



Scotland *The Bread*

building a home-grown grain economy

Andrew Whitley
Bread Matters

Organic Producers' Conference 2014
Diversity in Practice

An 'independent' Scotland?

Wheat Crop 2014	700,000+ tonnes
Wheat required to make all bread	150,000 tonnes
Wheat directly used to make bread	Almost none
What is it used for?	Some biscuits & cakes
	Animal feed
	Distilling (whisky & bioethanol)
Food security?	

Not just 'adequacy of supply'

Food security sovereignty

Food quality – who decides?

Loss of grain nutrient density

Stoneground organic v
roller-milled non-organic:
Mg + 50% Zn + 46%

Chaurand, M. et al (2005). *Influence du type de mouture (cylindres vs meules) sur les teneurs en minéraux des différentes fractions du grain de blé en cultures conventionnelle et biologique.*

Fortification or integrity?

Iron, vit E

'Diversity for Adversity' (Martin Wolfe)

Genes, supply chains, control

A Scottish flour and bread supply	healthy, equitable, locally-controlled, sustainable
Participatory research and action	plant breeders, farmers, millers, bakers, public health nutritionists and citizens
Better grain	lowest environmental impact maximum nutritional benefit
Support local economies	more jobs per loaf; people nourished per hectare*
Public health	combat diet-related ill-health revitalised staple accessed and enjoyed by everyone
= food sovereignty	

***Redefining agricultural yields: from tonnes to people nourished per hectare**

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How?

New grain varieties/populations

organic, resilient, nutrient-dense,
digestible

Local processing

fresh milling
community-supported baking (CSB)

Time and skill

bringing out the best of the grain

Trading/distribution

fair trade; collaboration; sense of
place

Public health

feeding the vulnerable; reaching
everyone

Progress so far

2013-14

13 19th century Scottish varieties

Four organic farms

East Lothian, Peeblesshire,
Perthshire, Aberdeenshire

April-July 2014

Technology Strategy Board
Innovation voucher

Testing by James Hutton Institute

19th Century Scottish wheat varieties



Grown at Macbiehill, Scottish Borders, 2013

1	Rouge d'Écosse	NL	4439
2	Rouge d'Écosse	USA	361722
3	Rouge d'Écosse	CZ	101388
4	Rouge d'Écosse	PL	102
5	Scottia (Rubrum)	CZ	100809
6	Goldendrop	USA	340699
7	Goldendrop	DE	24156
8	Goldendrop	UK	497
9	Goldendrop	UK	10035
10	Goldendrop composite	UK	497
11	Shirreff's Dickkopf	DE	20994
12	College Hunters	USA	283862
13	Hunter's 2	UK	1123

Accession	Ca	Fe	K	Mg	Na	P	S	Se	Zn	No of top 3 scores
	mg/100g	mg/100g	mg/100g	mg/100g	mg/100g	mg/100g	mg/100g	µg/100g	mg/100g	
1, NL 04439 Rouge d'Ecosse	25.33	9.934	590.7	164.9	4.263	574.9	187.6	24.62	6.368	6
2, US 361722 Rouge d'Ecosse	22.47	6.928	508.2	133.7	4.599	487.8	159.3	9.209	4.71	1
3, CZ 101388 Rouge d'Ecosse	22.45	15.51	507.2	146.6	2.248	490.3	163.1	<0.05	5.47	
4, PL 102 Rouge d'Ecosse	23.33	6.959	517.5	139.6	2.601	520.4	170.9	<0.05	5.084	
5, CZ 100809 Scotia (rubrum)	25.92	6.786	518.2	157.2	4.834	557.8	180.6	<0.05	5.846	2
6, US 340699 Golden Drop	21.78	12.47	472.9	139.2	2.683	517.2	186.5	<0.05	6.586	2
7, DE 24156 Golden Drop	24.83	7.11	490	137.3	2.364	479.6	179.8	<0.05	5.352	
8, UK 497 Golden Drop	30.67	92.01	484.6	159.8	2.173	521.2	182.9	20.61	5.972	4
9, UK 10035 (FR 3374) Golden Drop	35.57	14.63	478.4	139.6	3.614	474.3	163.8	10.14	5.025	3
10, UK 497 (DE 24156) Golden Drop	29.46	10.27	535.4	168.5	3.699	559.4	190.6	<0.05	7.531	6
11, DE 2094 Shirreff's Dickkopf	29.86	6.925	481.2	138.2	3.536	493.4	155.2	<0.05	4.391	1
12, US 283862 College Hunters	22.13	7.707	455.7	140.4	2.528	473.3	167.3	<0.05	5.551	
13 UK 1123 Hunter's 2	20.68	6.962	522.3	149.4	4.247	494	171.2	<0.05	5.329	2
14, AFP 1/1960 Mulika (Mungoswells)	31.95	5.099	530.2	120	3.717	397.1	159.4	29.47	3.262	
Dietary Reference Intakes (DRIs): Estimated Average Requirements (mg/day)	500-1100	3-23	300 5100	30-420	120-1500	100-1250	-	17-60	2-13	
Fineli: Wheatgrain crushed (http://www.fineli.fi/)	26.00	4.50	390.00	127.00	2.00	350.00	-	9.50	3.60	
USDA Whole grain wheat flour (http://ndb.nal.usda.gov/)	34.00	3.60	363.00	137.00	2.00	357.00	-	-	2.60	
Multielemental Fingerprinting as a Tool for Authentication of Organic Wheat, Barley, Faba Bean, and Potato. J. Agric. Food Chem. 2011, 59, 4385–4396	32.20	3.83		100.00	2.67	320.00	120.00		1.94	

Summer-Autumn 2014

Selection of varieties; sourcing new varieties for growing 2014-15; testing crop 2014

Work on nutritional standards

2015–

Pilot network of community bakers

Standards, training, further testing

Public procurement

New varieties, mixtures, populations meeting nutritional standards, adapted to local conditions

Horizon 2020 Sustainable Food Security 7B
with FAO and ORC?



No pain
No grain

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