endorsed the 'buy local' and organic movement, and have introduced initiatives to differentiate themselves from competitors using the food miles issue to promote their stores as environmentally friendly. Supervalu announced almost seventy-five percent of the products sold on their shelves are either produced or sourced in Ireland (Supervalu, 2016). Lidl ran an advertising campaign for their locally sourced produce (Lidl, 2015). While, Tesco Homegrown project aspires to support Irish local suppliers and producers, Tesco also label produce that has been air-freighted (Tesco, 2016). Despite retailers support and pledges to organic producers, only fifty-four percent of Irish consumers claim to have ever bought organic food (Bord Bia, 2015b). Having said that, this has grown from thirty percent in 2003. In the same study, it has shown Irish consumers are visiting supermarkets on average 3.4 times per fortnight, local butchers 2.3 times per fortnight (20% more frequently than in 2014), local fruit and vegetable shops 2.1 per fortnight, farmers markets 1.7 times per fortnight (20% more frequently than in 2014) and gourmet shops 1.7 times per fortnight. It is believed that increased sales may not be due to attitudinal changes amongst consumers regarding the benefits of organic consumption but rather reflects changes in increased availability of a differentiated range of products in a wider range of outlets (Lund et al., 2013; Coley et al., 2009). As with previous years, vegetables and fruit remains two of the most commonly purchased types of organic food, while yoghurt and poultry continue to be popular organic items.

In a study conducted by Bord Bia (2015b), it was documented that seventy percent of Irish consumers surveyed believe that buying local is important, which is a 18% increase since 2005 (Fig. 1) Furthermore, it has been mentioned that since 2010, there has been a 5% increase in for those who look for Irish products and a 7% increase for those who choose local products (Bord Bia, 2014).

### Price

Perceived expense is a particularly important factor for determining consumer acceptability and merchantability of organic produce in Ireland. Despite the fact that monthly disposable income may have increased by fifty euro in 2014, almost half a million adults have nothing left once all bills are paid (Pope, 2014). Irish consumers are as concerned now about how much they spend on grocery shopping as they were in 2010 (Bord Bia, 2014). Consumers who were content paying premium prices of up to 25% for food because it was organic are now finding price differences of more than 10% too expensive (Pope, 2009). Similarly, in Europe, several authors have indicated that price is a significant deterrent and dominant barrier for consumers to purchasing organic food (Padel and Foster, 2005; Roitner-Schobesberger et al., 2008). Commonly organically farmed foods in Ireland sell for higher prices than local or conventionally produced foods and this may be explained by higher production and transportation costs, as well as lower yields associated with organic agriculture (Gopinath et al., 2009). In a study conducted by Sirieix et al. (2011), it was found local food was not expected to be as expensive as organic produce, nor more expensive than conventional food. This would suggest that the trade-off between quality indicators, moral beliefs and perceived expense which all strongly affect organic food choices could be less pertinent for local food. Furthermore, most comparative studies relating to consumer's willingness to pay (WTP) for organic and local food also reveal stronger preferences for locally produced food (Costanigro et al., 2011; Wirth et al., 2011; Onken et al., 2011). In support for local foods chef patron Raymond Blanc of Michelin starred Le Manoir aux Quat'Saisons is reported to have said organic food is both elitist and expensive, while applauding McDonalds for supporting British farmers incorporating free-range eggs, pork and beef on their menus in England (Alexander, 2014).

Bord Bia (2014) documented there has been a five percent increase in the number of consumers who look for Irish products, and a seven percent increase for those who choose local products since 2010. While, it has been documented there has been a slight reduction in organic purchasing behaviour since 2011 (Bord Bia, 2015b). Interestingly, in the same study it was shown that 55% of Irish consumers have never purchased organic produce. Against an economic backdrop where price remains a primary concern, the propensity to buy Irish and local where possible remains high (Bord Bia, 2015a).



Fig. 2: Logos to identify certifiable organic and sustainable food products

### Labelling

In Ireland, organic labelling must include the code number of the inspection authority or the body to which the operator is subject, the producers name, address and/or license number, the appropriate organic logo (Fig. 2) and/or the name of the relevant certifying body and the words certified organic (Gilsenan, 2010).

In addition to certifiable organic labelling, a variety of environmental and sustainable labels appear on products in Irish supermarkets. In terms of sustainable seafood, the most recognisable environmentally friendly labels on food packaging is the Marine Stewardship Council (MSC, 2016) and Friends of the Sea (Friends of the Sea, 2016). The Fairtrade logo is recognised as leading social and sustainable quality mark. When a food product carries the fairtrade logo, its certification ensures that all ingredients that can be sourced as fairtrade are fairtrade. A carbon or water footprint label informs the customer of the total sum of the green house gas emissions (CO<sub>2</sub>e) or water used throughout the product's lifestyle from manufacture to consumer use and disposal.

According to Bord Bia (2015b), 60% of Irish consumers claim to be environmentally conscious, yet only 42% of the individuals surveyed recognised the term 'sustainable produce'. Although organically produced food is labelled with national and/or international organic certification logos, there are no common regulations or standards for local food in Ireland, and by consequence, it is more difficult to correctly identify local food than it is to identify organic food. In the same study, it was reported under a third of all consumers surveyed always check for symbols of quality on Irish producers. Ergönül and Ergönül (2015) believe most consumers are not familiar with legal organic certification logos which are placed on packages of organic food. While, Hempel and Hamm (2016) believe that consumers do not necessarily rely in labels in the purchase decision, either because they don't trust them, or because they don't know the standards behind them and they are confused by the multitudes of labels.

### Food miles

The food miles concept is based on the premise that the further food travels between farm and plate the greater its negative environmental impact must be (Seyfang, 2008). Bord Bia (2015b), reported sixty percent of Irish consumers claim to have heard the term 'food miles' (Fig. 3). Since 70%

of organic produce on the Irish retail market is imported (Western Development Commission, 2016), it's not surprising the topic has gained significant attention. In the advent

of global warming, environmental awareness emerges as a key factor for consumers, while many retailers are choosing to capitalise on this opportunity (Chen 2010). In a study conducted by Bord Bia (2015b), it was reported that 43% of Irish consumers sometimes check for country of origin, while, less than 33% always check. Kemp et al. (2010) indicate that country of origin is well down the list of considerations that motivate consumers when purchasing food in the supermarket. In the same study, of those surveyed 19.3% stated that they wouldn't buy produce from outside their country origin due to the contentious issue of food miles. Despite the fact, the majority of organic produce on the Irish market is imported, intuitively, one might imagine local food has a lower carbon footprint, but that may not always be the case. Food miles have been linked to carbon accounting, it was reported that sea transport accounts for only 12% of CO<sub>2</sub> emissions arising from food transport into the UK, compared to 72% of CO<sub>2</sub> emissions attributable to road transport within the UK (DEFRA, 2005). DEFRA also point out that air transport has a very high climate change impact per tonne whereas sea transport is relatively efficient. To put this into context for the Irish consumer, if a customer drives a round trip distance of more than 7.4km in order to purchase their organic vegetables, their carbon emissions are likely to be greater than the emissions from the system of cold storage, packaging, transport to a regional hub and final transport to a customer's doorstep used by large scale vegetable box suppliers (Coley et al., 2009). Furthermore, Carlsson-Kanyama (1998) stated that it would be better for Swedish

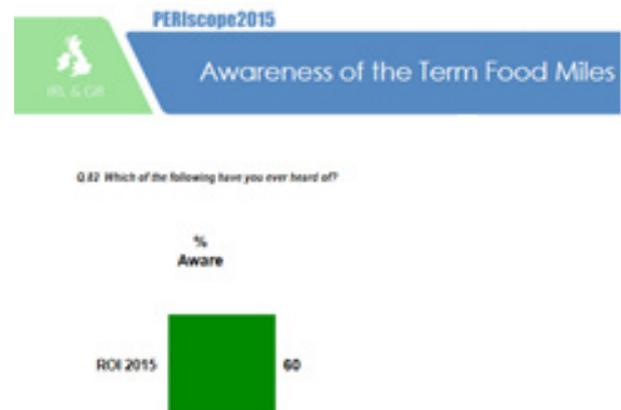


Fig. 3: Irish consumer's awareness of food miles (Adapted from Bord Bia, 2015)

retailers to source Spanish tomatoes than Swedish tomatoes, because the Spanish tomatoes were grown in open fields, whereas the local produce were grown in fossil fuelled heated greenhouses, creating greater carbon emissions outputs. It is clearly evident that carbon emissions, are dependent on a number of factors such as method of production, method of transportation, storage, time of year etc.

Nonetheless, this would suggest that in relation to CO<sub>2</sub> emissions and the negative impact of food miles some ideas behind the promotion of localism in the food sector will to be reconsidered. Purchasing the most geographically local produce does not necessarily mean the lowest carbon impact (Coley et al., 2009).

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### Taste properties

There is a growing volume of literature comparing the sensory quality of Irish organic and conventional produce.

Gilsenan et al. (2011) showed that in a comparative study of the physicochemical properties and sensory components of Irish grown organic and conventional cherry-vine tomatoes (cv. Amoroso), the preference was for the conventional tomatoes. The preference for the conventional cherry-vine tomatoes was influenced by sugar content and sweetness. Consumer sensory evaluations of Irish organic and conventional potatoes (cv. Orla) revealed no significant differences were evident for the sensory acceptability attributes of appearance, aroma, texture and taste (Gilsenan et al., 2010). Similarly, no sensory significant differences were apparent between the Irish grown organic and conventional carrots (cv. Nairobi) for the sensory parameters tested (Gilsenan, 2010). From a market-orientated perspective, Tobin et al. (2013) found no statistically significant differences between the properties of a range of organic and conventional fruit and vegetables available to the Irish consumer. Admittedly, in the latter study, the focus was on a comparison of organic and conventional vegetables available to the Irish consumer, and the vegetables were sourced mostly in retail outlets. Differences in basic environmental factors affecting plant development, crop nutrition, pest control, crop varieties grown, crop maturity, harvest dates, and post-harvest practices may have contributed to variability in results had these conditions been controlled. Nonetheless, market-orientated studies, do however, reflect the quality of products in commercial outlets and are therefore more applicable to the consumer.

This proves to be most interesting because research studies have shown that Irish consumers perceive organic food to be tastier than conventional produce and they are willing to pay price premiums to obtain it.

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### Safety

One of the main drivers of organic vegetables is the differentiation between organic and conventional

vegetables with respect to pesticide use and perceived pesticide residues. Bord Bia (2008b) stated that 73% of organic consumers purchase organic produce as they believe that it is free from chemicals and pesticides. Such limitations in available pesticides and the restrictions on their use should result in fewer pesticide residues in organic crops relative to conventional crops (Winter and Davies, 2006). However, it is important to note that pesticide residue levels authorised in conventional farming are very low, and are most often below the minimum detection limits (Magkos et al., 2006).

According to Gibney (2012)

We have NGO's on organic food, on anti GM and on food miles, all of whom exert a significant impact on the media and on the thinking of both consumers and policy makers. Regrettably, the scientific reality is rarely presented to consumers. We find that the top 2.5% of any crop will have pesticide intakes of between 0.1 and 10% of the safe exposure dose established by the WHO, thus there is zero public health risk from pesticide.

The Department of Agriculture, Fisheries and Foods (DAFF) through its Pesticide Control Service (PSC), monitor pesticide residues in vegetables in Ireland to ensure consumers are not exposed to unacceptable pesticide residue levels. When pesticides are used in good agricultural practices, unacceptable levels of pesticides should not occur in treated vegetables (Department of Agriculture Fisheries and Food, 2008).

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### Conclusion

There is slight shift away from the green organic revolution and this could be attributable to the conventionalisation of organic agriculture, as well as the Irish consumer's desire for greater consumption of fresh produce. Admittedly, there is a growing interest in 'localness' as a desirable trait of foods. It was found local food was not expected to be as expensive as organic produce, nor more expensive than conventional food. This would suggest that the trade-off between quality indicators, moral beliefs and perceived expense which all strongly affect organic food choices could be less pertinent for local food. The concept of food miles has undoubtedly served as an important ideological and political role in highlighting the importance of carbon foot-prints on the system. Nonetheless, the food miles argument has not had a great influence on Irish consumers. In an effort at becoming more visible on supermarket shelves, Irish consumers are bombarded with a multitude of labels on packages, some of which they are unfamiliar with or don't trust because they don't recognise them. Finally, there is no conclusive evidence about the taste or safety benefits of choosing organic over local conventional produce. The organic revolution is not delivering on what it is promising.

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## Works cited

- Alexander, E. (2014) Raymond Blanc: Organic food is elitist says chef (who is surprisingly positive about McDonalds: [online], available: <http://www.independent.co.uk/news/people/raymond-blanc-forget-organic-food-mcdonalds-is-the-way-forward-9646545.html> [accessed 18 March 2016].
- Bord Bia (2015a) Organic Irish Market Performance: [online], available: <http://www.bordbia.vantage.ie/market-information/sector-overviews/organic-market/> [accessed 30 January 2016].
- Bord Bia (2015b) Irish and British consumers and their food: [online], available: <http://www.bordbia.ie/industry/manufacturers/insight/publications/bbreports/PERIScope6/Pages/PERIScope2015.aspx> [accessed 30 January 2016].
- Bord Bia (2014) The Irish organic consumer: A qualitative and quantitative research study [online], available at <http://www.bordbia.ie/industry/events/SpeakerPresentations/2014/OrganicDebriefJuly2014/The%20Irish%20Organic%20Consumer%20-%20Tarik%20Laher,%20IPSOS.pdf> [accessed 30 January 2016].
- Bord Bia. (2008b). Ethics, Emotions and Organic Food. Dublin: Bord Bia. Available: <http://www.bordbia.ie/aboutus/publications/Documents/Organic%20Consumer%20Research%202008%20-%20Ethics,%20Emotions%20and%20Organic%20Food.pdf> Accessed 22 April 2016).
- Carlsson-Kanyama, A. (1998) Climate change and dietary choices-how can emissions from greenhouse gases from food consumption be reduced? *Food Policy*, 23(3-4), 277-293.
- Chen, Y.S. (2010) 'The drivers of green brand equity: Green image, green satisfaction and green trust', *Journal of Business Ethics*, 93, 307-319.
- Codex Alimentarius Commission. (2001) Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Food. Rome: Joint Food and Agriculture Organisation/World Health Organisation.
- Coley, D., Howard, M. and Winter, M. (2009) 'Local food, food miles and carbon emissions: A comparison of farm shops and mass distribution approaches', *Food Policy*, 150-155.
- Costanigro, M., Kroll, S., McFadden, D.T and Nurse, G. (2011) 'In-store valuation of local and organic apples: The role of social desirability', *Agribusiness*, 27(4), 465-477.
- DAFF (2010) Food Harvest 2020: A vision for Irish agri-food and fisheries [online], available: <https://www.agriculture.gov.ie/media/migration/agri-foodindustry/foodharvest2020/2020FoodHarvestEng240810.pdf> [accessed 30 January 2016].
- Department of Agriculture Fisheries and Food (2008). Pesticide residues in food, 2006. Available: <http://www.pcs.agriculture.gov.ie/Docs/PesticidesReport2006.pdf> (Accessed 20 April, 2016).
- DEFRA (2005) Organic statistic UK. London: DEFRA
- Cohen, R. (2012) The organic fable [online], available: [http://www.nytimes.com/2012/09/07/opinion/roger-cohen-the-organic-fable.html?hp=&adxnnl=1&adxnnlx=1347044654-LY0UvCCm8oxA6GTD15Sq0Q&\\_r=0](http://www.nytimes.com/2012/09/07/opinion/roger-cohen-the-organic-fable.html?hp=&adxnnl=1&adxnnlx=1347044654-LY0UvCCm8oxA6GTD15Sq0Q&_r=0) [accessed 18 March 2016].
- Ergönül, B. and Ergönül, P.G (2015) 'Consumer motivation for organic food consumption', *Emirates Journal of Food and Agriculture*, 27 (5), 416-422.
- Friend of the Sea (2016) Friend of the sea: Sustainable seafood [online], available: <http://www.friendofthesea.org/> [accessed 18 March 2016].
- Gibney, M. (2012). No scientific evidence showing organic is better. [online], available: <http://www.irishtimes.com/opinion/no-scientific-evidence-showing-organic-is-better-1.529731> [accessed 18 March 2016].
- Gilsenan, C., Burke, R.M. and Barry-Ryan, C. (2011) 'Do organic cherry-vine tomatoes taste better than conventional cherry vine tomatoes? A sensory and instrumental comparative study from Ireland', *Journal of Culinary Science and Technology*, 10(2), 154-167.
- Gilsenan, C. (2010) An investigation into the factors influencing the sensory properties of selected Irish grown organic and conventional vegetables. PhD Thesis, Dublin Institute of Technology.
- Gilsenan, C., Burke, R.M. and Barry-Ryan, C. (2010) 'A study of the physicochemical and sensory properties of organic and conventional potatoes (*Solanum tuberosum*) before and after baking', *International Journal of Food Science and Technology*, 45(3), 475-481.
- Gopinath, K.A., Supradip, S., Mina, B.L., Pande, H., Srivastva, A.K. and Gupta, H.S. (2009). 'Bell pepper yield and soil properties during conversion from conventional to organic production in Indian Himalayas', *Scientia Horticulturae*, 122, 339-345.
- Hempel, C. and Hamm, U. (2016) 'How important is local food to the organic minded consumers', *Appetite*, 309-318.
- Levitt, T. (2016) Tesco's fictional farms: A marketing strategy past its sell-by date [online], available: <http://www.theguardian.com/lifeandstyle/wordofmouth/2016/mar/22/tescos-fictional-farms-a-marketing-strategy-past-its-sell-by-date> [accessed 22 March 2016].
- Lidl (2015) Dig in for local [online], available: <https://www.youtube.com/watch?v=xVq7Arntyjw&index=14&list=PLW2bgVWXEsh8aNcpEjoAkm4dBnL3ESg6Q> [accessed 18 March 2016].
- Lund, T.B., Andersen, L.M. and O'Doherty Jensen, K. (2013) 'The emergence of diverse organic consumers: Does a mature market undermine the search for alternative products?', *Sociologia Ruralis*, 54(4), 454-478.
- Kemp, K., Insch, A., Holdsworth, D.K. and Knight, J.G. (2010) 'Food miles: Do U.K consumers actually care', *Food Policy*, 35(6), 504-513.

- Magkos, F., Arvaniti, F. and Zampelas, A. (2006). Organic food: Buying more safety or just peace of mind? A critical review of the literature. *Critical Reviews in Food Science and Nutrition*, 46, 23-56.
- Marine Stewardship Council (2016) Marine Stewardship Council. Certified sustainable seafood [online], available: <https://www.msc.org/> [accessed 30 January 2016].
- Neilsen (2007) Consumers, retailers and the organic market [online], available: <http://www.bordbia.ie/industry/events/SpeakerPresentations/2008/nofc2008SpeakerPresentations/AC%20NIELSEN%20-%20Consumers,%20Retailers%20and%20the%20Organic%20market.pdf> [accessed 30 January 2016].
- Onken, K.A., Bernard, J.C. and Pesek, J.D. (2011). 'Comparing willingness to pay for organic, natural, locally grown and state marketing promoted foods in the Mid-Atlantic Region', *Agricultural and Resource Economics Review*, 40(1), 33-47.
- Padel, S. and Foster, C. (2005). 'Exploring the gap between attitudes and behaviour: Understanding why consumers buy or do not buy organic food', *British Food Journal*, 107 (8), 606-625.
- Pope, C. (2009). Is organic worth it? *The Irish Times*, 14 September, p15.
- Pope, C. (2014). Monthly disposable income increased by €50 in December. [online], available: <http://www.irishtimes.com/news/consumer/monthly-disposable-income-increased-by-50-in-december-1.1662248> [accessed 30 January 2016].
- Ricketts-Hein, J., Ilberry, B. and Kneafsey, M. (2006) 'Distribution of local food activity in England and Wales: An index of food relocalisation', *Regional Studies*, 40(3), 289-301.
- Roitner-Schobesberger, B., Darnhofer, I., Somsook, S. and Vogl, C.R. (2008). 'Consumer perceptions of organic foods in Bangkok, Thailand'. *Food Policy*, 33, 112-121.
- Sheehy, J. (2013). Organic sector still on the fringes. [online], available: <http://www.irishexaminer.com/farming/dairy/organic-sector-is-still-on-the-fringes-242002.html> [accessed 18 March 2016].
- Seyfang, G. (2008) 'Avoiding Asda? Exploring consumer motivations in local organic food networks', *Local Environment*, 13(3), 187-201.
- Sirieix, L., Kledal, P.R. and Sulitang, T. (2011) 'Organic food consumer trade-offs between local or imported, conventional or organic products: A qualitative study in Shanghai', *International Journal of Consumer Studies*, 35(6), 670-678.
- Supervalu (2016) Supporting Ireland [online], available: <https://supervalu.ie/about/supporting-ireland> [accessed 18 March 2016].
- Tesco (2016) Tesco Homegrown [online], available: <http://www.tesco.ie/homegrown/> [accessed 18 March 2016].
- Tobin, R., Larkin, T. and Moane, S. (2011) 'The Irish organic food market: Shortfalls, opportunities and the need for research', *Journal of the Science of Food and Agriculture*, 91(12), 2126-2131.
- Tobin, R., Moane, S. and Larkin, T. (2013) 'Sensory evaluation of organic and conventional fruit and vegetables available to Irish consumers', *International Journal of Food Science and Technology*, 48(1), 157-162.
- Western Development Commission (2016) Organic Agri-Food [online], available: <http://www.wdc.ie/regional-development/organics/> [accessed 18 March 2016].
- Winter, C.K. and Davis, S.F. (2006). Organic food. *Journal of Food Science*, 71 (9), R117-R124.
- Wirth, F.F., Stanton, J.L., and Wiley, J.B. (2011) 'The relative importance of search versus credence product attributes: Organic and locally grown', *Agricultural and Resource Economics Review*, 40(1), 48-62