

National Potato Conference & Trade Show **2020**

Potatoes – The Food of the Future



Red Cow Hotel,
Naas Road, Dublin
Tuesday 18th February 2020

Organised by



In association with





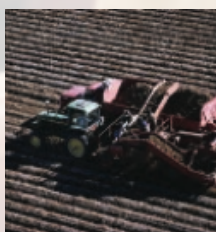
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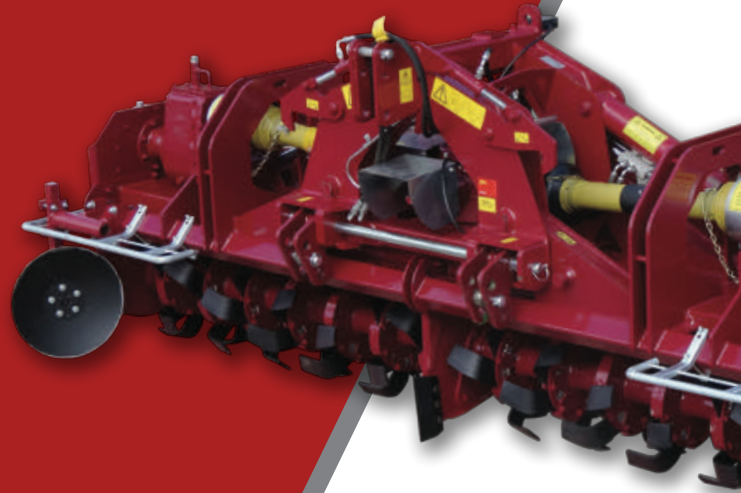
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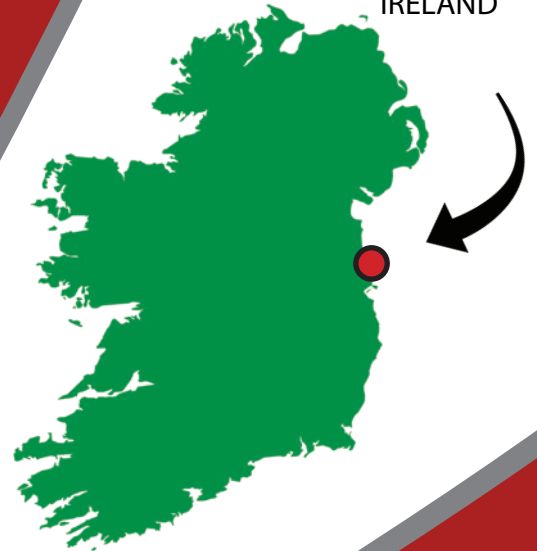
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Thomas McKeown
IFA Potato Chairman



Michael Hennessy
Head of Knowledge Transfer Crops, Teagasc

IFA/Teagasc National Potato Conference 2020

Welcome to this year's National Potato Conference organised by the Irish Farmers' Association and Teagasc in association with Bord Bia.

Irish potato growers are currently facing a challenging marketing season, however supply is in balance with demand. The area of potatoes planted was the second lowest on record, with only a 3% increase on 2018 (the lowest year on record). There was also a further decrease in the planting of traditional varieties such as Kerr Pinks and Golden Wonders.

Farmers continue to be the poor relation within the supply chain. Despite carrying the least risk within the potato supply it is the retailers and facilitators who take the lion's share of the margin. Increased inputs and storage costs and the continued decrease of phytosanitary products available continue as core problems affecting the sector. The price that growers receive is often not sufficient to cover increased costs.

Bord Bia in conjunction with IFA and IPF were successful in their application for a second EU potato promotion fund. Ireland is now partnered with organisations in Belgium and France, along with Europanel. This campaign will focus on millennials and has an overall budget of €1.95 million.

The morning session of this year's conference will focus on the new EU Potato promotion campaign, "*Millennials Attitudes to Potatoes*" and the health benefits of potatoes. The first speaker from Kantar Worldpanel will present a comprehensive market analysis of the 'Irish Potato Market' and this will be followed by presentations on the future of potatoes. The final speaker will speak about the World Potato Congress 2021 in Ireland.

The afternoon session will focus on plant health, energy use in the potato sector, desiccation and controlling sprouting in store without CIPC. We will hear presentations from an expert from Sutton Bridge along with Teagasc specialists and DAFM personnel.

IFA and Teagasc acknowledge the presence and valued support today of industry associated exhibitors and conference sponsors.

We hope that you find this year's conference proceedings of benefit to you as you make decisions going forward in your business.

Thomas McKeown
IFA Potato Chairman

Michael Hennessy
Head of Knowledge Transfer Crops, Teagasc




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Meade Potato Company,
Lobinstown, Navan, Co. Meath, Ireland



National Potato Conference & Trade Show **2020**

CONFERENCE PROGRAMME

9.00am Registration/Tea and Coffee
Chairman: Thomas McKeown, IFA Potato Chairman

10.00am **Message from Conference Hosts**
Tim Cullinan, IFA President
Gerry Boyle, Director Teagasc

Session 1

10.30am **Chairman: Thomas McKeown**, IFA Potato Chairman
Cliona Lynch, Kantar Worldpanel – ‘The Irish Potato Market’
Lorcan Bourke – ‘Millennials Attitudes to Potatoes’ & the new EU Potato Promotional Campaign 2020-2022
Stu Baker, AHDB ‘Potatoes - the Food of the Future - a British Perspective’
Aoife Hearne – ‘Putting Potatoes Centre Plate for Millennials Optimum Nutrition’
Liam Glennon – ‘World Potato Congress, Ireland, 2021’

12.30pm Lunch – Experience www.potato.ie recipes from EU Potato Promotion Campaign

Session 2

2.00pm **Chairman: Andy Doyle**, Tillage Specialist, Irish Farmers’ Journal
Barry Delaney, DAFM– Potatoes, Plant Health and Beyond”
Barry Caslin, Teagasc – Energy use in the Potato Sector
Shay Phelan, Teagasc – Desiccation – Life after Diquat
Adrian Briddon, Sutton Bridge – Controlling sprouting in store without CIPC

3.30pm – **Workshops**

- 4.30pm
1. **Adrian Briddon** – Sprout Management in Store
 2. **Shay Phelan** – Desiccation Strategies for 2020
 3. **Barry Caslin** – Energy Management on Farm

Trade show ongoing throughout the afternoon

Tea/Coffee at trade show in the afternoon



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National Potato Committee 2020

COUNTY	CONTACT	MOBILE
Chairman	Thomas McKeown , Laggagh, Castletown, Navan	087 262 5831
Vice-Chairman	Nora Sheehan , Sleemana, Castletown-Roche, Co. cork	087 653 4787
Cork (C)	John Griffin , Boycetown, Carrigaline	087 687 6293
Donegal: 1	William McGonagle , Kildrum, Carrigans, Lifford, Co. Donegal.	086 852 5137
Donegal: 2	Jimmy Rankin , Cloon, Carrigans, Co. Donegal	087 257 1835
Dublin	David Garrigan , Baldurgan Farm, Ballyboughal	086 855 3581
Galway	John Stephens , Ballinderry, Cummer, Tuam, Co. Galway	086 843 9308
Kerry	Bridget O' Connor , Kilbaha, Moyvane, Co. Kerry	087 268 0258
Kildare	Bart Maertens , Loughanure, Clane	087 678 0990
Kilkenny	John Doody , Ballincur, Mooncoin, Co. Kilkenny	086 190 3350
Louth	Brendan Lynch , Oberstown, Ardee, Co. Louth	086 839 5494
Meath: 1	Andrew Sheridan , Whitegables, Clooney, Castletown, Navan, Co. Meath	086 830 7599
Meath: 2	Barry Mitchell , The Hill, Kilberry, Navan, Co. Meath	087 298 6626
Offaly	Shane Howell , Killurin, Killeigh, Tullamore	086 301 8525
Tipperary (N)	Michael Healy , Coolcroo, Two-Mile-Borris, Thurles	087 260 4271
Wexford	Sean Ryan , Ballinadoney, Ballywilliam, Enniscorthy, Co. Wexford	087 237 9748
Wicklow	Tom Delahunt , Ballinaclough, Wicklow	087 987 8428



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- Talent Programmes

Contact: Lorcan Bourke, Bord Bia, Fresh Produce & Potato Manager
Clanwilliam Court, Lower Mount Street, Dublin 2, Ireland
T: 00 353 1 6142263 **E:** lorcan.bourke@bordbia.ie

www.bordbia.ie

Bord Bia Contacts

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Lorcan Bourke	Sector Manager Fresh Produce & Potatoes	(01) 614 2263	Lorcan.Bourke@BordBia.IE
Michal Slawski	Sector Manager Horticulture	(01) 614 2274	Michal.Slawski@BordBia.IE
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Andrew Mahon	Feed & Horticulture QA Manager	(01) 614 2249	Andrew.Mahon@BordBia.IE

Teagasc Potato Advisory Service



Name	Address	Phone
Michael Hennessy	Head of Crops Knowledge Transfer Teagasc, Oak Park, Carlow	059 9183427
Shay Phelan	Tillage & Potato Crops Specialist Teagasc, Oak Park, Carlow	059 9170200
John Pettit	Teagasc, Advisory Centre Johnstown Castle, Wexford	053 9171350
Shane Kennedy	Teagasc, Slane Road, Drogheda, Co. Louth	041 9833006

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Department of Agriculture, Food and the Marine

Potato Seed Certification

The Department has a team of Inspectors throughout the country who implement the certification scheme for seed potatoes. The scheme is based on EU legislation, primarily on Directive 2002/56/EC and also on Irish legislation as set out in Statutory Instrument No 641/2015. Ireland implements higher disease and pest control standards for seed potatoes compared to most other EU Member States. Only certified basic or pre-basic seed may be imported and marketed in the state.

Crop Policy, Evaluation and Certification Division

Department of Agriculture, Food and the Marine,
Administration Building, Backweston Campus,
Celbridge, Co. Kildare. W23 X3PH.

Tel: +353 1 5058792

Email: potatoonline@agriculture.gov.ie

Website: <https://www.agriculture.gov.ie/farmingsectors/crops/potatoes/seedpotatocertificationscheme/>

Ware Potato quality, labelling and associated plant health issues

The Department has a team of Inspectors who work across the food safety, authenticity and plant health areas throughout the country. This team of Inspectors, who are part of the Horticulture & Plant Health Division's team, are involved in controls relating to the food safety, quality and authenticity of ware potatoes as well as dealing with plant health issues that may arise in relation to the crop. In the event of concerns, queries or complaints regarding any of these matters please contact:

Horticulture & Plant Health Division

Department of Agriculture, Food and the Marine,
Administration Building, Backweston Campus,
Celbridge, Co. Kildare. W23 X3PH.

Tel: +353 1 5058786

Email: RegisterFBO@agriculture.gov.ie

Website: <https://www.agriculture.gov.ie/farmingsectors/horticulture/>

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Irish Potato Federation Contacts

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Michael Kennedy	K&K Packs Limited Broughan Lane, The Ward Co Dublin	kkpack@eircom.net Tel: 01 834 7586
Colm McDonnell	Irish Potato Marketing Ltd Unit 412, Q house, Sandyford Industrial Estate, Dublin 18	colm@ipm.ie Tel: 01 213 5410
Michael Hoey	Country Crest Ltd. Rathmooney Lusk, Co Dublin	Michael@countrycrest.ie Tel. 01 843 7061
Maurice Matthews	Seed Potato Company of Ireland Unit E3, Ballymun Industrial Estate Dublin 11	mauricematthews@eircom.net Tel: 01 842 5431
Peter Keogh	Peter Keogh & Sons Ltd. Westpalstown, Old Town Co Dublin	Peter@keoghs.ie Tel: 01 843 3175
Philip Meade	Meade Potato Company Braystown, Lobbinstown Navan, Co Meath	philipmeadejr@meadepotato.com Tel: 046 9053198
James O'Shea	O'Shea Farms Limited Piltown, Co Kilkenny	james@osheabros.ie Tel: 051 643733
Edward English	Castlecor Potatoes Mallow, Co.Cork	Nedenglish02@hotmail.com Tel: 022 48228

Potato Herbicides

SHARMETRIN	MOST MICRO	PILOT ULTRA
Metribuzin 700g/kg	Pendimethalin 365g/lit	Quizalofop-p-ethyl 50g/lit

Fungicides

AZ-TEC / CHAMANE	C50 WG	GRECALE
Azoxystrobin 250g/lit	Cymoxanil 500g/kg	Cymoxanil 200g/lit + Fluazinam 300g/lit
NAUTILE DG	PENNCOZEB WDG	PROXANIL
Cymoxanil 50g/kg + Mancozeb 680g/kg	Mancozeb 750g/kg	Propamocarb 400g/lit + Cymoxanil 50g/lit

Fertilisers, Stimulants and Adjuvants

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For Technical Information Contact
Adrian Caulfield (M.Agr.Sc.)
086 2578428



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Conference Presentations

Session 1

The Irish Potato Market

Cliona Lynch, Kantar Worldpanel

Kantar Market Overview

- 1) Changing Consumer Trends
- 2) Total Grocery Market Headlines
- 3) Importance of Potatoes
- 4) Focus on Irish Potato Market

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Changing Consumer Trends

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Changing Consumer Trends

1) Consumers are moving towards favouring using vouchers on their shopping trips – helping Dunnes see strong total market growth

Store	% of Trips with Coupon
SuperValu	18.5%
TESCO	18.0%
DUNNES STORES	19.8%

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Changing Consumer Trends

2) Plastic Waste is a growing concern globally, now the second largest

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Changing Consumer Trends

3) Concerns around Sustainability and Ethical Consumption are also on the rise. Irish products also becoming more important.

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Changing Consumer Trends

4) Health is a growing concern for our panel members. The below are certain claims made by panellists:



69.5%
Say they try to restrict the amount of sugary food they consume

73.4%
Agree that diet is important to them

80.1%
Try to lead a healthy lifestyle

61.2%
Say nutritional information has an impact on their food choices

72.2%
Are aware if a food is good for them



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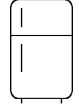
Changing Consumer Trends

5) A trend in Produce that we have seen is the emergence of Frozen. New brands starting to play in this area and in percentage terms both frozen areas have grown ahead of fresh.



52 w/e 3 Jan 16
Vs
52 w/e 29 Dec 19

Frozen Fruit **Frozen Veg (excl. Potatoes)**
+€6m (+84.4%) **+€2m (+5.4%)**



52 w/e 3 Jan 16
Vs
52 w/e 29 Dec 19

Fresh Fruit **Fresh Veg (excl. Potatoes)**
+€132m (+20.0%) **-€6m (-1.1%)**

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Kantar Worldpanel - 52 w/e 29 Dec 19

8

Changing Consumer Trends

6) The next trend we have seen is the emergence of pre-prepared Produce and salad within the Irish market. People wanting more convenient options when they shop to save time rather than money.

Chilled Prepared Salad



52 w/e 3 Jan 16
Vs
52 w/e 29 Dec 19

+€4m (+11.4%)

Chilled Prepared Fruit and Veg



+€9m (+10.9%)

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Kantar Worldpanel - 52 w/e 29 Dec 19

9

Looking Forward

Convenience



The produce market is moving towards convenience options within Fruit and Vegetables. Can you take advantage of this with more convenience offerings for consumers.

Variety



There is a slight decline in penetration for both fruit and vegetables. People are buying less options now compared to previously. Can you promote a varied diet within produce, tagging onto the emergence of health.

Environmental Concerns



Retailers are starting to move towards no plastic in stores, something to be aware of. UK retailers such as M&S have already taken action, something to prepare for and take advantage of.

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Kantar Worldpanel – Total Produce 10

Total Grocery Market Headlines

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Total Grocery Market 12 w/e Headlines



The Irish Grocery Market continues to grow in the most recent 12we up by +1.5%.



Growth has been driven by consumers spending more per buyer +0.3% and more per Trip +€0.10.



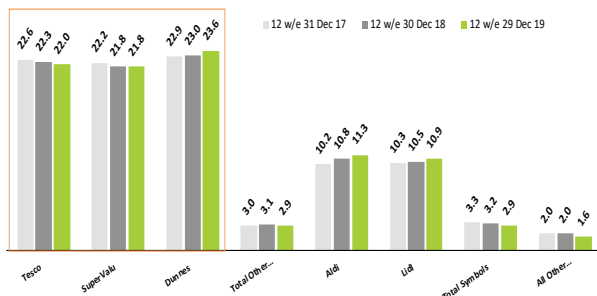
However people are starting to shop less often, frequency declined -0.03%.

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Retailer 12 w/e Headlines

Dunnes grew to 23.6% share of the Irish market in the latest 12 weeks. Tesco moves to have the 2nd highest share of the market during the Christmas period.

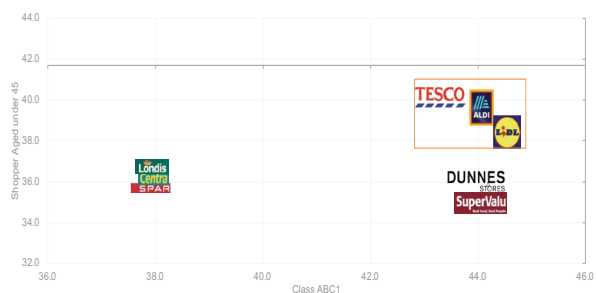


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Retailer 12 w/e Headlines

The retailers performing best with younger shoppers are Tesco and Aldi. Surprisingly Lidl is most likely to attract the affluent ABC1 shoppers compared to all the other retailers.



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Key Takeout's

Discounters



Discounters are growing across the total market and through Fresh & Chilled. However Dunnes are bucking this trend through their vouchering scheme.

Trip Size



Trends are changing, with lower inflation compared to last year, shoppers are now making fewer but larger trips. Winning this bigger basket is key to retailer growth moving forward.

Split Demographics



There are three main retailers driving younger shoppers into the market – Tesco, Aldi and Lidl. These are the key targets if you want to attract a younger audience.

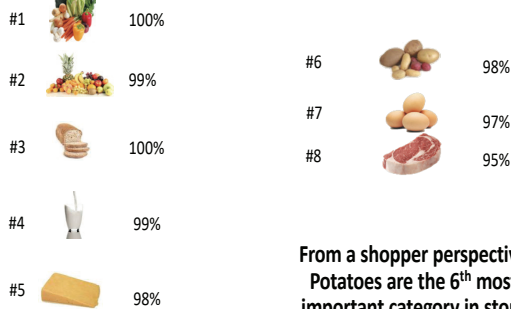
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Importance of Potatoes

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% of households buying (penetration)...



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212K Tonnes of potatoes sold in 2019

Potatoes are bought once every 1 second in Irish Retailers



1.7 million households purchasing annually

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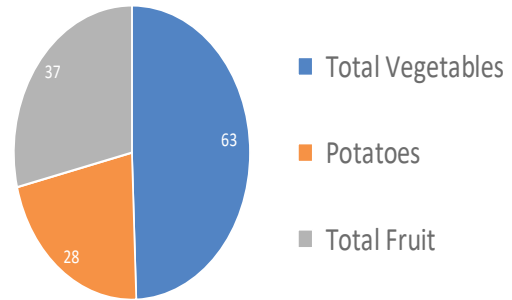
18

12% of all shopping trips feature potatoes. These trips contribute 26% of all sales. When potatoes are included in the basket, these grocery trips are worth €26.10 more than the average, highlighting the importance of the potato category to retailers



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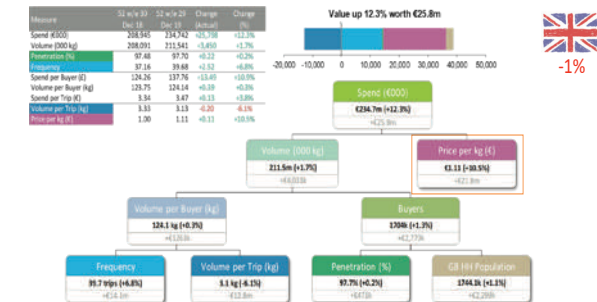
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Focus on Irish Potato Market

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Total Potatoes

The potato market has grown by +12.3% this year in value terms, mainly due to average price increases. However there have also been strong gains in frequency of purchase



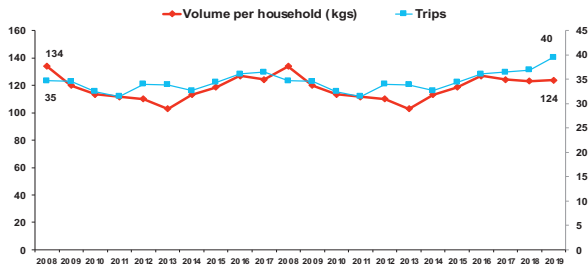
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Potatoes – The Food of the Future

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Shoppers are making picking up potatoes more often than ever before in the last 10 years – including them on 40 shopping trips a year.

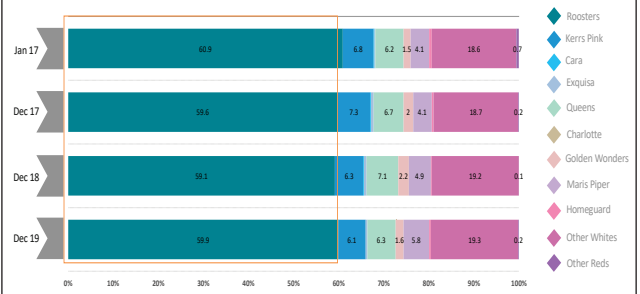


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Total Potatoes

Roosters are continuing their dominance in the potato market/ The areas losing share have been Kerrs Pink and Queens.



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Top performing markets

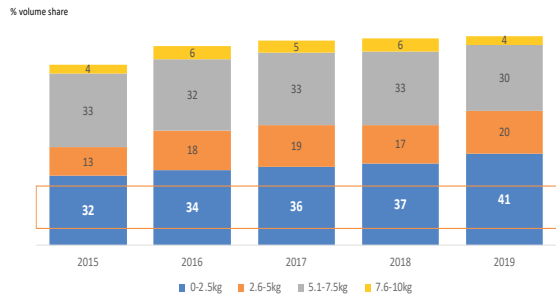


Roosters
Maris Piper

Roosters are growing through Trips & Prices but Maris Piper are winning new shoppers

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Across smaller bags have increased their market share with under 2.5kg bags now accounting for 41% of volume sales

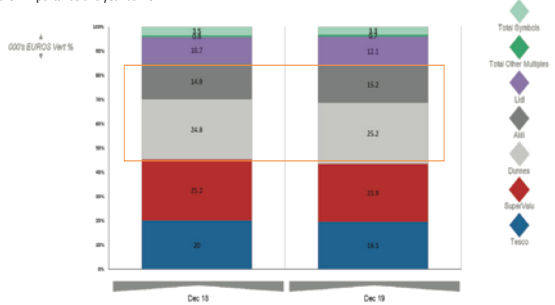


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Total Potatoes

Dunnes remains very important for the potato market and now sits above 25% value share, both discounters increasing their importance this year as well.



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Top performing retailers in Potato categories



Discounters are winning new shoppers to Potatoes while all retailers increase trips & prices

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Total Potatoes

In line with Total Produce, we see a strong growth in Pre-Family Potato buyers, but still one of the smaller segments. Potatoes are increasing their appeal with younger shoppers

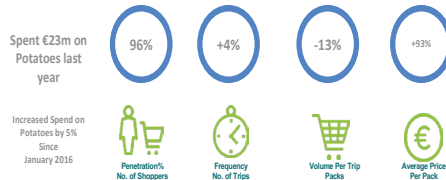


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Kantar Worldpanel – Total Potatoes - 52 w/e 29 Dec 19 29



Shopper Aged Under 35



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Summary

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Thank you

Cliona Lynch
Consumer Insight Director
Kantar Worldpanel

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Millennials Attitudes to Potatoes & the new EU Potato Promotional Campaign 2020-2022

Lorcan Bourke, Bord Bia



'Millennials Attitudes to Potatoes' & the new EU Potato Promotional Campaign 2020-2023

Lorcan Bourke
Fresh Produce & Potato Manager
18/2/2020

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Ireland's Feel-Good Food



Contents

- Millennials Attitudes to Potatoes (summary)
- The new EU Potato Promotional Campaign 2020-2023

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2

Bord Bia Millennial Potato Market Research

In the lead in to the EU application (Jan-April 2019), Bord Bia commissioned an online survey (sample size n=1,500 respondents) with a specific focus on **Irish millennials** to understand their thinking around food trends, alternative carbohydrates and specifically fresh potatoes.

The following are **6 key learnings** that emerged from the market research study:

1. The **carbohydrate world** is being increasingly challenged & there is a rise in meal snacking
2. Younger cohorts are gravitating towards **other carbohydrates**, in particular for their convenience, and perceived health benefits

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Bord Bia Millennial Potato Market Research

3. The **health benefits of potatoes** are not well understood with millennials seeing them as having the most fat and calories (when compared with other carbohydrates)

4. Younger cohorts believe **potatoes to be harder to cook**, in a world where they believe cooking should not take more than 15-20 minutes

5. The **potato lacks relevance** for many younger consumers in Ireland – it is not being showcased on social media (e.g. Instagram) in the way other foods are

6. The potato is very much part of an indulgent moment with strong associations with **traditional family cooking** and it is viewed to keep so-called 'bad' 'fattening friends' i.e. butter, cheese, mayonnaise, etc.

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Bord Bia Market Research Recommendations for the New Potato Campaign was to 'I.N.S.P.I.R.E.' Millennials – which guided the EU application

<p>ignite</p> <ul style="list-style-type: none"> • New ways to eat that are "backful" • Focus on the "feel-good" benefits of potatoes • New recipes and FAST COOKING • New ways to eat, snack, combine • Play to the taste of a wide demographic, include vegetarians • Engage consumers in more gender-specific marketing and social media campaigns 	<p>Presentation</p> <ul style="list-style-type: none"> • Formats that win • Collaborate content, family fun • Weekly fast facts • Foods for one • Easy prep - speed of cooking • Sustainable stories • Collaborate in the aisle in store 	<p>Indulgence</p> <ul style="list-style-type: none"> • Play to comfort • Celebrate meals and weekend moments • Don't shy away • Celebrate occasions like birthdays • Play to indulgence • Play to indulgent moments • "Feel-good" of the potato
<p>New news</p> <ul style="list-style-type: none"> • The potato is a "feel-good" food • Focus on the "feel-good" benefits of potatoes • New recipes and FAST COOKING • New ways to eat, snack, combine • Play to the taste of a wide demographic, include vegetarians • Engage consumers in more gender-specific marketing and social media campaigns 		<p>Relevance</p> <ul style="list-style-type: none"> • Create the right tone of voice • Celebrate what millennials want to know about • More snacking opportunities, etc. • Simple, authentic and relatable • Celebrate households and the way people live • Can we take on snacking?!
<p>Strength</p> <ul style="list-style-type: none"> • The potato is strong, let the potato be "feel-good" • "A better call" • Highlight place in the history world of food • Highlight the potato's role in the history of food • Highlight the potato's role in the history of food • Highlight the potato's role in the history of food • Highlight the potato's role in the history of food 		<p>Educate... about potatoes</p> <ul style="list-style-type: none"> • Different types • Celebrate the versatility of potatoes • "Don't shy away from potatoes" • What potatoes are used for (e.g. fries, etc.) • What potatoes are good for (e.g. health, etc.) • What to cook and how long it takes to cook

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5

Towards a New Potato Promotional Campaign

POTATOES
MORE THAN
A BIT ON THE SIDE



2015-2018 campaign

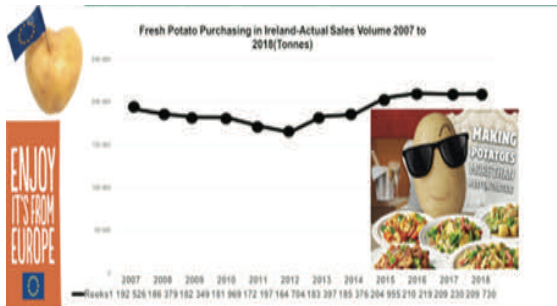
potatoes
PREPARE
TO BE
SURPRISED
Europe's favourite
SINCE 1536

2020-2022 campaign

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6

Previous Campaign: Volume Lift & Stability



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Fresh Potato Consumption - Same Issues & Challenge for a New Demographic



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Application for a Campaign - Why Choose a Millennial Target Audience?

Focus on Fresh Potato Consumption in Ireland
Source: Kantar World Panel

Age Group	Millennials Under 34's	Total Population
Total Population	22.56 year 48%	32.44 year 50.0%
Total Population	624,428.83	6,207,428.89
Total Population	24,402	387,209
Population	85.4	87.7
Population	28.8	28.8
Population	478.23	423.22
Population	78.1	127.2
Population	49.02	49.02
Population	3.1	3.1
Population	63.02	63.02

Key Metrics - Total Population & Millennial Household Purchasing Ireland (Source: Kantar World Panel)

- The millennial consumption challenge is around their under consumption of potatoes compared to the total market.
- Objective 1** is to increase frequency of purchase of millennials from 26 times per annum to 30 times per annum
- Objective 2** is to increase the volume kg per buyer from 78.1 kg to 90 kg for millennials
- Potential volume uplift through promotional activity is 11,268 tonnes with the average price of fresh potatoes in Ireland is €1/Kg, thus there is potential to increase sales by €11,268,000

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How it works ...



- New partner countries are Flanders (VLAM), France (CNIPT) & Europatat
- Joint millennial multi-country campaign was applied for April 2019
- Awarded October 2019 (start Jan 2020)
- 80:20 ratio for EU: Industry Funding
- 80% EU funded
- Growers funding 10% : Packers 10%
- Annual Irish industry contribution €130K realises promo budget €650K
- Total Irish promotional budget is c.€1.95m across 3 years
- Close Irish industry partner group Potato Promotions group (IFA/IPF/DAFM chaired by Bord Bia) –decided on the agency/selected & to guide the campaign
- Bord Bia are the official EU 'proposing organisation' for Ireland

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10

EU Application Process – a Campaign Promotional Agency Chosen



- Darwin BBDO agency won the campaign tender (BBDO Dublin)
- The agency supported the EU bid for a total partner campaign spend of €5,550,000
- Primary message:** potatoes are easy to prepare and fit in a modern lifestyle; they are versatile and tasty.
- Secondary message:** reassurance about health and origin

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Millennial Campaign Touchpoints - Proposed Digital & Social Media Channels



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12

PR and Other Possible Campaign Tie-in's in 2021...



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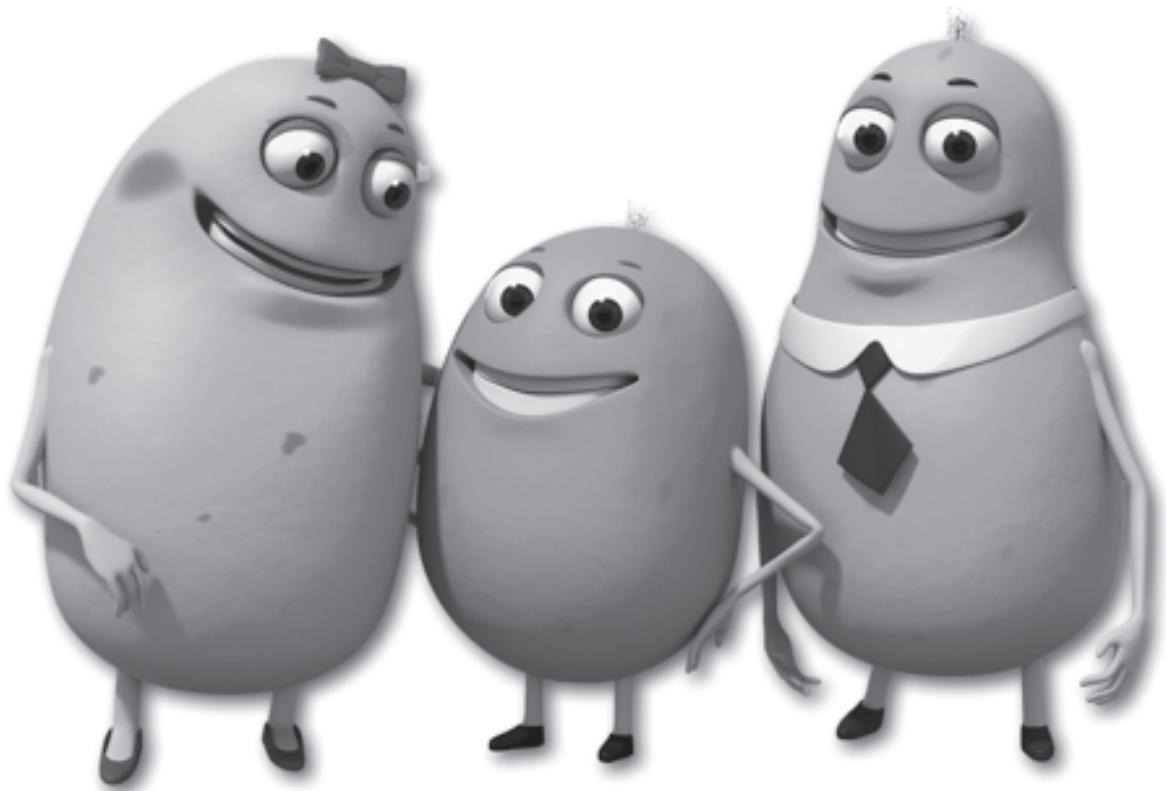
13

Thank You

Lorcan.Bourke@BordBia.IE

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**wilson's
country**





Potatoes are our passion!

Proud to support the
2020 National Potato Conference

www.wilsonscountry.com


Potatoes- the Food of the Future – a British Perspective

Stu Baker, AHDB



Potatoes – the food of the future

Stu Baker – Senior Marketing Manager, AHDB


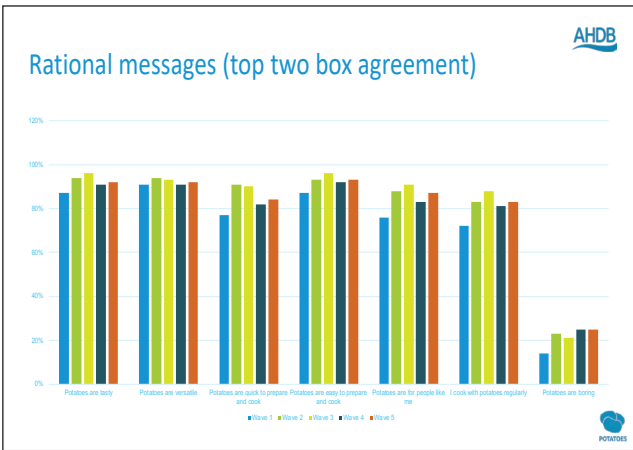
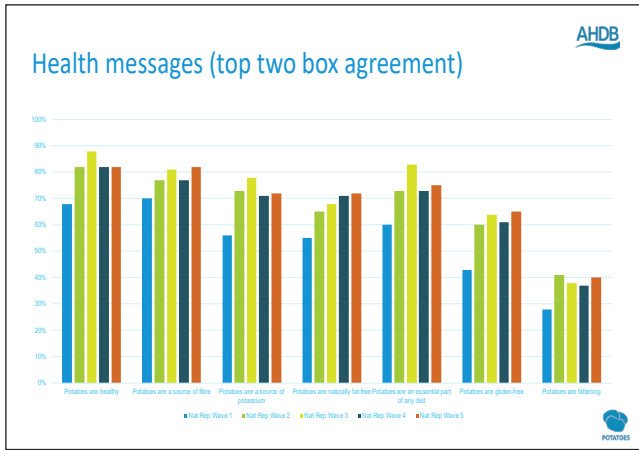




Millennials in the UK

What do we know about attitudes towards potatoes?





Who are the millennials?

What issues affect consumers

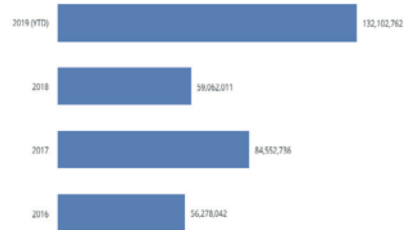
What's changed?





Climate change content engagement

AHDB



Credentials

What sets potatoes apart from the competition?

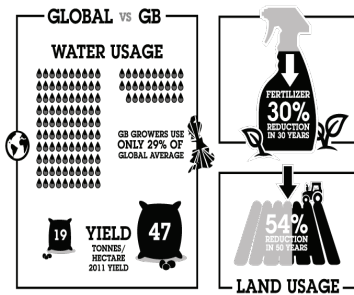
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POTATOES



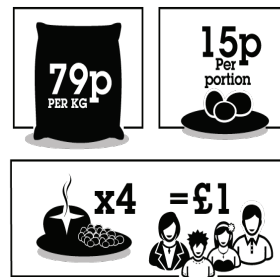
Good for the Planet

AHDB



Good for your Pocket

AHDB



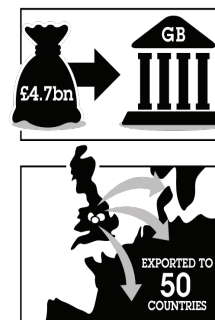
Good for You

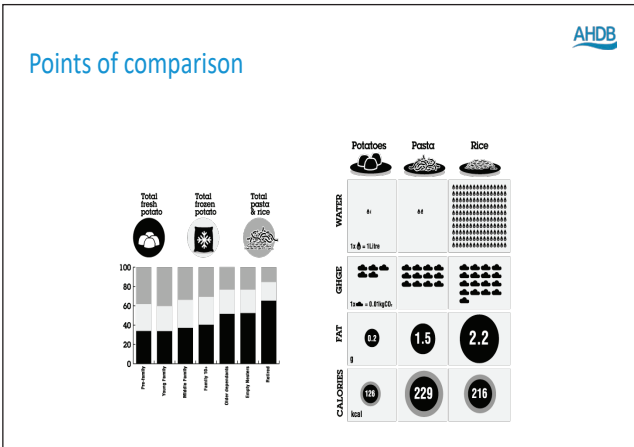
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Good for GB PLC

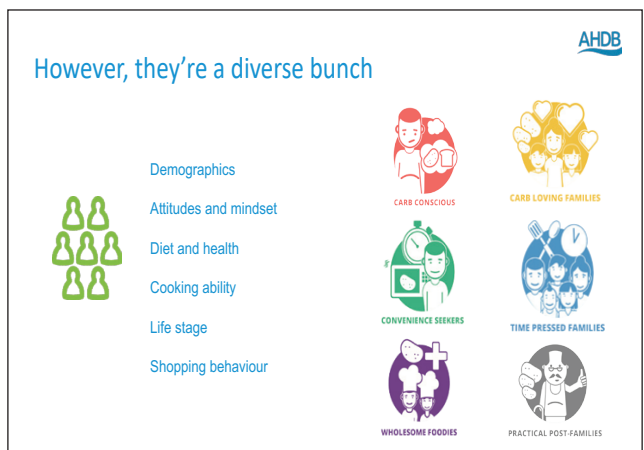
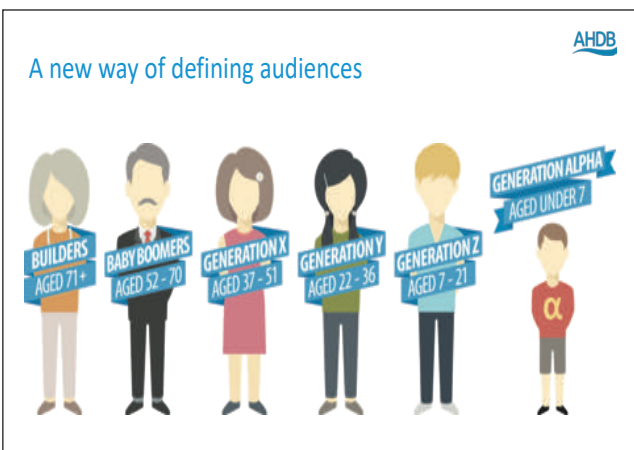
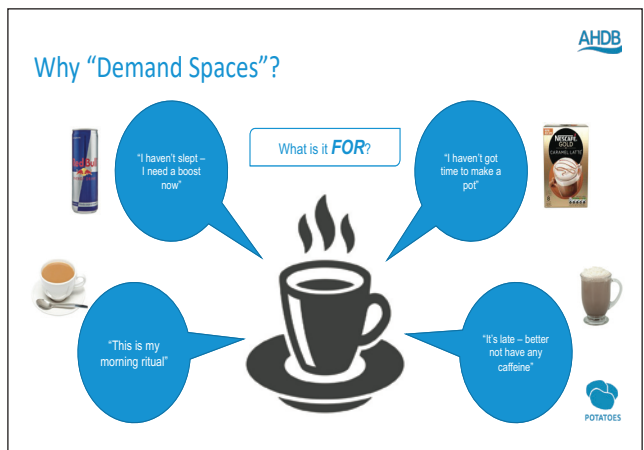
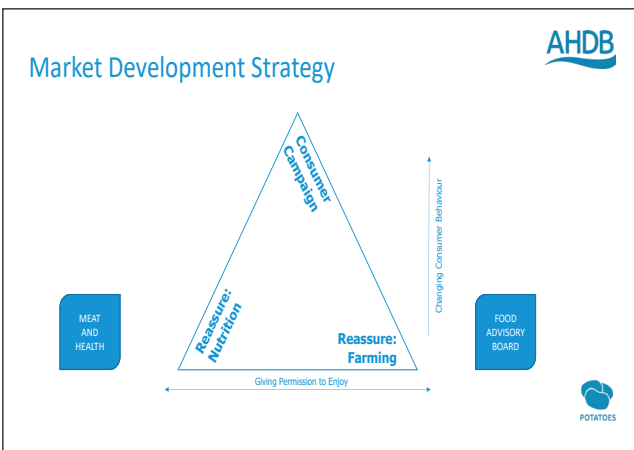
AHDB






AHDB consumer marketing

How do we approach our audiences?



AHDB

Messages that cross the divide



- VERSATILITY
- EASY TO PREPARE
- QUICK TO PREPARE
- TASTE
- VALUE FOR MONEY

Meet need states from segmentation

Other key messages from YouGov and attitude tracking

POTATOES





FARMING IS IN OUR ROOTS

Country Crest has a great, true story. One that really is about local heritage, dedication and ultimately, a leading Agri-Food business. With sustainability at our core, we respect the power and purity of the land, and through this, we deliver the best produce to the Irish market.

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www.countrycrestfarmshop.ie

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**Country Crest**
True to nature

Putting Potatoes Centre Plate for Millennials Optimum Nutrition


Aoife Hearne, RD



Aoife Hearne
DIETITIAN
...making good nutrition simple


Putting Potatoes Centre Plate for Millennials

Aoife Hearne RD



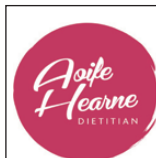
Potatoes: what's under the skin?

- Part of the carbohydrate family
- Carbohydrates main function is for energy
- Only energy source readily available for the brain to use





But what we know..

- Carb-phobia persists
- Carbohydrates are seen as the least important part of the plate
- In the US there is a very obvious low carb focus for a lot of people within this group

Value of the Potato

- Important Source of:
 - Potassium
 - Vitamin C
 - B Vitamins
- Contribution to the Irish Diet:
 - Vitamin C
 - Folate
 - Iron



DIETARY FIBRE



Why is Fibre Important?

- Essential for healthy digestive system
- Fibre provides the food the good bacteria in our gut need to survive
- Recommendation: 25g/day




Spectrum of Carbohydrates



**Nutrition & Potato
A Snapshot View**










The Truth

Hi! I'm a rooster potato, the most popular in Ireland. I have 200 Kcals
0.5g fat
5.2g fibre
320mg potassium



Hi! I'm white rice


The Truth

Hi! I'm a rooster potato, the most popular in Ireland. I have 200 Kcals
0.5g fat
5.2g fibre
320mg potassium



Hi! I'm a sweet potato I have 200 Kcals
0.6g fat
4.3g fibre
370mg potassium


Millennials



- Many have made some effort to eat more healthily in the past year
- 92% would like to make change to improve health
 - physically active
 - financially secure
 - sleep better
 - healthy eating





Diversity with the Group




- 18 - 34 males & females
- Independently living
- sharing / couples
- New / young family
- Eating Environment
- Social Media Influence
- Single / Couple
- Pregnant
- Young family
- Active with Sport
- Sedentary
- First job / cooking skills

Where do potatoes fit into a well planned eating plan?




Considerations for this group



- How to Cook
- Healthy habits
- Equipment
- Shopping / Storing..

Anxiety around Food



- 90% irish consumers worry about what they eat



Potatoes...beliefs

- low food miles
- useful for young families
- health credentials not fully understood
- taste?
- sweet potato - better?
- vs rice -
- vs pasta - speed



Value of Potatoes for young families



Value of Potatoes sharing / couples



Value of Potatoes Young professionals

My Top Tips: Tip # 1

- Preparation is key
- Planning meals for the week
- Food shopping
- Go to produce section first in the supermarket
- Be sure to fill 1/3 of your shopping trolley / basket with fruits & vegetables

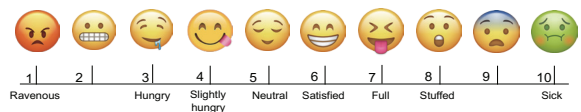


Prep is Key

How to put it into Action



Tip # 2 Hunger Scale



Aim to eat every 3 hours to make it easier to stay on track



World Potato Conference 2021

Liam Glennon

WPC2021 IRELAND
31 MAY - 3 JUNE 2021
WWW.WPC2021.COM

WORLD POTATO CONGRESS

11th World Potato Congress 2021
31 May - 3 June 2021, Dublin, Ireland

Visit Ireland! Komm nach Irland!
Ven a Irlanda! 访问爱尔兰! Visitez l'Irlande!

Past World Potato Congresses

- 1993 Charlottetown, Canada
- 1994 Harrogate, United Kingdom
- 1997 Durban, South Africa
- 2000 Amsterdam, The Netherlands
- 2004 Kunming, China
- 2006 Boise, Idaho, USA
- 2009 Christchurch, New Zealand
- 2012 Edinburgh, Scotland
- 2015 Yanqing, China
- 2018 Cusco, Peru



WPC2021.com

Official Host Body

- Irish Potato Federation - 1973
- To promote sale and consumption of potatoes
- 10 members
- Growers, traders, packers, seed companies.



WPC2021.com

Europatat

- Founded 1952
- 62 members, 20 countries
- 16 National Associations
- 40 Potato Companies



WPC2021.com

WPC 2021 Local Organising Committee

- Fresh, processed, seed potato sectors
- State Agencies: DAFM, Bord Bia, Fáilte Ireland, Teagasc
- Producers: IFA
- Northern Ireland Representation



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WPC Inc., Canada

- Own the event 'World Potato Congress'
- President: Mr. Romain Cools (Belgium)
- Directors: Canada, USA, UK
- International Advisors:
Argentina, South Africa, Ethiopia, India, China



WPC2021.com

About WPC Inc.



VISION
To be the premier global, potato, networking organisation

MISSION
To create a value chain network to lead sustainable growth and development

WPC2021.com

For Ireland ?




- Event itself worth €1.6m
- Promote Ireland and Irish Food
- Global business platform
- Buyers, sellers, business, research
- Trade Exhibition

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Key Message




- Healthy
- Wholesome
- Nutritious
- Sustainable



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Sample Topics.....




- Opportunities
- Where is the business going world-wide?
- Where is growth
- The Green Consumer
- Innovation – Smart Farming

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Legacy.....

- Best WPC ever
- Increase in Business
- New Ideas
- New Contacts Made
- Good impression of the Island of Ireland







WPC2021.com

11th World Potato Congress 2021

"The Changing World of the Potato"

The WPC in 2021 will provide a solid platform to do business and to present, analyse and develop the global potato industry.




Key topics will include:

- Potato Business
- Innovation
- Health and Nutrition
- Sustainability
- Agronomy
- Legislation and international trade

Save the Date: 31 May – 3 June 2021

Go to www.wpc2021.com to sign up for regular e-updates about the World Potato Congress 2021

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Conference Presentations

Session 2

Potatoes, Plant Health and Beyond

Barry Delaney, DAFM

DEPARTMENT OF AGRICULTURE, FOOD & MARINE

AT THE NATIONAL POTATO CONFERENCE, RED COW HOTEL, NAAS ROAD 18TH FEBRUARY 2020

Plant Health and Biosecurity Strategy. Ireland is recognised as having a favourable plant health status which means that many of the pests and pathogens of plants which are present elsewhere are still absent from Ireland. However, increased globalisation leading to increasingly complex trade patterns throughout the world in plants and plant products (and their associated pests and pathogens) means that Ireland cannot be complacent. We cannot assume that Ireland will retain its freedom from plant health pest and pathogens by simply continuing with 'business as usual'. In addition, emerging plant pests and pathogens, such as the Epitrix flea beetle, Colorado beetle, the bacteria causing Zebra Chip of Potatoes and many others, whose establishment may be facilitated by changes in climate, may impact on the food security, biodiversity and wider environment of Ireland. These compelling economic, social and environmental drivers resulted in the Department of Agriculture, Food and the Marine prioritising the development of a Plant Health Biosecurity Strategy as one of its high-level priorities.

The objectives of this strategy are to minimise the threat to plant health by preventing the introduction and establishment of plant pests and pathogens, and reducing their impact in order to achieve environmental protection and economic growth. The Plant Health Biosecurity Strategy is Ireland's response to the increasing emerging threats that we face. This strategy is underpinned by three key strategic principles which are, Risk Anticipation, Surveillance and Awareness.

Seed certification is an EU-wide quality assurance system whereby seed potatoes intended for marketing are subject to official control and inspection to ensure minimum standards throughout the EU. Certified seed ensures common quality and health standards throughout the EU and thereby allows free movement of certified seed between Member States. The certification scheme is linked to plant health regulations to prevent the spread and multiplication of plant pathogens that adversely affect crop production.

DAFM is the certifying authority for seed potatoes in Ireland. Under the scheme, DAFM officials carry out crop and tuber inspections to ensure seed meets minimum purity and quality standards, thereby ensuring the supply of high quality seed to growers. Under EU and Irish law, it is illegal to market non-certified seed and all seed lots must be sealed and labelled to comply with the regulations. Member States may impose higher plant health standards than the minimum required under the EU regulations and Ireland restricts the marketing of seed potatoes of lower standard. Only four generations of pre-basic, and three subsequent generations of basic seed may be placed on the market in Ireland. Growers may plant one further generation of home-saved seed, provided they are in compliance with plant variety rights.

Imports of seed potatoes in excess of 2 kgs must be notified to DAFM via email to PotatoOnline@agriculture.gov.ie

Food Safety and Authenticity

DAFM has a team of Inspectors who work across the food safety and authenticity area in food of plant origin, including potato growers. All potato growers must register as a primary producer of a food and will receive evidence of registration through allocation of a Horticultural Food Registration number. Non processed potatoes are regarded as low risk from a food safety point of view, however where additional processing takes place such as peeling, chopping or dicing, the food safety risk increases. The purpose of the controls in this area is to ensure that food producers are in compliance with relevant EU and national food safety legislation. This same team of Inspectors are responsible for ensuring that the labelling and quality standards of the potatoes offered for sale complies with the relevant legislation. In recent years, mostly on foot of complaints from concerned consumers or growers, DAFM has developed the facility to sample potatoes at retail or wholesale level and have variety testing carried out in order to verify the authenticity of the labelling claims made. Compliance notices have been issued on foot of these tests and growers and or packers can face enforcement action as a result of sampling carried out.

For information on how to register as a horticulture food business or in the event of concerns, queries or complaints regarding any of the matters raised above, please contact RegisterFBO@agriculture.gov.ie

DAFM supports

Progress continues to be made in terms of diversification and import substitution through the salad potato research programme and in more recent times the fresh chipping project. The Tillage Capital Investment Scheme (TAMS) has more recently included specialised salad potato harvesting equipment has been able to support this initiative.

Given the objectives of the TAMS to facilitate the Sector to develop a targeted and precise approach focusing on environmental dividends, efficiency and growth and in addition to improve competitiveness and contribute to the improvement of agricultural incomes. DAFM will examine potential items to develop the correct agronomy and crop conditioning facilities for Irish production for the fresh chip trade to facilitate growers making the necessary investments to take maximum advantage of this important market.

UK Exit of EU

The UK left the European Union on 31 January 2020 on the basis of the Withdrawal Agreement which was agreed by the European Council on 17 October 2019.

The agreement includes a transition period until at least 31 December 2020.

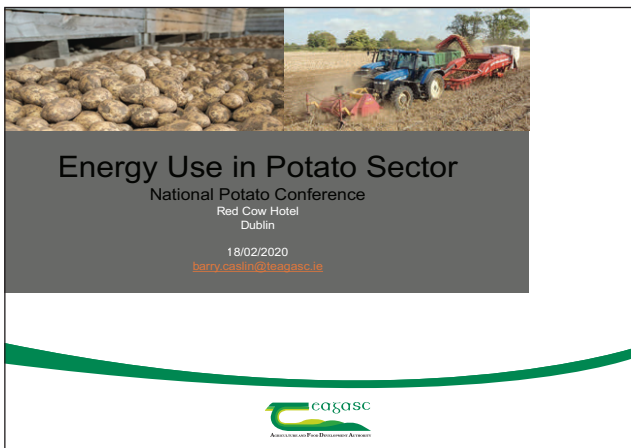
During this time, EU rules and regulations will continue to apply to the UK and the UK will remain part of the EU's Single Market and Customs Union. There will be no immediate changes for citizens and businesses in their day-to-day dealings.

The EU and the UK will start negotiations on a new future relationship agreement which, if agreed, is due to come into effect from 1 January 2021.


Consequently, we are strongly advising all traders involved in the import and export of potatoes to register with the DAFM as soon as possible, where more detailed information on legislative requirements can be provided.

Energy use in the Potato Sector

Barry Caslin, Teagasc




Energy Use in Potato Sector
National Potato Conference
Red Cow Hotel
Dublin
18/02/2020
barry.caslin@teagasc.ie





Progress towards targets

	End of 2017	End of 2018	Target 2020
Overall Renewable Energy	10.5%	11%	16%
Renewable Transport	7.4%	7.2%	10%
Renewable Heat	6.7%	6.5%	12%
Renewable Electricity	30.1%	33.2%	40%

2 Teagasc Presentation Footer

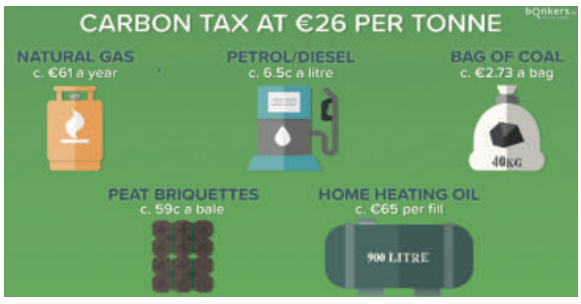
- ### Potential opportunities for on-farm Renewable Energy
- Biomass - heating, electricity, transport
 - Hydro - electricity
 - Solar - heating, electricity
 - Geothermal – heating
 - Anaerobic Digestion (AD) / biogas
 - Fuel cells / Hydrogen – electricity, heating, transport
 - Wind - electricity
- 

- ### Energy use in potato business
- **Field Operations – Land preparation, plant**
 - Land preparation
 - planting
 - chemical/fertiliser application
 - Harvesting
 - **Post Harvesting process**
 - Grading
 - Cleaning
 - Drying
 - Cooling
 - Lighting
- 


- ### Impact of Carbon Taxes
- Budget 2020 increased by €6 per tonne – from €20 to €26
 - First step in commitment to rise to €80 by 2030
 - €6 carbon tax adds:
 - €1.17 for a 60L diesel fill (2 c L)
 - €1.02 for a 60L petrol fill (1.7 c L)
 - €0.93 per 60L MGO (1.5 c L)
- 

Carbon Tax

CARBON TAX AT €26 PER TONNE



NATURAL GAS c. €61 a year
PETROL/DIESEL c. 6.5c a litre
BAG OF COAL c. €2.73 a bag
PEAT BRIQUETTES c. 59c a bale
HOME HEATING OIL c. €65 per fill
900 LITRE



Potato Sector in Ireland

Production type	Reported area	Tonnes	Growers
Potatoes	8,000 ha	334,000	600



7 Teagasc Presentation Footer



Energy use Potato Production

Applications	Energy Technology	Fossil fuel / electricity split	Typical energy use	Best Practice
Field Operations		100 / 0	85	65
Loading	Conveyor motors, fork lift	75 / 25	0.5	0.2
Grading for quality control, dirt removal & sizing	Conveyors, motors, dust extraction, lighting	0 / 100	2.0	1.0
Drying	Electric fans, refrigeration, heating	0 / 100	3.5	2.0
Washing	Conveyor/brush motors, pumps	0 / 100	2.5	1.0
Short/medium term storage	Ventilation fans, Recirculation fans, louvres, lighting, humidification	0 / 100	20	10
Long term Storage	Refrigeration, recirculation fans, lighting humidification	0 / 100	80	50
Chemical application	Fans	0 / 100	0.5	0.2
Outloading	Conveyor motors, forklift, packing	0 / 100	0.5	0.2
Benchmark			194	130

8 Teagasc Presentation Footer



Energy Saving technologies

Description of measures	% saving overall	Cost category	Comments
Energy monitoring / management benchmarking	5%	Low	Energy monitoring is a key factor in successfully managing energy use. Industry monitoring will establish robust industry benchmarks.
Field operations	7%	Low	Depends largely on equipment selection, set-up of equipment, ballasting, tyre inflation and general optimisation of tillage operations.
Building improvements	Up to 20%	Medium to high	Some established products like thermal insulation and draught proofing. Other more novel products like low emissivity surface coatings, heat reflective films.
Advanced Control Techniques	10%	Medium	High quality control, integrating information on store environment and energy performance. Cheap tariff period targeting for system operation can be used.
Variable speed drives on fans / pumps / compressors	30%	Medium to high	Applicable to a wide range of ventilation and pumping applications. Concentrate on high load factor applications like ventilation in stores.

9 Teagasc Presentation Footer



Energy Saving technologies cont'

Description of measures	% saving overall	Cost	Comments
High efficiency motors	3%	Medium	Widely applicable but only economically viable for high load factor equipment or when equipment is being changed or repaired
High efficiency lighting	30%	Medium	Lighting technology is constantly developing with lower energy light sources and better control systems.
High efficiency fan and duct designs	30%	High	High efficiency equipment is available but benefits are not well understood by installers or users.
Cooling technique optimisation	10%	High	Mixed ambient/refrigeration systems, and new techniques in refrigeration technology need to be evaluated – variable speed condensers, new refrigerant mixes.

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Energy Improvements

- Air leakage (can account for 37% of stores energy consumption (pre-pack) and 55% (processing) (FEC study))
 - Seal gaps around doors / close doors properly
 - Fill joints on roof eaves or ridges
 - Place flaps over louvres or ventilation systems
 - Minimise airflow through ambient fans when turned off

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Steps towards Energy Efficiency

- 1) Use meters or sub-meters
- 2) Ensure controls work correctly
- 3) Consider VSD's
- 4) Calibrate temperature probes annually
- 5) Insulation
- 6) Fans & ducts
- 7) Doors / Louvres and joints
- 8) Lighting
- 9) Consider replacing old motors or graders
- 10) Get an energy audit
- 11) Layout – Ensure boxes allow uniform airflow
- 12) Hygiene – Keep fans and ducts and coils clear of debris – good airflow

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Improve field operations

- Correct tractor ballasting
- Tyre selection
- Implement matching

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Methane powered tractors



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Methane tractors

- On combustion only releases CO2 and water – Emissions are 80% lower than diesel equivalents.
- Possible 30% savings on running costs
- No AdBlue
- Top speed of 50kph
- Methane is stored in pressurised composite layered tanks.



15

LED Lighting

Cost of LED Lighting and fitting €71 + €4	€75
Energy used by LED light	25 W
Energy used by double fluorescent tubes	116 W
Hours of light per day	14
Saving in electricity (116W – 25W)	91 W
At 14 hours per day (14 x 91W)	1274 Wh
For 365 days	465 kWh
At 18 cent per kWh / unit of electricity = 465 x 0.18	€84
Accelerated Capital Allowances (TAX)	

CO2 savings 465 x 0.437 kg of CO2 per kWh = 203 kg



15

Renewable Energy Systems

- Wind and solar: can provide energy for cooling without being too sensitive to the erratic availability of these energy sources.
- Heat recovery: in some situations, it may be feasible to use recovered heat for offices, workshops or domestic dwellings.
- Alternative Refrigeration: currently use conventional compression cycle refrigeration.



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The SSRH



18

What is the SSRH?

- Govt. scheme
- Financial support to renewable heat generators
- 15 year period
- Administered by SEAI
- Technologies – Solid Biomass Boilers & Heat Pumps
- Non-domestic sector



19

SSRH proposed tariff levels (Cent for each kWh of heat produced)

Tier	Lower Limit (MWh/yr)	Upper Limit (MWh yr)	Biomass Heating Systems Tariff (c/kWh.yr)	Anaerobic Digestion (c/kWh.yr)
1	0	300	5.66	2.95
2	300	1,000	3.02	2.95
3	1,000	2,400	0.5	0.5
4	2,400	10,000	0.5	0.0
5	10,000	50,000	0.37	0.0
6	50,000	N/A	0.0	0.0



Photovoltaics



- One kilo Watt Photovoltaic, produces 822 kWh in year one with output declining by 0.7% per year.
- Average output of 764 kWh per year over 20 years
- Requires RESS in form of REFIT to support.
- Using 100% in the business
- 764 kWh (18.0 cent per kWh) = €137 payback/yr.
- At a cost of €1,100 per kW installed gives a simple payback of **8.0 years**
- TAMS Grant available 40%**
- 60% for Young Trained Farmers**



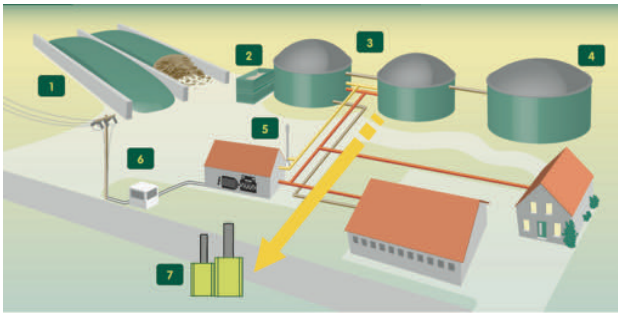
PV cuts your Carbon Footprint

- Each kWh of electricity generated by fossil fuels produces around 0.47 kg of carbon dioxide.
- A 20 kW PV system will produce about 20 x 800 kWh per year (16,000 kWh)
- This reduces the carbon footprint of the business by 16,000 x 0.47 kg = 7,520 kg of **7.5 tonnes**



18

Biogas Plant



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Conclusions



- Storing potatoes is one of the most energy intensive activities in agriculture.
- There are many modern stores but also many ageing stores that waste energy
- Refrigeration costs and the efficiency at which stores are cooled is the key concern.
- **RURAL COMMUNITIES CAN REALISE FARM DIVERSIFICATION OPPORTUNITIES** – Renewables will help Ireland meet its renewable / decarbonisation targets
- **RURAL COMMUNITIES CAN REALISE FARM DIVERSIFICATION OPPORTUNITIES** – Renewables will help Ireland meet its renewable / decarbonisation targets


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Desiccation – Life after Diquat


Shay Phelan, Teagasc

Desiccation – Life after Diquat
Shay Phelan
Teagasc Potato specialist

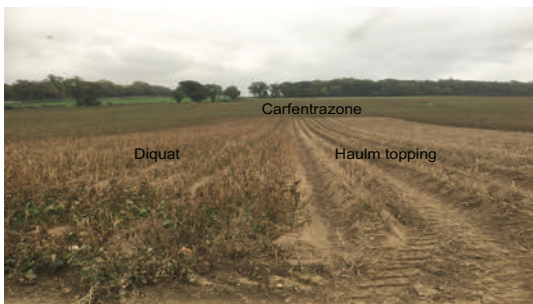


Desiccation


- Diquat – last date of use **4 Feb 2020**
- Very efficient desiccant and herbicide
- Fast acting – 2 applications
- Good on leaves + stems
- Reliable



Options



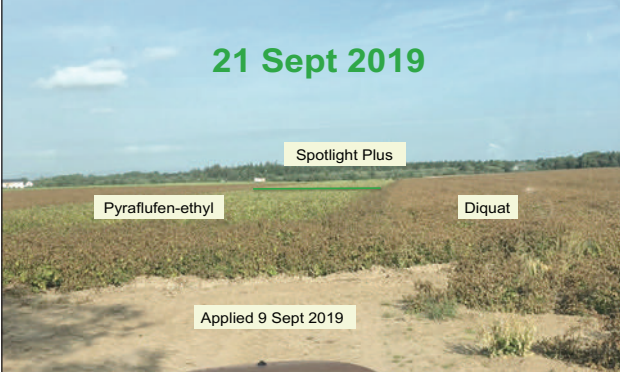
Diquat Carfentrazone Haulm topping



Spotlight Plus Diquat




21 Sept 2019




Pyraflufen-ethyl Spotlight Plus Diquat

Applied 9 Sept 2019



Carfentrazone-ethyl

- Spotlight Plus
- Max individual dose 1.0l/ha
- Max total dose 1.6l/ha
 - Second appl. must not exceed 0.6l/ha
- Interval 7 days
- PHI 7 days



Spotlight plus – a few points

- Good on stems
- No translocation into tubers
- Weaker on leaves than diquat
- Better results when applied in direct sunlight
- 300l/ha min.
- No problem in dry weather.



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Spotlight Plus – more points

- Works best when crop is senescencing
- Trace elements *may* help take down leaves
- Works well with Ranman Top
- Can be used +/- haulm topping
 - Leave enough leaf on to take in chemical!



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Desiccation strategy

- Harvest date October 1st
- Desiccation time 4 weeks min.
- Last date for application end of August
- 1st application 7-10 days earlier
 - 20th August - first application!!



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Haulm Topping

Pros

- Fast acting
- Leaves removed immediately
- Stops growth



Cons

- Slow work
- Need good ground conditions
- Disease spread
- Even haulm length
- Fungicide/dessicant needed
- Crows



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Haulm topping

Good job



Poor job



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Haulm Topping

- Top to 8 inches
 - Leave some leaves for fungicide/dessiccation uptake
- Watch out for scalping e.g. wheel tracks
- Lifters for lodged crops
- Treat fungicide/dessicant within 48 hours



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Classification of Varieties according to haulm longevity

1	2	3	4
Short Longevity	Medium Longevity	Long Longevity	V. Long Longevity
Premiere	B. Queen, Lady Rosetta	Rooster, M. Piper	Markies, Cara
Home Guard	Lady Claire, Charlotte	Golden Wonder	Kerrs Pink
	Maris Peer	Record	



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Maincrop N rates (Kg/ha)

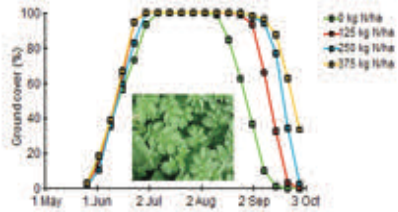
Variety determinacy group	Soil Index			
	1	2	3	4
1	-	-	-	-
2	190 - 250	160 - 190	140 - 160	120 - 140
3	150 - 210	130 - 150	110 - 130	80 - 110
4	100 - 180	70 - 90	50 - 70	20 - 40

Variation in variety Nitrogen requirements



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Effect of N application rate on canopy persistence in Brooke (CUF 2009)



Source: AHDB



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Potential Options

- Haulm pullers
- Salts
- Electrocuting
- Nutrient toxicity
- Natural death



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Workshop → Points to consider

- Crop nutrition
- Organic manures
- Late planting
- Role of Sprouting
- Seed crops



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Conclusions

- Options are very limited
- Nothing as convenient as diquat
- More planning of the crop needed



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Be CIPC Compliant
 All applications of CIPC from the 2017 harvest must be made using active recirculation to comply with protocol



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Controlling Sprouting in Store without CIPC

Adrian Briddon, Sutton Bridge



Controlling sprouting in store without CIPC

Adrian Briddon
AHDB Sutton Bridge Crop Storage Research

National Potato Conference and Trade Show 2020

CIPC is being withdrawn in 2020


Approvals for CIPC have been withdrawn (8 January 2020)



Storage, use or disposal of CIPC needs to be completed by 8 October 2020




CIPC



What now?

The legacy

- EU process




CIPC contamination¹

- Without approvals for CIPC the MRL will revert to LOQ (0.01ppm)
- AHDB is submitting data to support a tMRL -

stores	max CIPC residue ¹	mean CIPC residue
11	0.36	0.052

bulk & box stores
storage durations from 3 to 8 months
CIPC cessation 1 to 12 years
all stores exceeded the LOQ at 3 months

¹CIPC residue of potatoes held in stores where CIPC applications have ceased. This is the likely magnitude of contamination from the store fabric.




CIPC contamination update



- Rapporteur Member State (NL) has recommended a tMRL
- Requires EFSA ratification

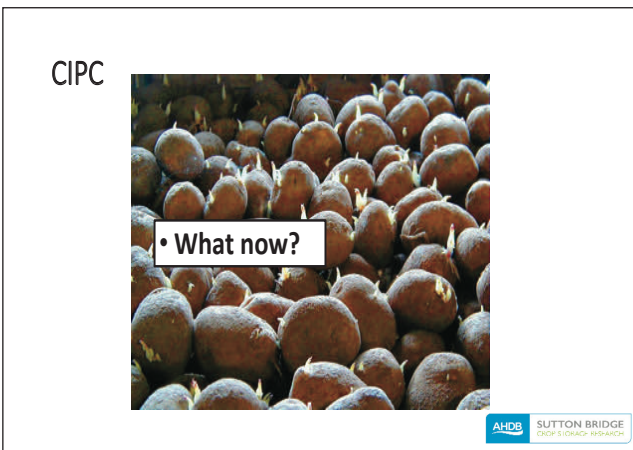
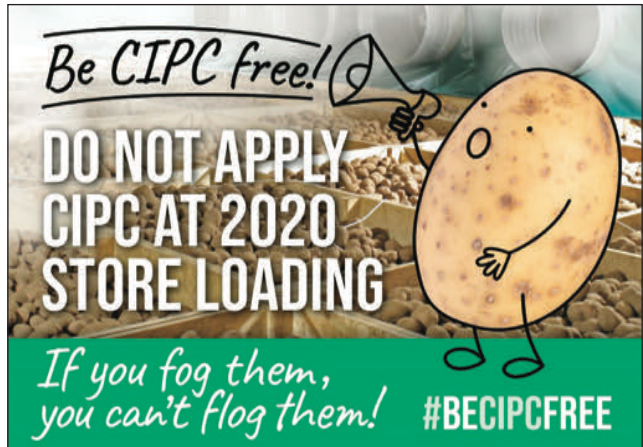
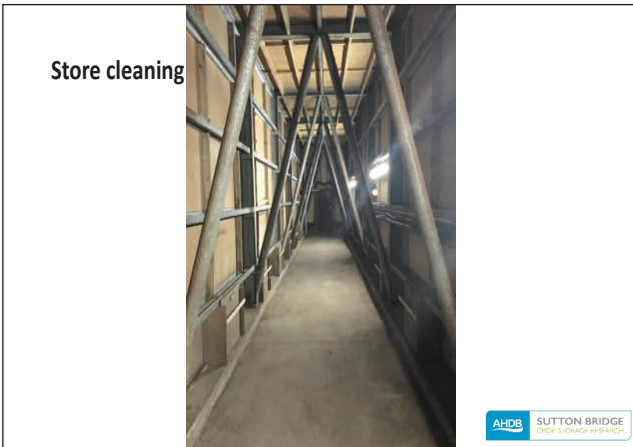
As stores empty

- leave boxes to weather outside
- leave stores open to 'air' (CIPC sublimes)
- cleaning
 - chisel or wirebrush solid deposits in main duct
 - remove all loose dust & soil with hoover
 - be aware of operator exposure



Store cleaning



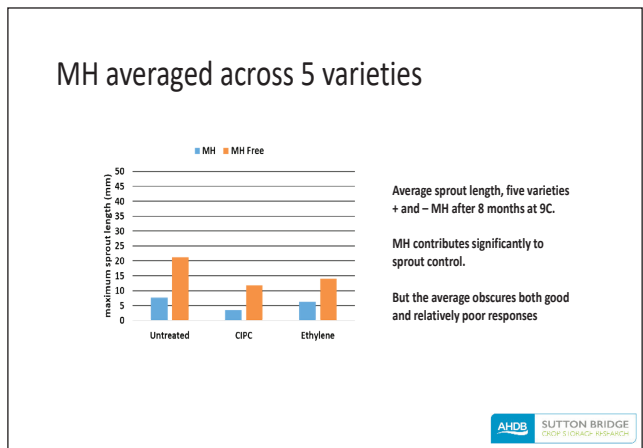
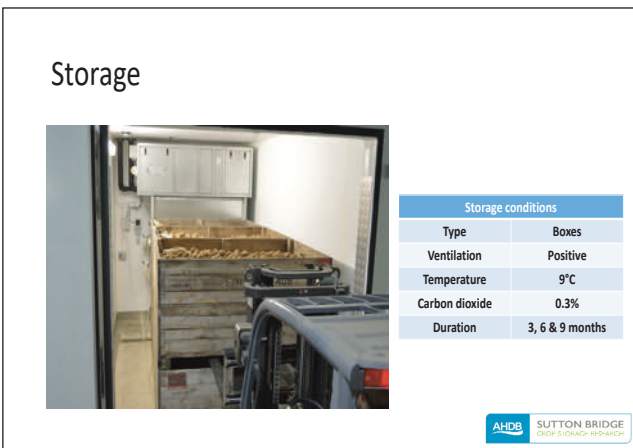
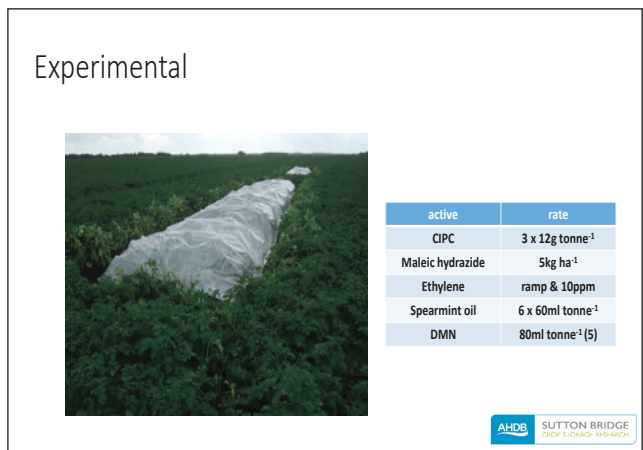
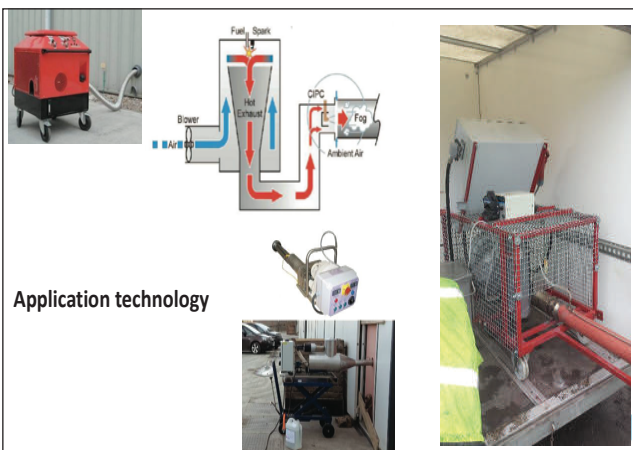
Limited availability of sprout suppressants

active	2018	2019	2020	2021
MH ¹	✓	✓	✓	✓
CIPC	✓	✓	✗	✗
Spearmint ²	✓	✓	✓	✓
Ethylene	✓	✓	✓	✓
DMN ³	✓	✓	✓	✓
Orange ⁴	✗	✗	?	?
SB ⁵	✗	✗	✗	✗

2020 UPDATE
BIOX-M label requires approved application equipment and 48 hour store closure period.

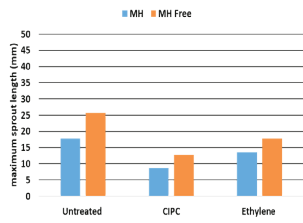
¹ Some markets may limit maleic hydrazide
² Spearmint oil/BIOX-M
³ 1,4-dimethylnaphthalene/1,45IGHT
⁴ Orange oil, Argos
⁵ 3-decen-2-one/SmartBlock

AHDB SUTTON BRIDGE
CICP 5.10.6ACD-190-440CH



Cultivar Performer

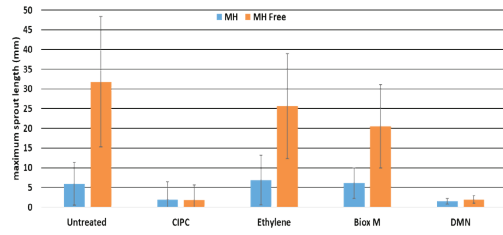
MH residue concentration 5.9 mg kg⁻¹ SD1.81



AHDB SUTTON BRIDGE
CIPIC 5.10.6420-110-4420

Cultivar Royal

MH residue concentration 7.8 mg kg⁻¹ SD1.97



Sprouting was maintained at low levels in Innovator and VR808 when MH was used and residue values were 37 and 15ppm respectively

AHDB SUTTON BRIDGE
CIPIC 5.10.6420-110-4420

The importance of MH

- Synergy
- Cost control
 - Maleic hydrazide (and CIPC) is non-volatile (low SVP)
 - Residues are long-lived
 - Ventilation of stores has little impact on residues
- Not to mention control of volunteers & 2nd growth
- The new products tend to be volatile (high SVP)
 - Restricting ventilation extends period of sprout control
 - Ambient air exchange results in losses (additional cost)
 - ambient air cooling / carbon dioxide flushing / drying rots
 - store leakiness

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CIPIC 5.10.6420-110-4420



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Notes

Notes

Notes

Notes

All roads lead to



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