

Estimating the economic cost of PCN to the Scottish economy – a modelling approach

Steven Thomson

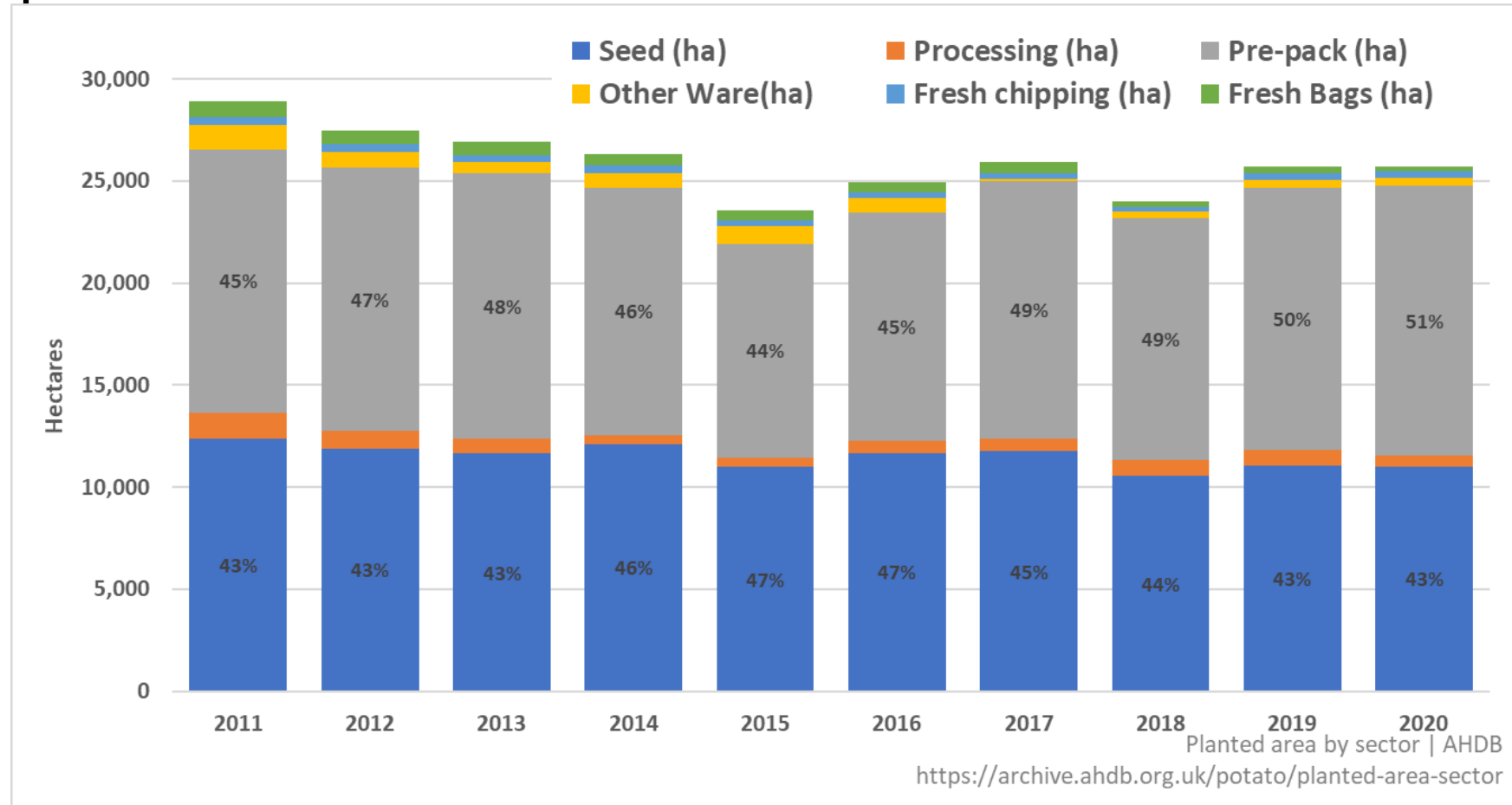
Reader in Agricultural Economics and Policy

PCN Action Scotland Winter conference,
17th Jan 2023

Seed sector underpins

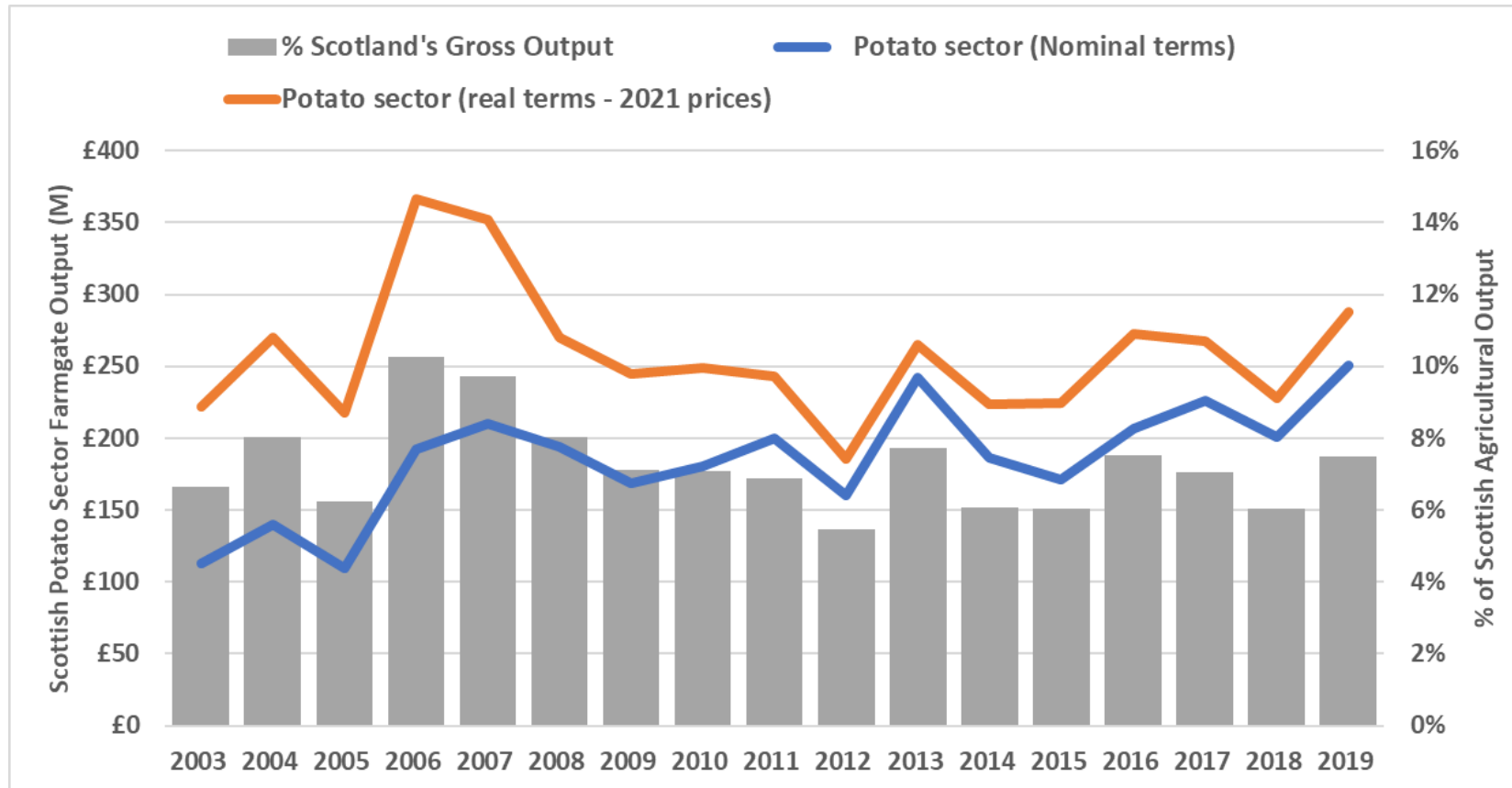


- c. 11k Ha of seed and 15k Ha ware grown
- Seed sector underpins Scottish ware, UK ware & international growers
- Thus impacts beyond Scotland (aka 'exports')

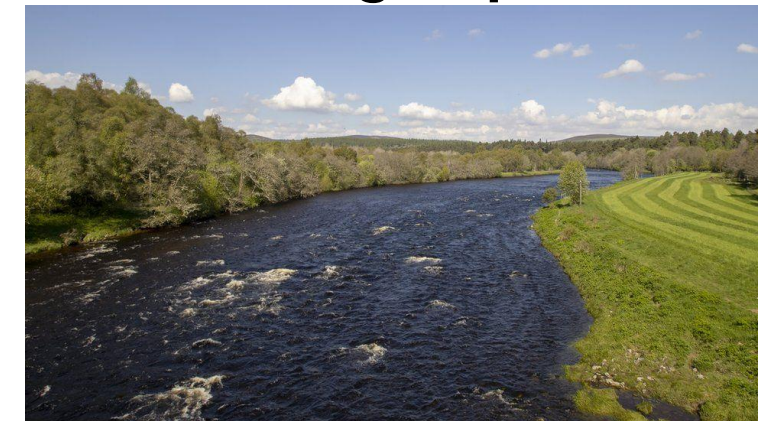


Potato sector economic contribution

- Traditionally the contribution of sector = farmgate output = c. £250m



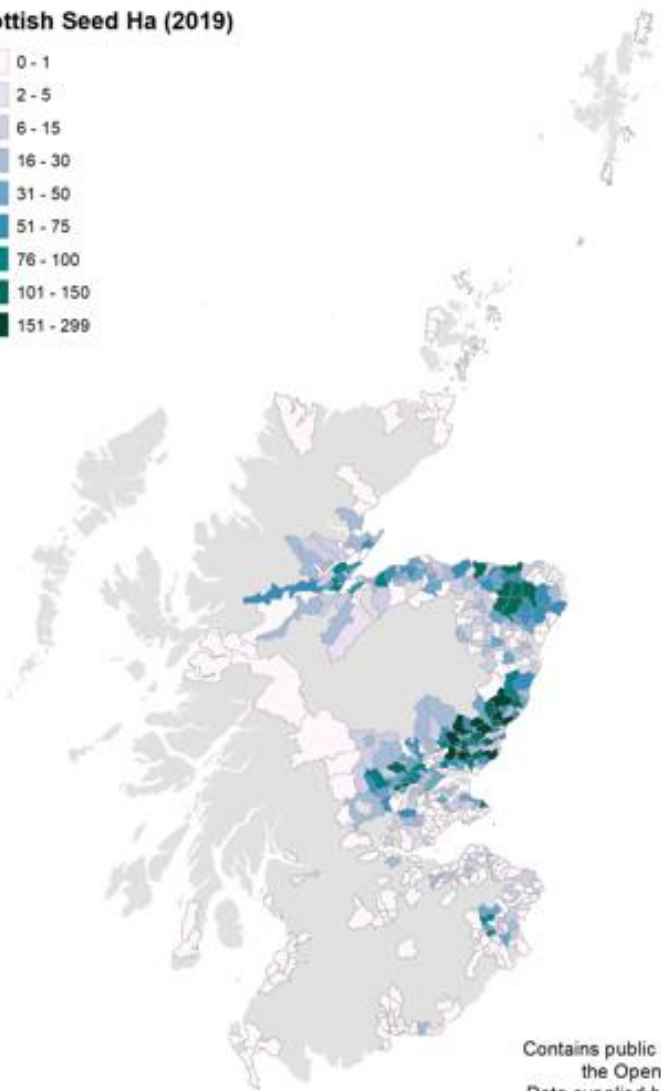
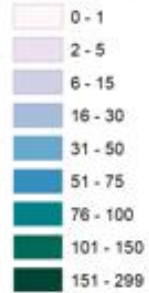
BUT
No upstream supplier
or downstream
processing and
retailing impacts



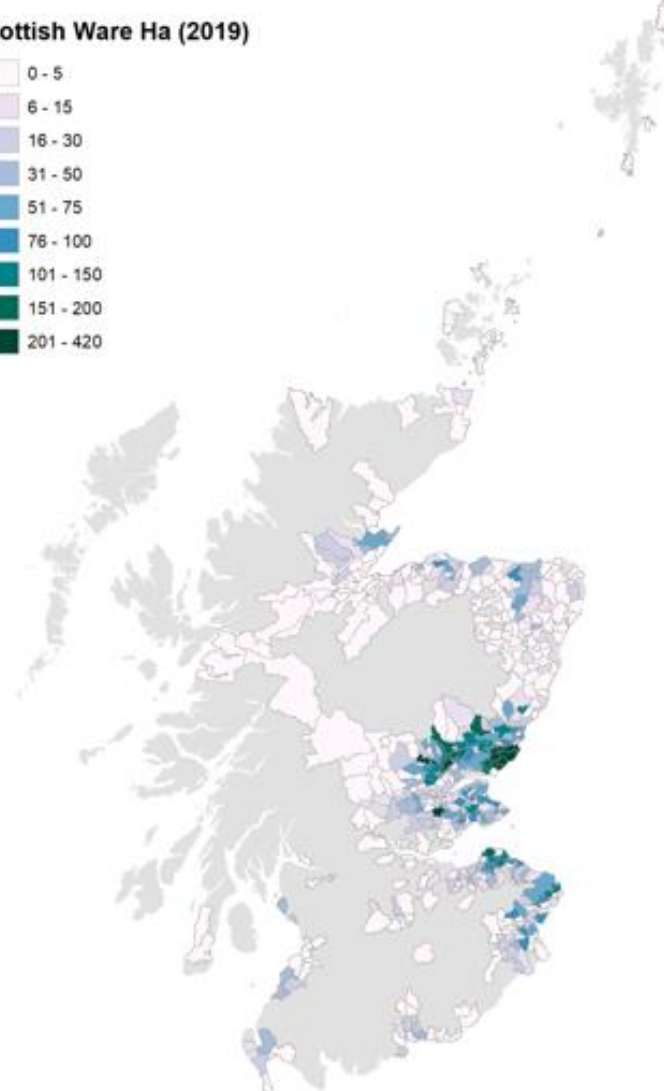
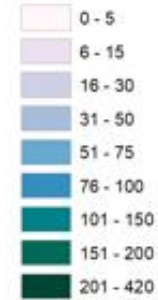
Estimated farmgate value of Scotland's potato sector and average seed and ware/earlies price 2003-2019

Impact form relatively small geography

Scottish Seed Ha (2019)

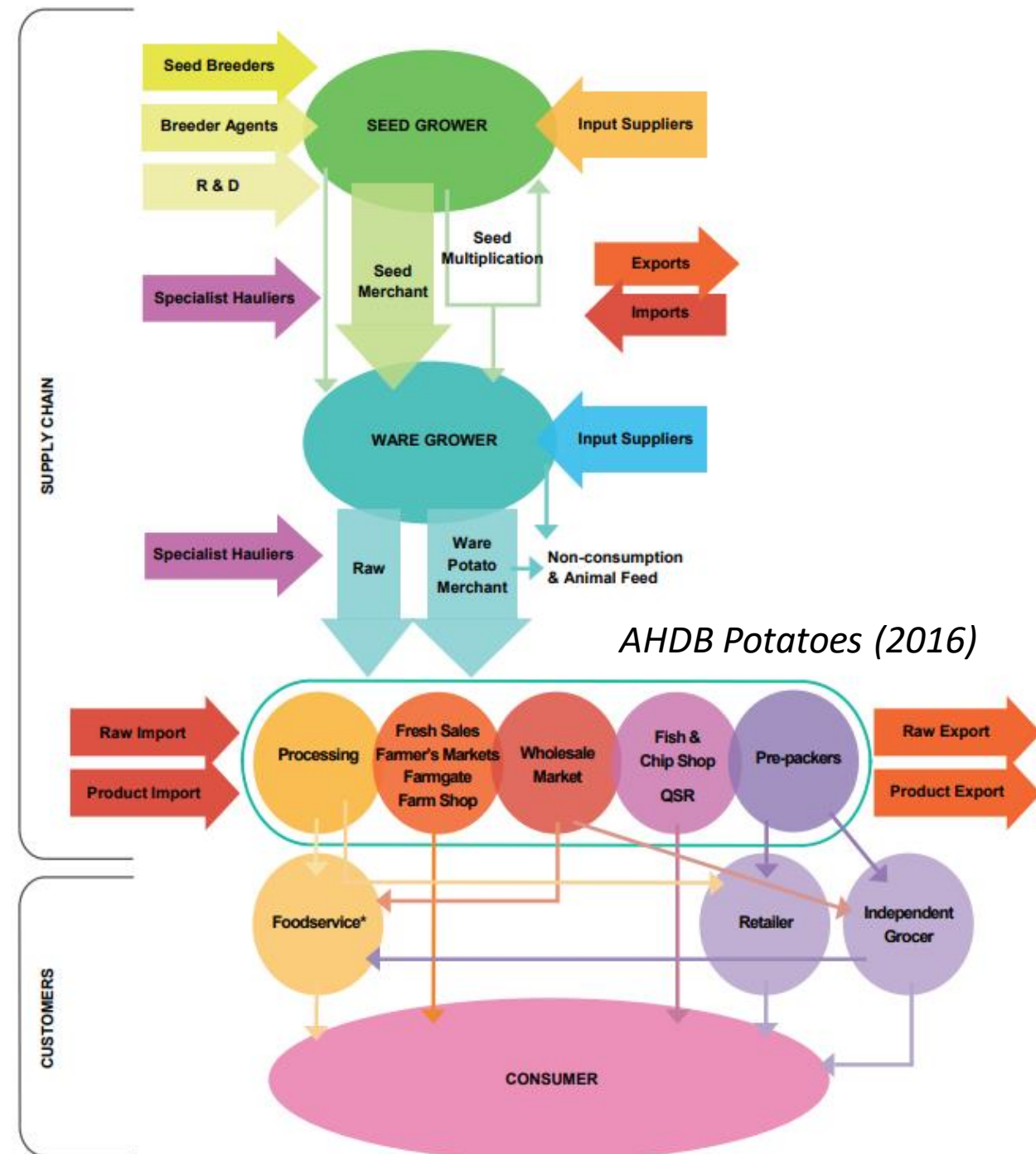
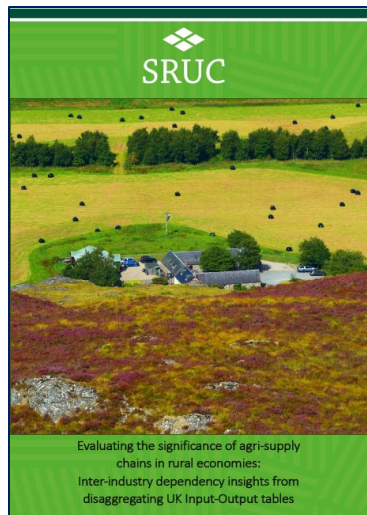
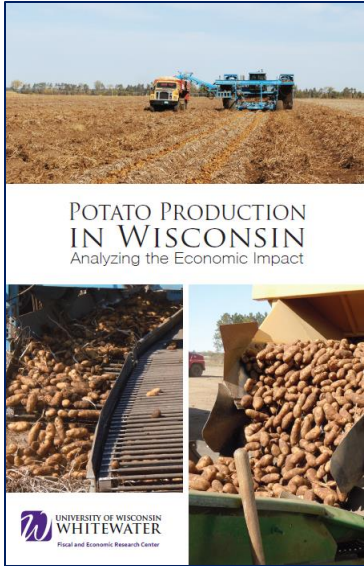


Scottish Ware Ha (2019)

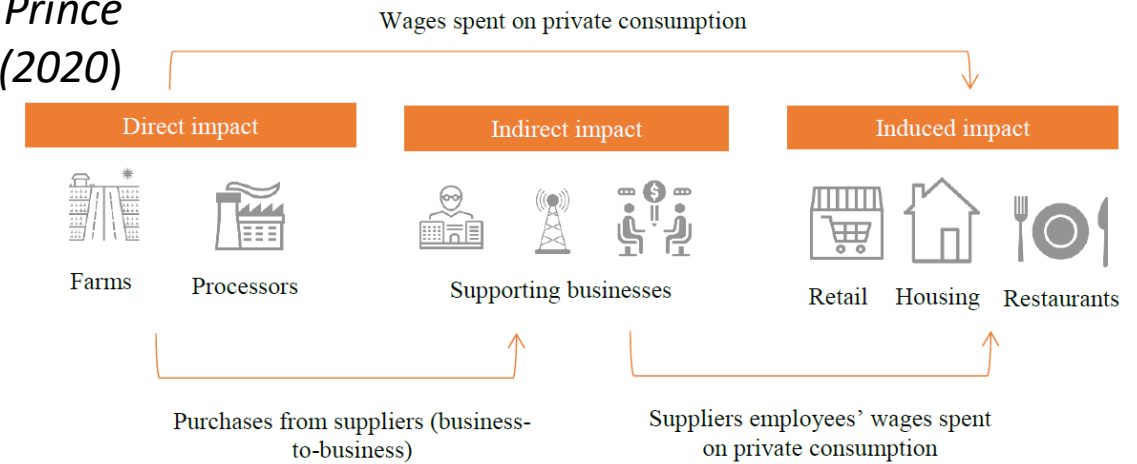


Beyond farm gate

- Need to capture some of the wider impacts!
- Input-output tables and multipliers



Using Existing Multipliers



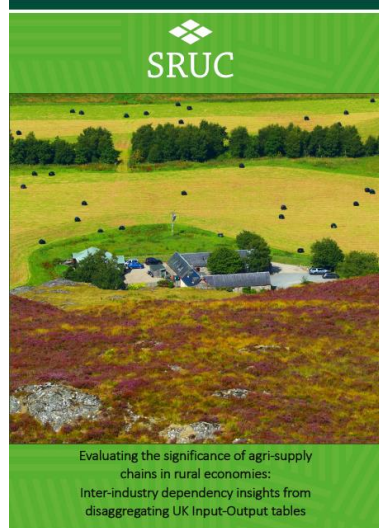
Estimated economic contribution of Scottish seed and ware potato sectors in the Scottish and UK economies using Leontief backward multipliers 2019

	Multiplier	Estimated Economic Impact		
		Seed	Ware	Total*
Direct impact	(a) 1	£155.3m	£90.0m	£250.0m
Scotland Type I Output	(b) 1.415	£219.8m	£127.3m	£353.8m
Scotland Type II Output	(c) 1.422	£220.9m	£127.9m	£355.5m
Indirect impact	(b)-(a)	£64.5m	£37.3m	£103.8m
Induced impact	(c)-(b)	£1.1m	£0.6m	£1.8m
United Kingdom Type I Output	(d) 1.77	£274.4	£159.0m	£441.8m
United Kingdom Type II Output	(e) 2.79	£433.9m	£251.3m	£698.5m
Indirect impact	(d) - (a)	£119.1m	£69.0m	£191.8m
Induced impact	(e) - (d)	£159.5m	£92.4m	£256.8m
UK Type 1 Income Multiplier	2.047	£388.3m	£224.9m	£625m
UK Type 1 Employment	1.345			

Multipliers naturally greater across larger UK market – where there is more added value opportunity and induced impacts

Impact on household income from sector

For every direct FTE potato jobs an additional 0.345 jobs up/downstream





Using I/O multipliers & farmer expenditure data to shock upstream sectors

-Thanks to [AHDB](#) for use of Farmbench data) & sector contacts for financial insights

Allocate Farmbench data to Input Output SIC codes



Agriculture

3rd Party Storage,
Contracting,
Organic fertiliser,
Rent, Seed

Coke, petroleum & petrochemicals

Fuel

Electricity

Electricity, Drying
& storage energy

Machinery & equipment

Equipment Hire & Leasing

Financial services

Overdraft, loans,
HP, bank charges

Construction

Buildings & drainage
depreciation, Property
repairs, farm maintenance,
store maintenance

Insurance & pensions

Insurance

Wholesale - excl vehicles

Equipment depreciation, mole
ploughing, soil conditioning

Research & development

Research

Retail - excl vehicles

Sundries

Textiles

Fleece

Inorganic chemicals, dyestuffs & agrochemicals

Seed treatment, herbicides, fungicides,
insecticides, nematicides, molluscicides, other
crop protection, Inorganic fertiliser

Repair & maintenance

Equipment spares and
repairs

Other professional services

Seed certification, agronomy fees,
levy, subscriptions, professional fees

Oil & gas extraction, metal ores & other

Lime & Trace Elements

Public administration & defence

Government / Agency

Telecommunications

Telephone & Office

Labour

Direct staff costs

Water & Sewerage

Water

Other land transport

Haulage

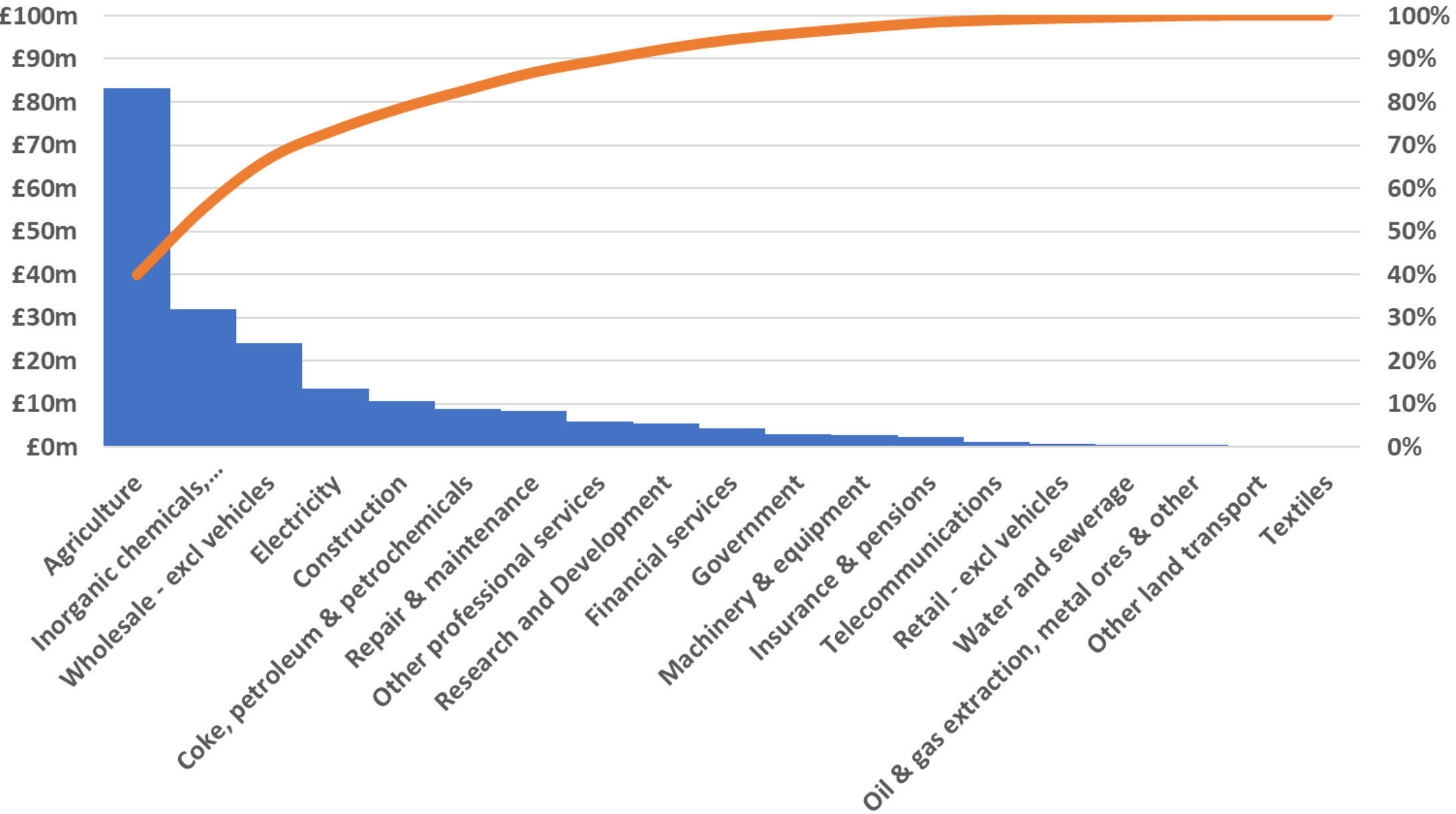
Model Summary

Seed Ha	10,749	Total Costs	£164.7m		
Ware Ha	12,512	Total Returns	£198.7m		
Total Ha	23,261	Upstream impacts (direct, indirect and induced impacts)			
Scottish IO sector	Per Ha	Output Multiplier	Income Effect	Employment Effect	GVA Effect
Agriculture	£2,076	£83.2m	£13.9m	691	£34.9m
Coke, petroleum & petrochemicals	£347	£8.8m	£1.7m	27	£2.7m
Construction	£309	£10.7m	£2.6m	86	£5.0m
Oil & gas extraction, metal ores & other	£25	£0.6m	£0.1m	4	£0.2m
Textiles	£1	£0.0m	£0.0m	0	£0.0m
Inorganic chemicals, dyestuffs & agrochemicals	£1,024	£31.9m	£7.9m	161	£17.4m
Other professional services	£144	£5.8m	£2.1m	71	£3.2m
Telecommunications	£33	£1.2m	£0.4m	11	£0.8m
Water and sewerage	£19	£0.6m	£0.1m	3	£0.4m
Electricity	£350	£13.6m	£1.7m	37	£5.6m
Financial services	£142	£4.5m	£1.2m	24	£2.4m
Other land transport	£140	£0.2m	£0.1m	2	£0.1m
Wholesale - excl vehicles	£711	£24.2m	£7.0m	173	£12.8m
Insurance & pensions	£85	£2.4m	£0.4m	8	£1.0m
Machinery & equipment	£93	£2.7m	£0.8m	17	£1.2m
Retail - excl vehicles	£21	£0.8m	£0.3m	12	£0.5m
Repair & maintenance	£299	£8.3m	£3.1m	47	£5.0m
Total Inter-Industry	£5,819	£199.4m	£43.3m	1,374 FTEs	£93.2m
Gross operating surplus (after labour)	£1,463	£34.0m			
Research and Development	£138	£5.5m	£1.8m	44	£2.6m
Government	£86	£3.1m	£1.2m	25	£1.8m
Total Inter-Industry	£6,042	£208.0m	£46.3m	1,443 FTEs	£97.6m

	Labour/Ha	Staff Costs		
Direct Potato Labour (@ c. £14/hr)	£1,260	£36.8m	1,264	Potato FTEs
Government wages	£172	£4.0m	80	Govt FTEs

Direct, Indirect and Induced Output Impacts - Scottish Potatoes (Av 2017-20)

■ Output Multiplier — Cumulative %



Making PCN scenario adjustments

- With experts we can now run the economic model (Seed and Ware) to reflect PCN & other outcomes

PCN Scenario example				
Factor	Assumptions	%Adjustment	Total	
Ha	Reduced area	85%	9,137	
Yield	Increased losses	82%	30.24	
Price	Increased seed price due to supply shortage	120%	£276	
Rent	Rent increases due to land scarcity	150%	£1,296	
Seed	Seed costs increase	120%	£1,585	

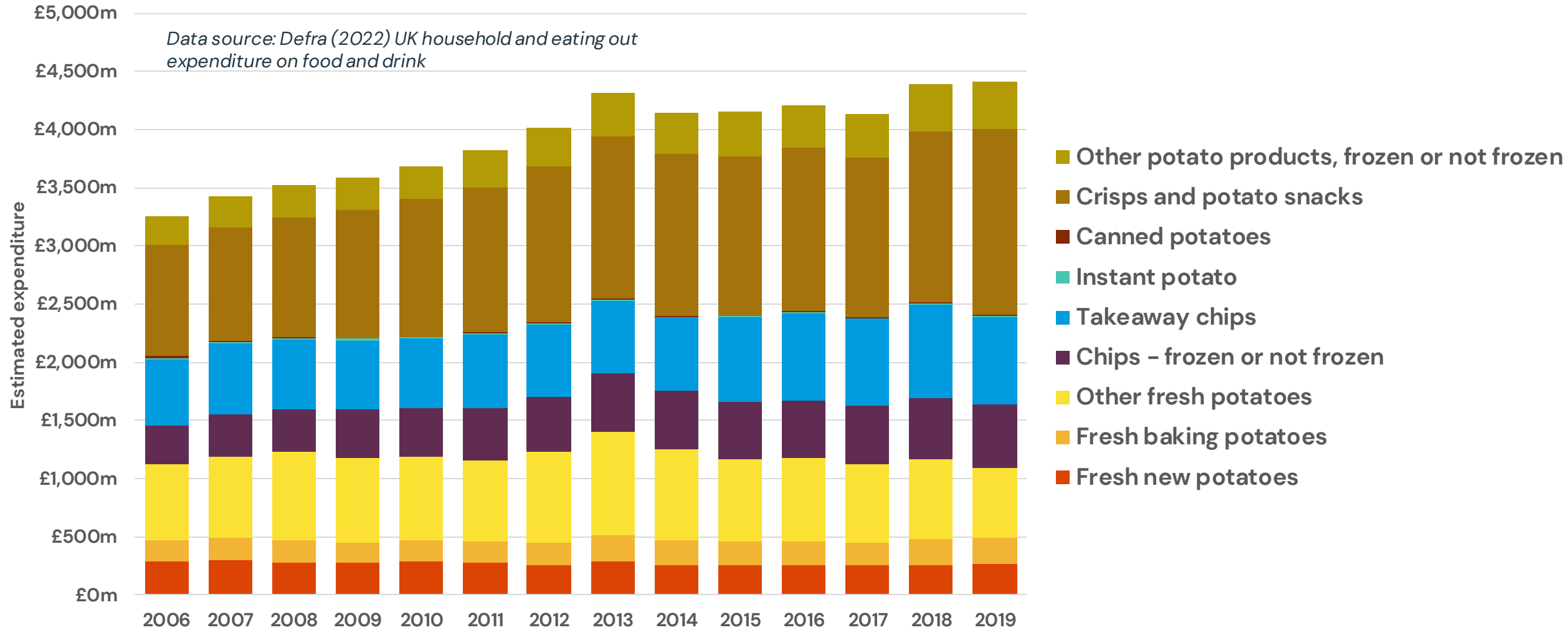
Downstream impacts – harder to estimate?

- Ex-farm gate economic impacts are more challenging to estimate
- Large businesses operating in multiple countries
- Commercially sensitive data
- Company accounts demonstrate scale of larger processors
 - Combined '00s of million turnover, '000s of staff and millions of wages.
- Haulage, retail, hospitality sectors, etc add to the downstream impacts – all stemming from seed sector



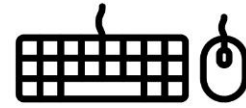
UK Household and eating out expenditure on potatoes

Data source: Defra (2022) UK household and eating out expenditure on food and drink



- UK c.70% self-sufficient in potatoes suggesting c.£3bn potato products consumed from the UK
- Estimate that **for every £1 of potatoes grown and sold in the UK, consumer expenditure is £3.70 through value chain and retail impacts**

Contact Details



steven.thomson@sruc.ac.uk



[@StevenGThomson](https://twitter.com/StevenGThomson)