



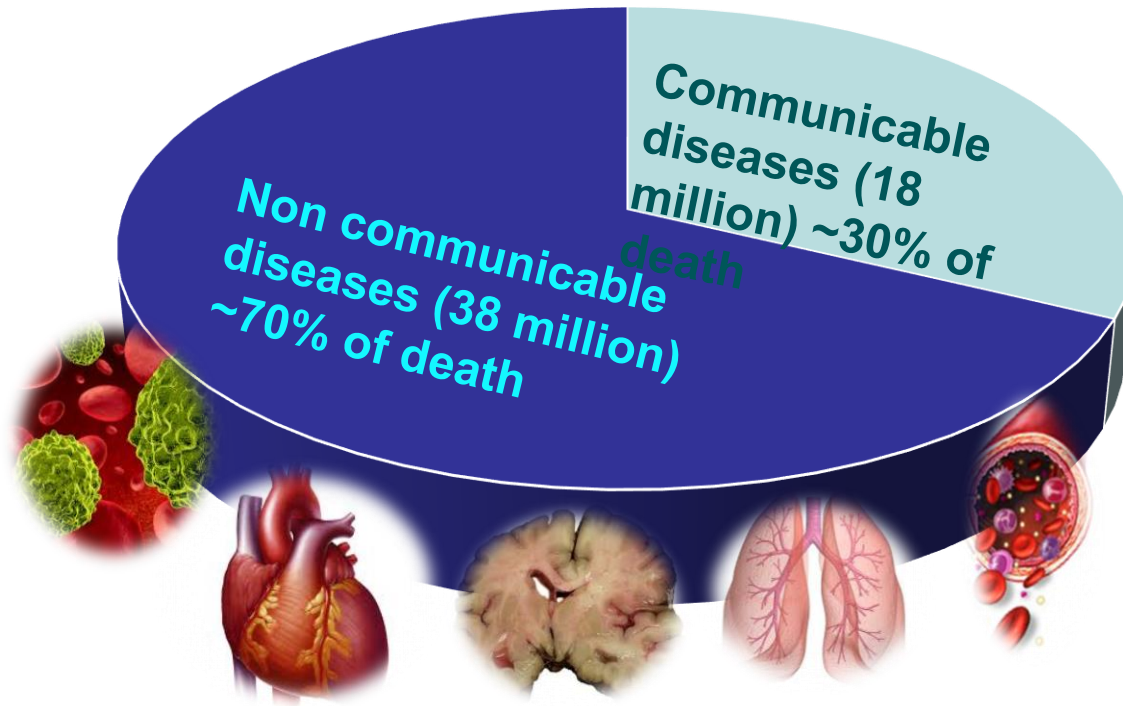
High Amylose Wheat: a route to healthier foods



**Develop and commercialise high
amylose wheat technology**



GLOBAL HEALTH BURDEN



Global mortality
(WHO, 2012)

A problem of the West?

Colorectal cancer

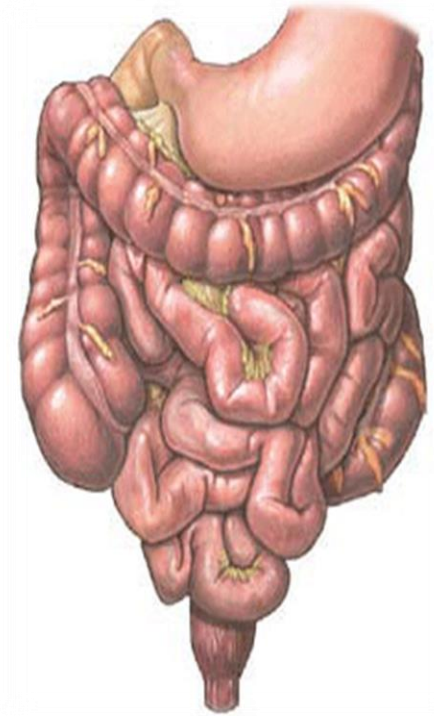
Kills 2X as many
Australians as
vehicle
accidents

70% of cases
preventable

Type-2 diabetes

\$9 Billion
total economic cost

58% of cases
preventable



Australian adults

1989

44%

overweight

11%

obese

Source: AIHW

2016

65%

overweight

29%

obese

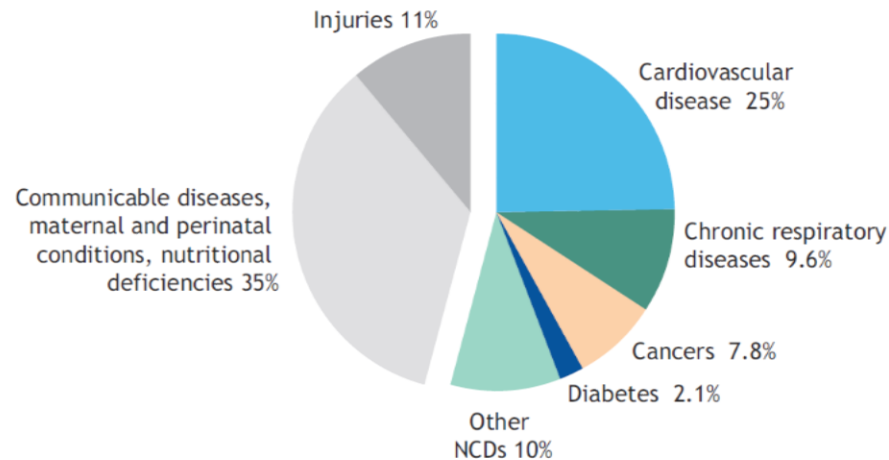
Worldwide obesity
gains 30 %



DAVE GRANLUND © www.davegranlund.com

NCD burden in Asia

Fig 2.1: Estimated percentage of deaths by cause, South-East Asia Region, 2008



NCDs are the leading cause of death in the Region

Source: Global Health Observatory. World Health Organization 2011.
Note: percentages do not add up to 100% due to rounding off.

Indiatimes| The Times of India |The Economic Times

THE TIMES OF INDIA LIFE

Life & Style Relationships Health & Fitness Listen To Your Sugar Beauty Spotlight Food
Health News Fitness Diet Weight Loss Home Remedies De-stress Specials Every Heart Coun

News » Lifestyle » Health & Fitness Tips » Health News » India is the diabetes capital of the world!

India is the diabetes capital of the world!

Rakesh Malik| Mumbai Mirror | Jan 28, 2016, 12:41 PM IST

WJGO World Journal of Gastrointestinal Oncology

[World J Gastrointest Oncol](#). 2012 Apr 15; 4(4): 68–70.

PMCID: PMC3334381

Published online 2012 Apr 15. doi: [10.4251/wjgo.v4.i4.68](#)

Increased burden of colorectal cancer in Asia

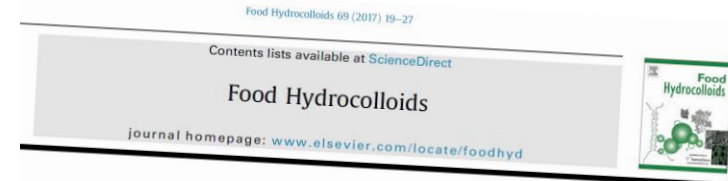
[Mohamad Amin Pourhoseingholi](#)



Fibre & Starch digestibility.....still **hot** topics



May/June 2017
Health & Nutrition
Volume 62, Number 3



Resistant starch: Variation among high amylose rice varieties and its relationship with apparent amylose content, pasting properties and cooking methods^{1,2}
Ming-Hsuan Chen^{a,*}, Christine J. Bergman^b, Anna M. McClung^a, Jace D. Everette^a, Rodante E. T.

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Editorial

☒ Why Is Fiber a Hot Nutrient?

Volume 95, February 2017, Pages 635-642

Optimization of resistant starch formation from high amylose corn starch by microwave irradiation treatments and characterization of starch preparations

Selime Mutlu^a, Kevser Kahraman^b, Serpil Öztürk^a, R. R.

ins mitigate *in vitro* wheat starch digestibility

Barón^a, Yuchen Gu^a, Thava Vasanthan^{a,*}, Ratnajothi Hoover^b



>100 articles
in 2017

Starch Digestibility and Physicochemical and Cooking Properties of Irradiated Rice Grains ☆

Luis Fernando Polesi^a, R. R., Manoel Divino da Matta Junior^b, Silene Bruder Silveira Sarmento^b, Solange Guidolin Canniatti-Brazaca^b



Relationships between physicochemical, thermal, rheological and *in vitro* digestibility properties of starches from pearl millet cultivars
Kawaljit Singh Sandhu^a, Anil Kumar Siroha

European Journal of Clinical Nutrition (2017) 71, 227–233; doi:10.1038/ejcn.2016.248; published online 14 December 2016

Carbohydrates, glycemic index and diabetes mellitus

The acute effects of inulin and resistant starch on postprandial serum short-chain fatty acids and second-meal glycemic response in lean and overweight humans

S Rahat-Rozenbloom¹, J Fernandes¹, J Cheng², G B Gloor³ and T M S Wolever^{1,4}

FULL ARTICLE

Starch digestibility and predicted glycemic indices of raw and processed forms of hausa potato (*Solenostemon rotundifolius* poir)

C. O. Eleazu^{1,2} | K. C. Eleazu³ | M. A. Iroaganachi⁴ | W. Kalu⁵

WILEY

Journal of Food Biochemistry

Cereal Chemistry

The premier, peer-reviewed grain science journal



Abstract

May/June 2017, Volume 94, Number 3
Pages 400-408
<https://doi.org/10.1094/CCEM-04-16-0089-R>

RESEARCH

Composition, Functional Properties, Starch Digestibility, and Cookie-Baking Performance of Dry Bean Powders from 25 Michigan-Grown Varieties

Yongfeng Ai^{1,2}, Yining Jin¹, James D. Kelly² and Perry K. W. Ng^{1,2}

Journal of the Science of Food and Agriculture

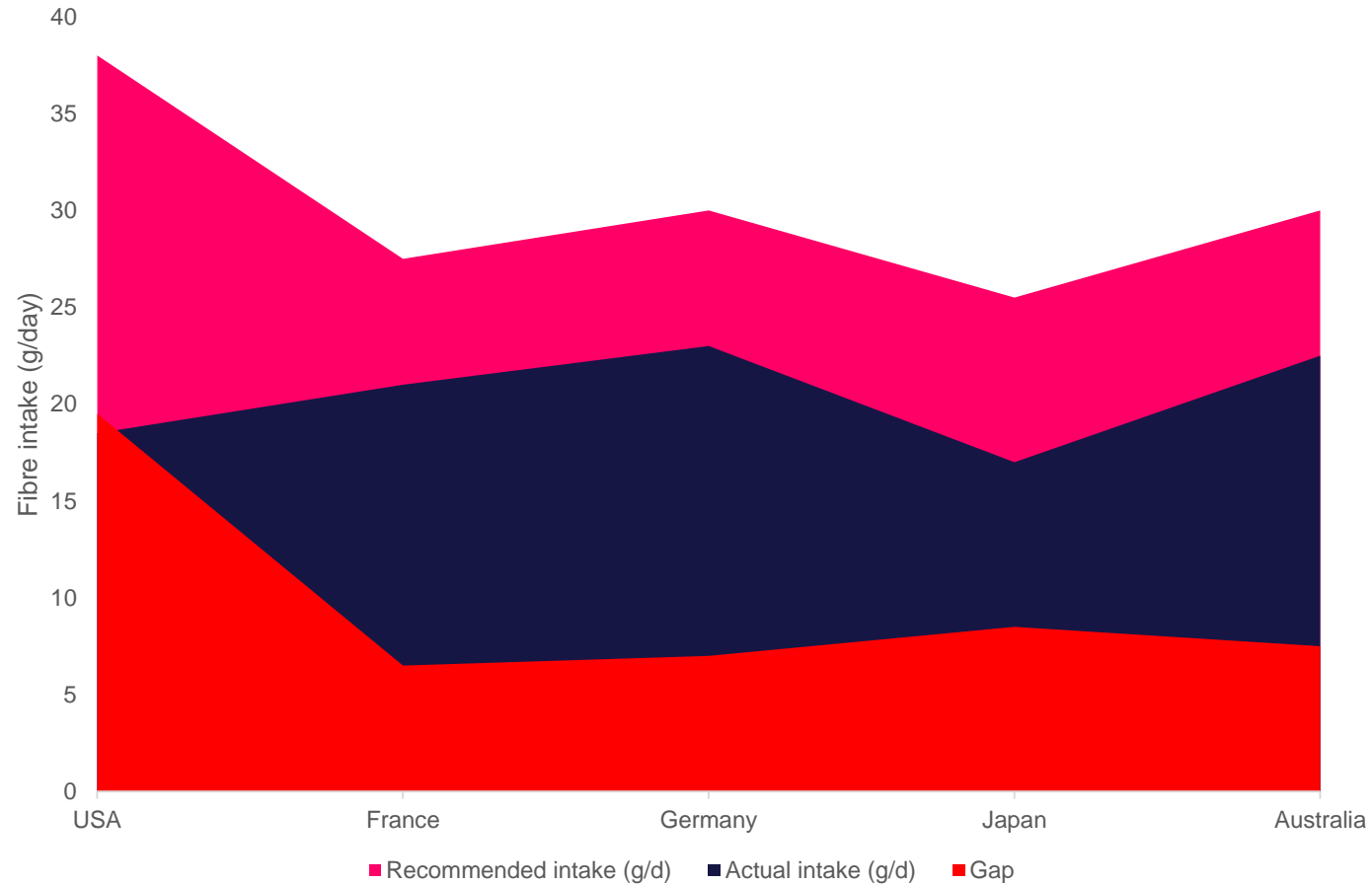
Explore this journal >

Research Article

Impact of postharvest drying conditions on *in vitro* starch digestibility and estimated glycemic index of cooked non-waxy long-grain rice (*Oryza sativa* L.)

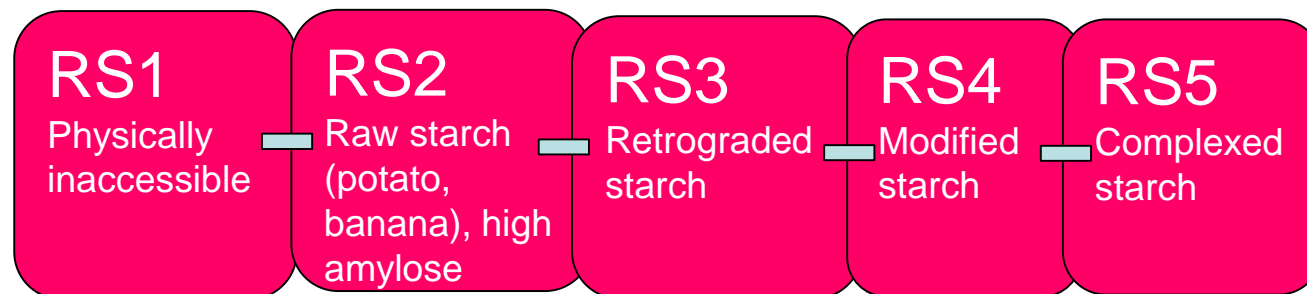
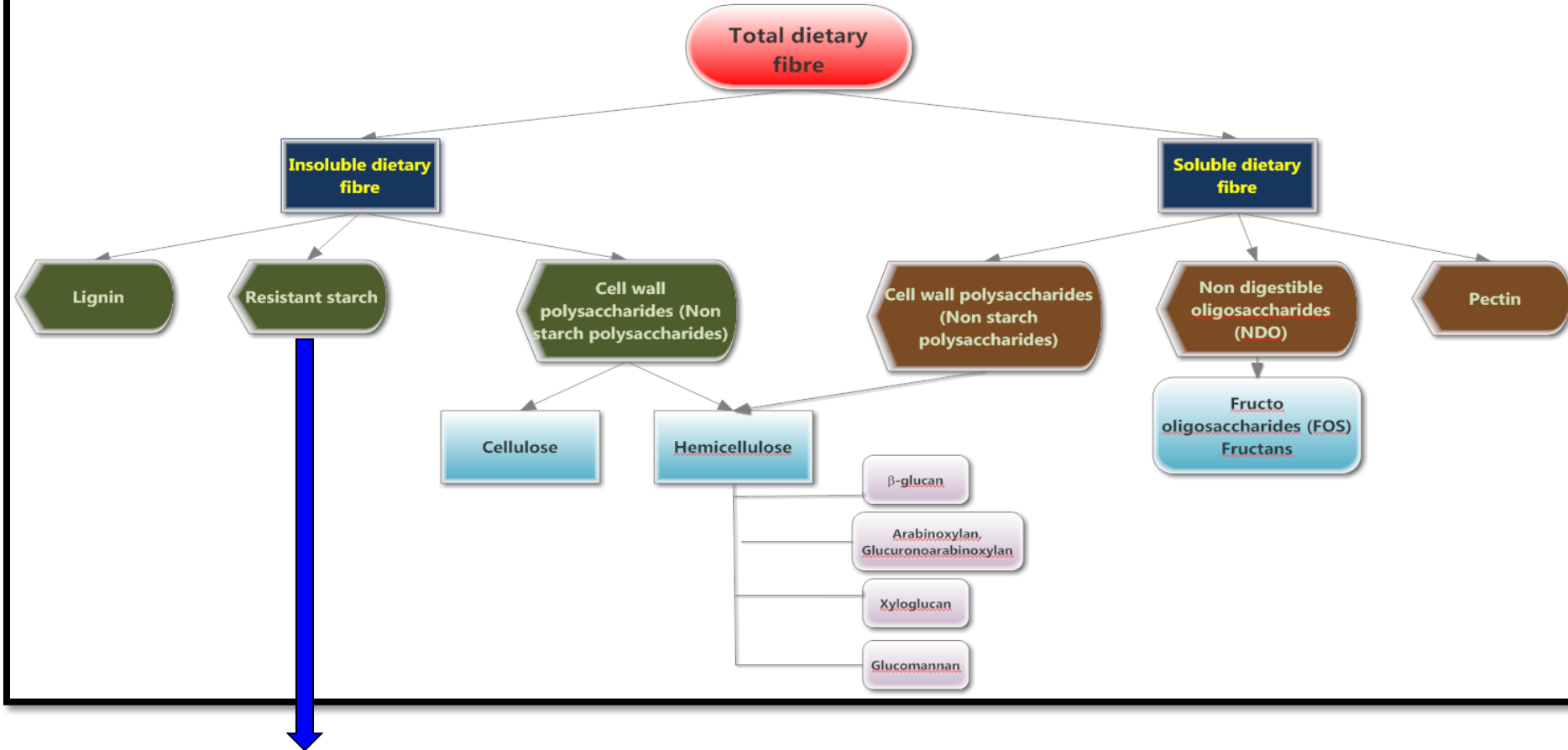
Natthawuddhi Donlao, Yukiharu Ogawa

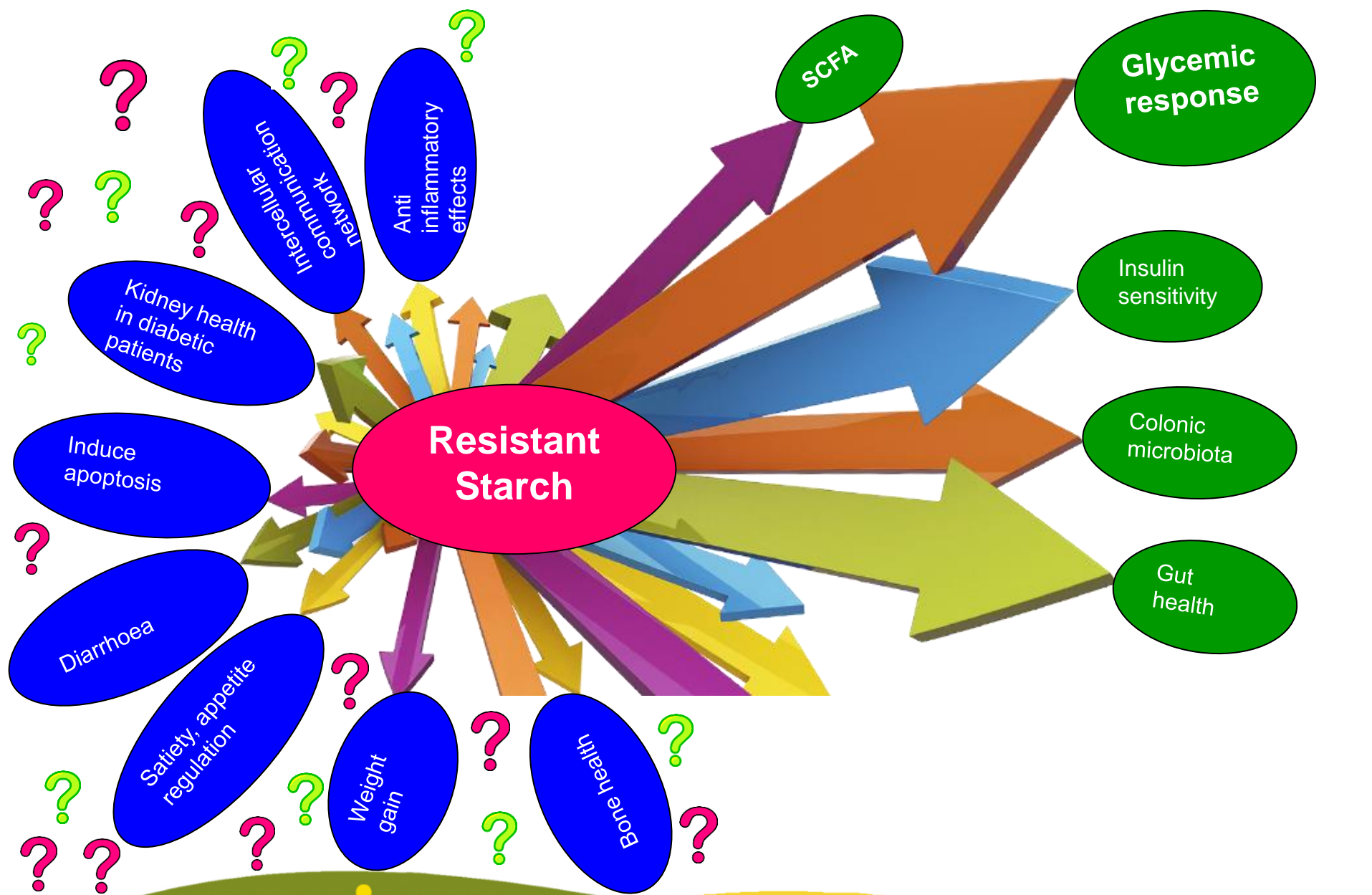
Fibre Gap



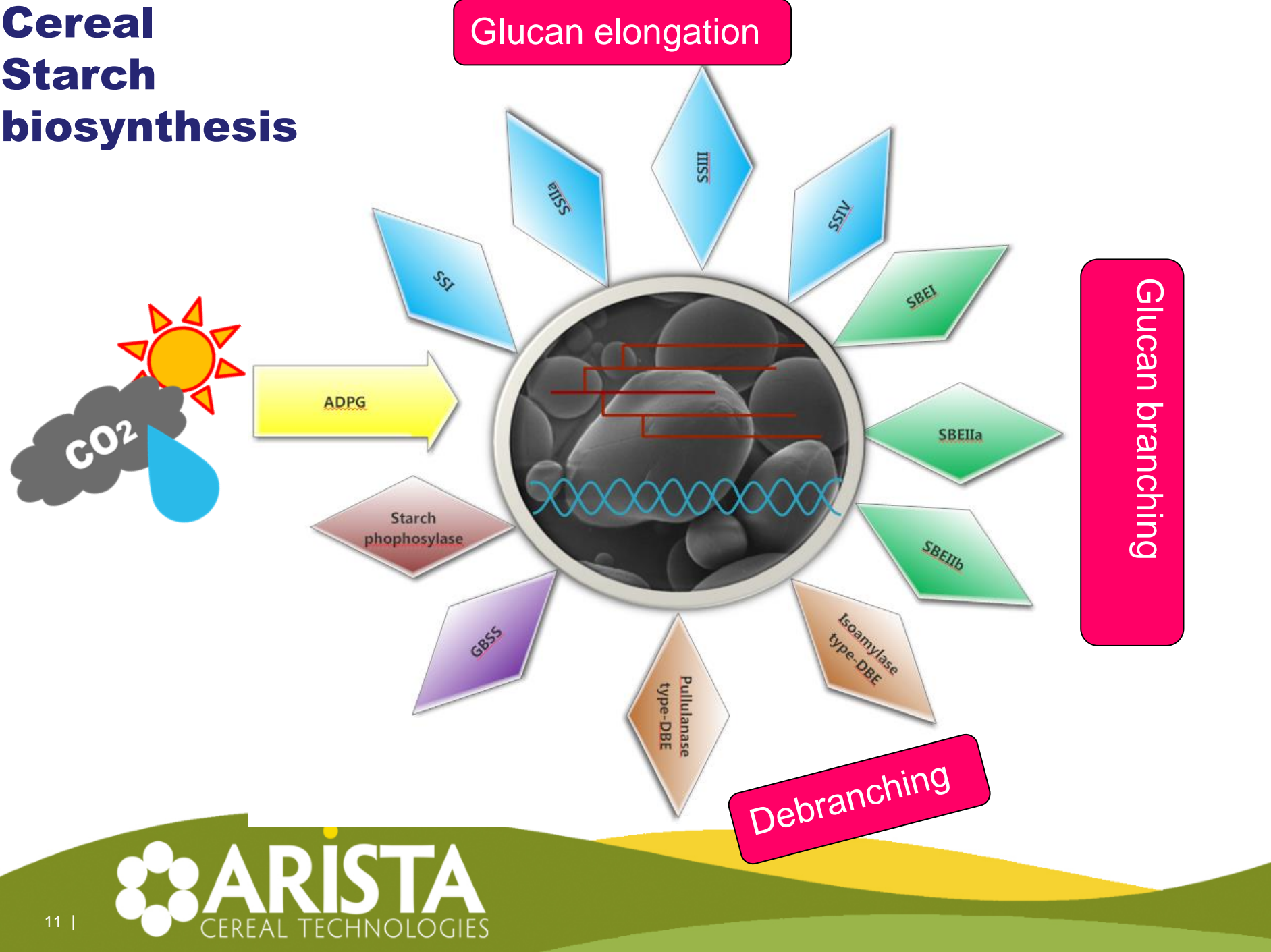
A close-up photograph of wheat plants, showing several green spikes and long, narrow leaves. The background is slightly blurred, emphasizing the wheat in the foreground.

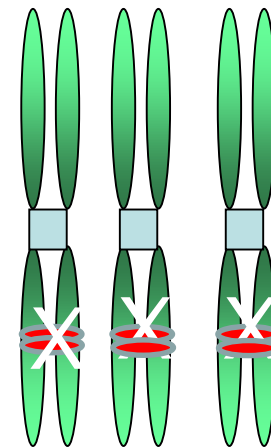
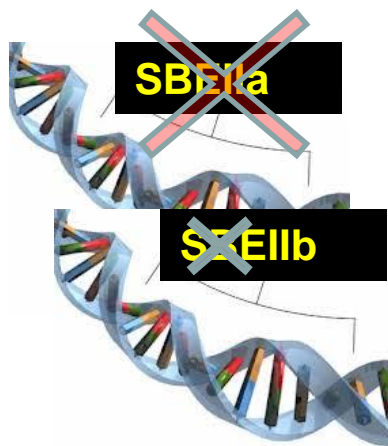
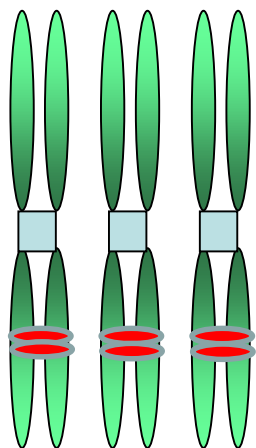
**To narrow the fibre
gap through high
amylose wheat
products**





Cereal Starch biosynthesis





Amylopectin

75%

Amylose

25%



**Standard
wheat**



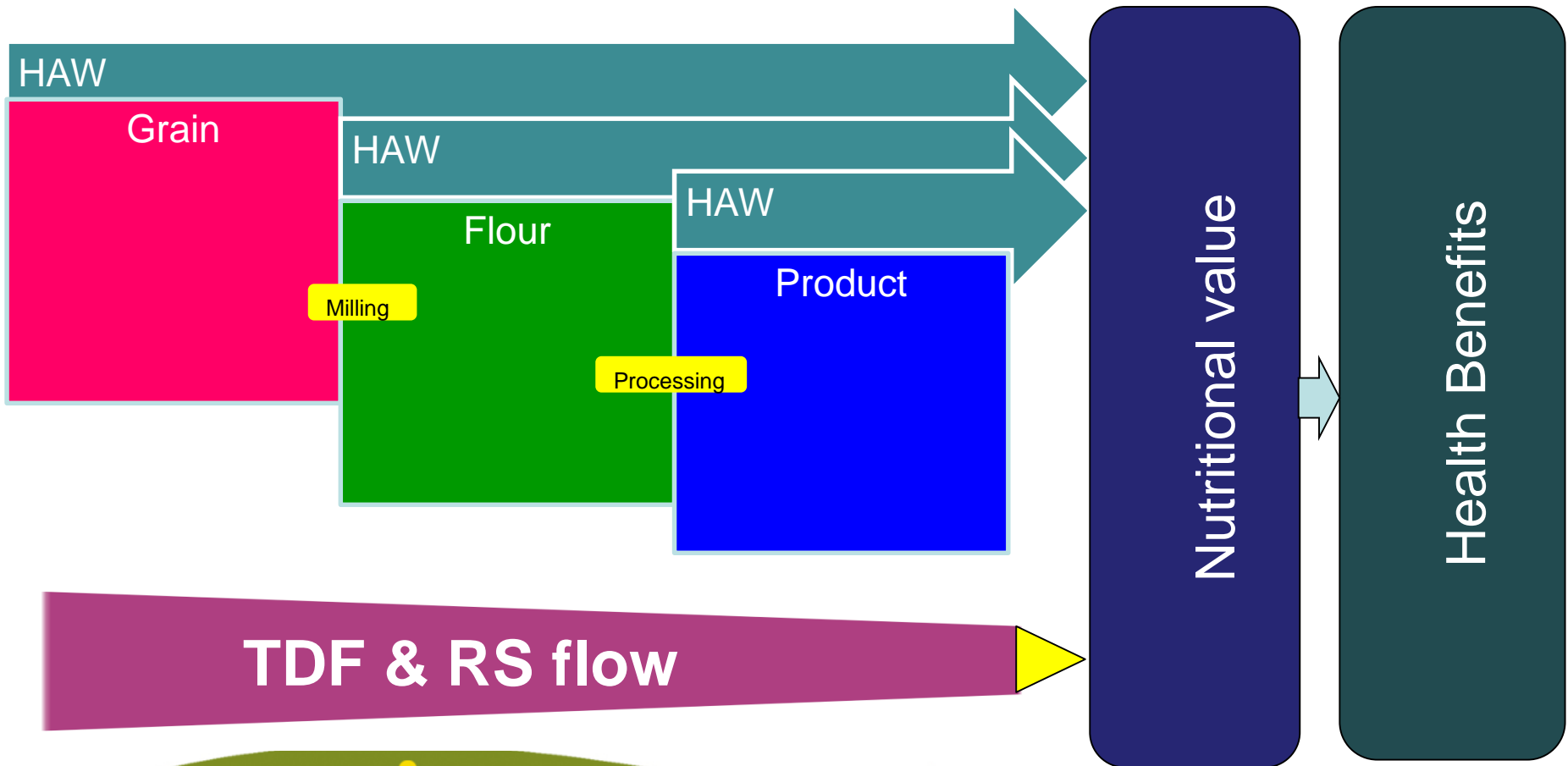
Amylose

>75%

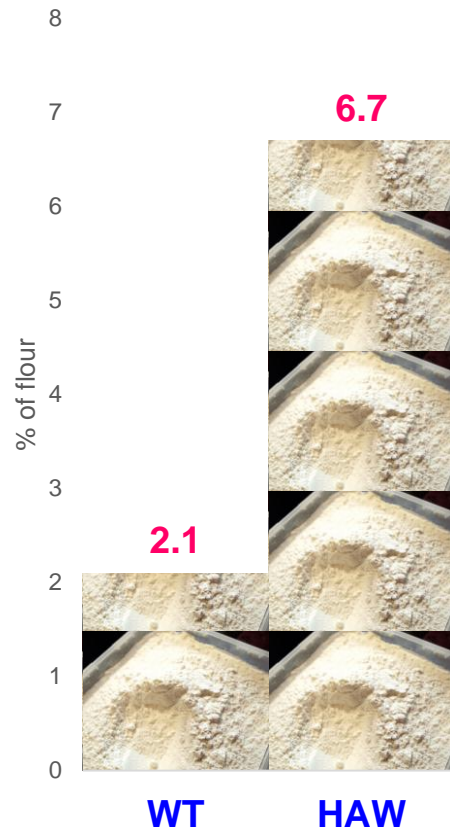


**High amylose
wheat**

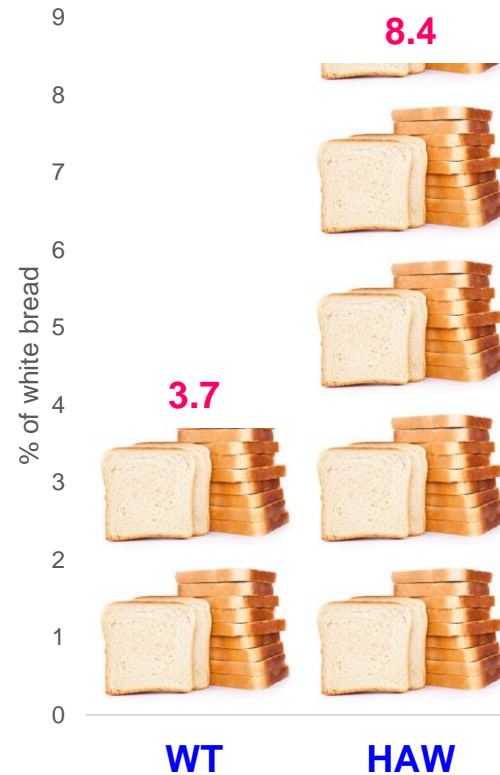
Nutritional value chain



Total dietary fibre (AOAC 991.43)

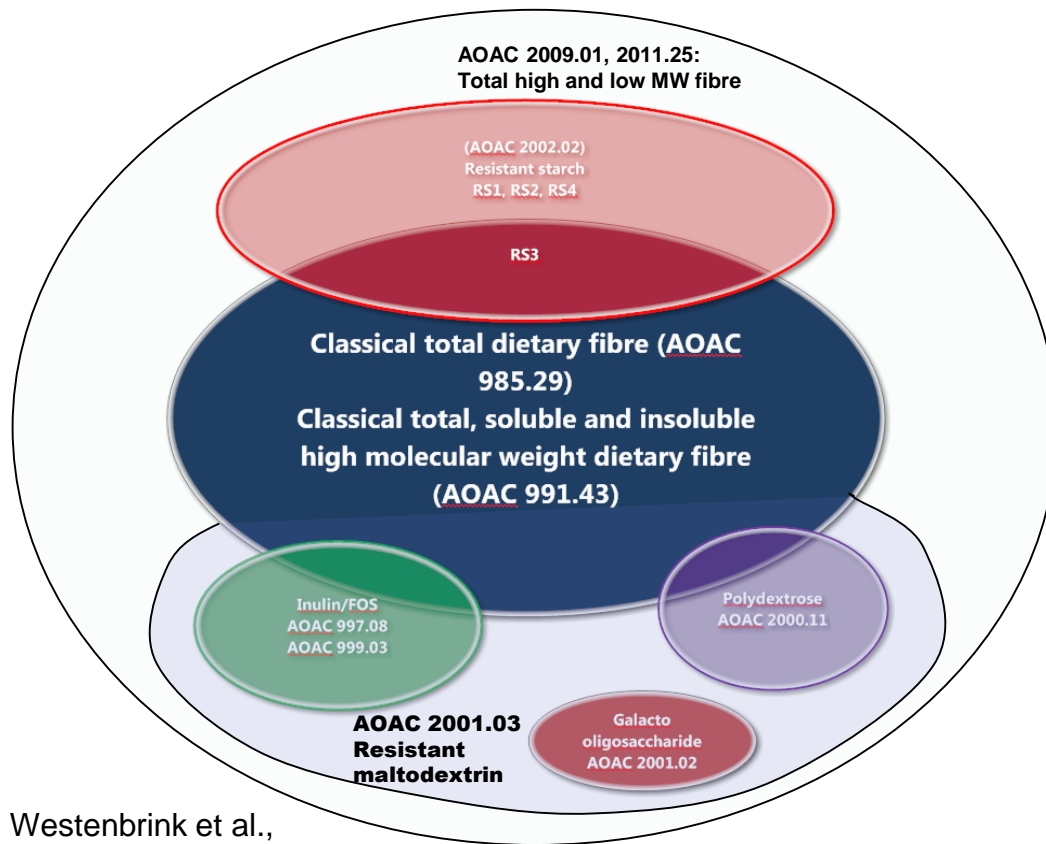


Flour

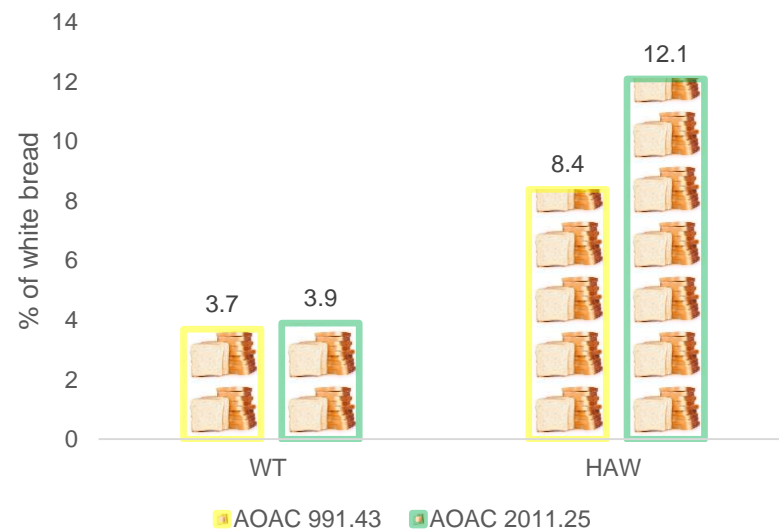


Bread

TDF (AOAC 991.43 Vs AOAC 2011.25)

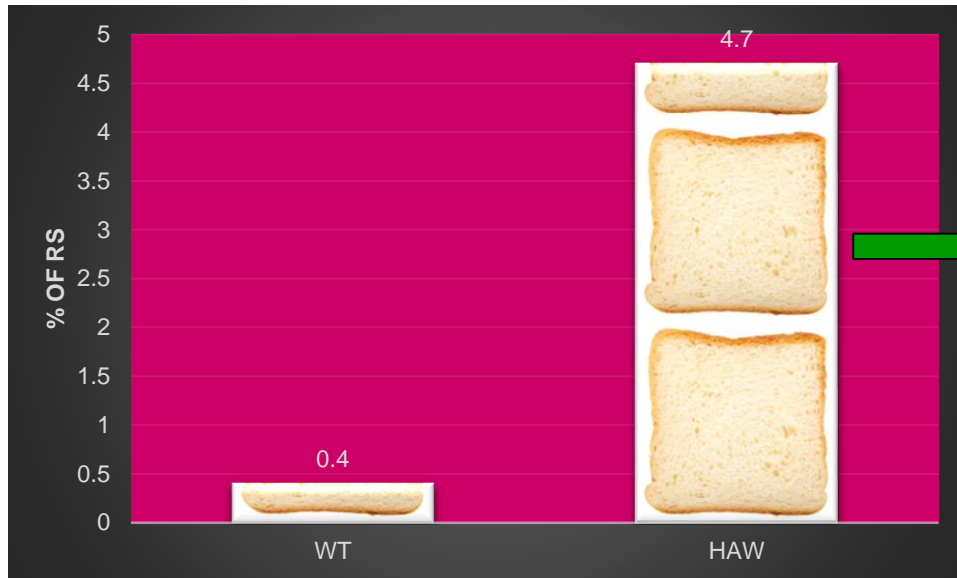


Westenbrink et al.,
(2013)

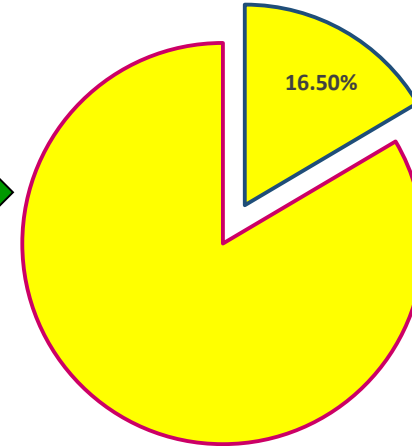


Bread

Resistant starch (AOAC 2002.02)

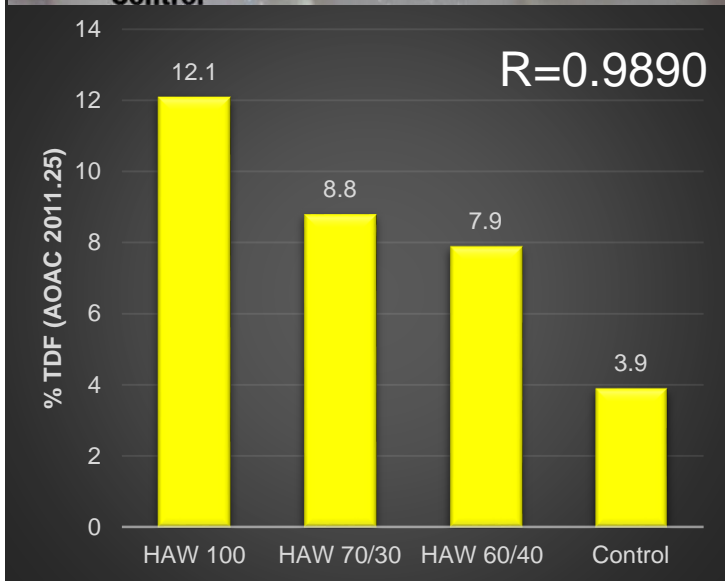
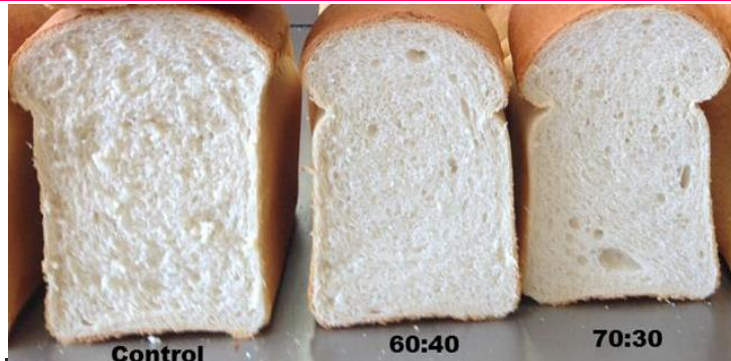


RS in total starch

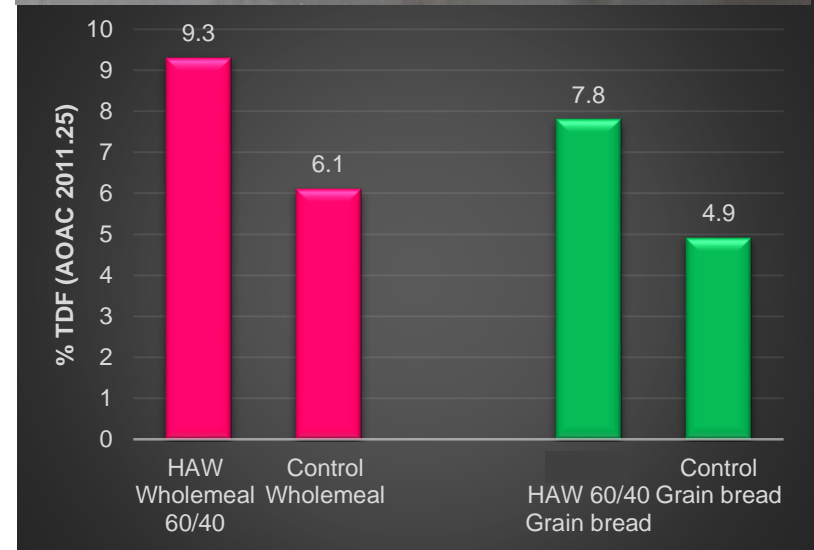


➤ ~12x RS in HAW bread compared to control bread

TDF elevated in different types of breads

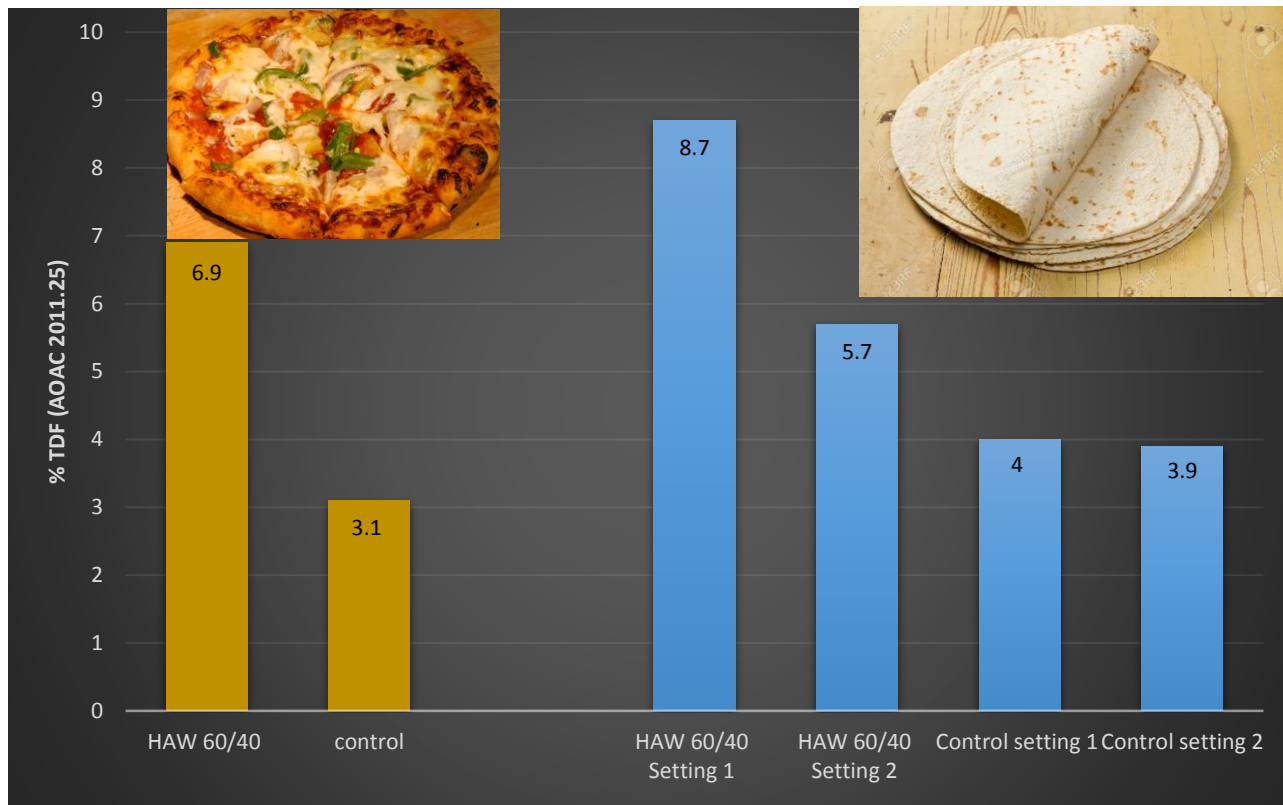


TDF (AOAC 2011.25) in bread is highly correlated with the level of incorporation of HAW flour



>50% increase in TDF in HAW wholemeal and grain breads at 60% incorporation levels

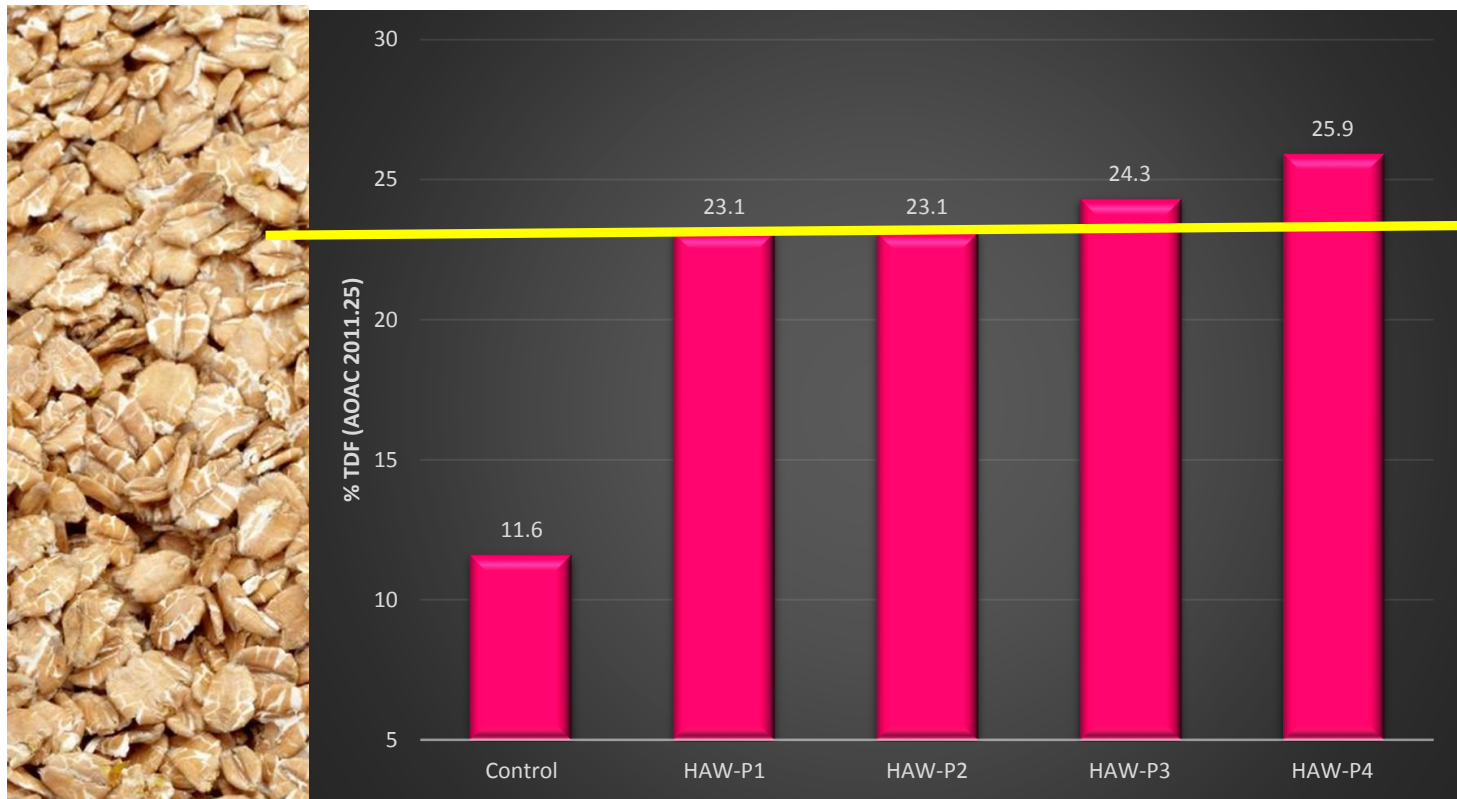
Pizza base & Tortilla



>100% increase in TDF 2011.25 in HAW pizza base compared to control

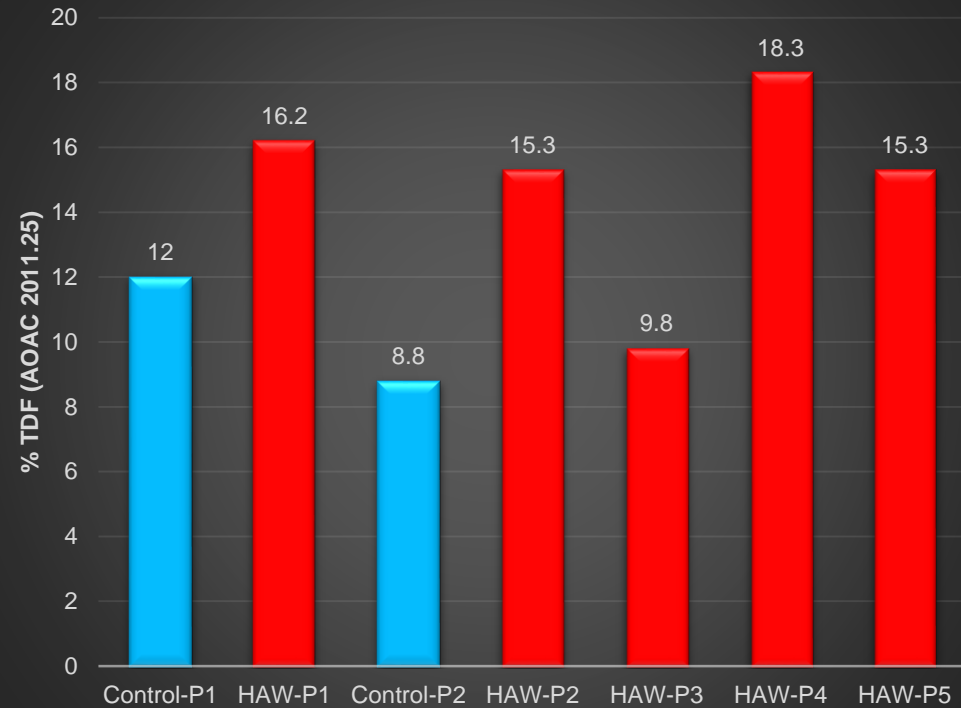
TDF in tortilla further increased through changes in process settings

Steam Flakes



- **HAW Steam flakes: A very high TDF food product**
- **Process changes can further increase TDF**

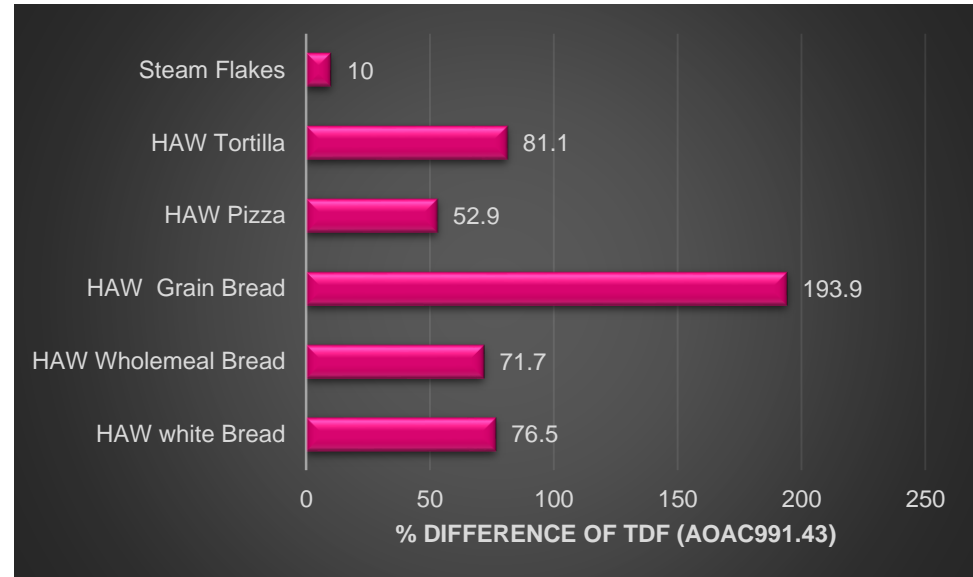
Extruded products



Extrusion retains considerable level of RS in HAW products

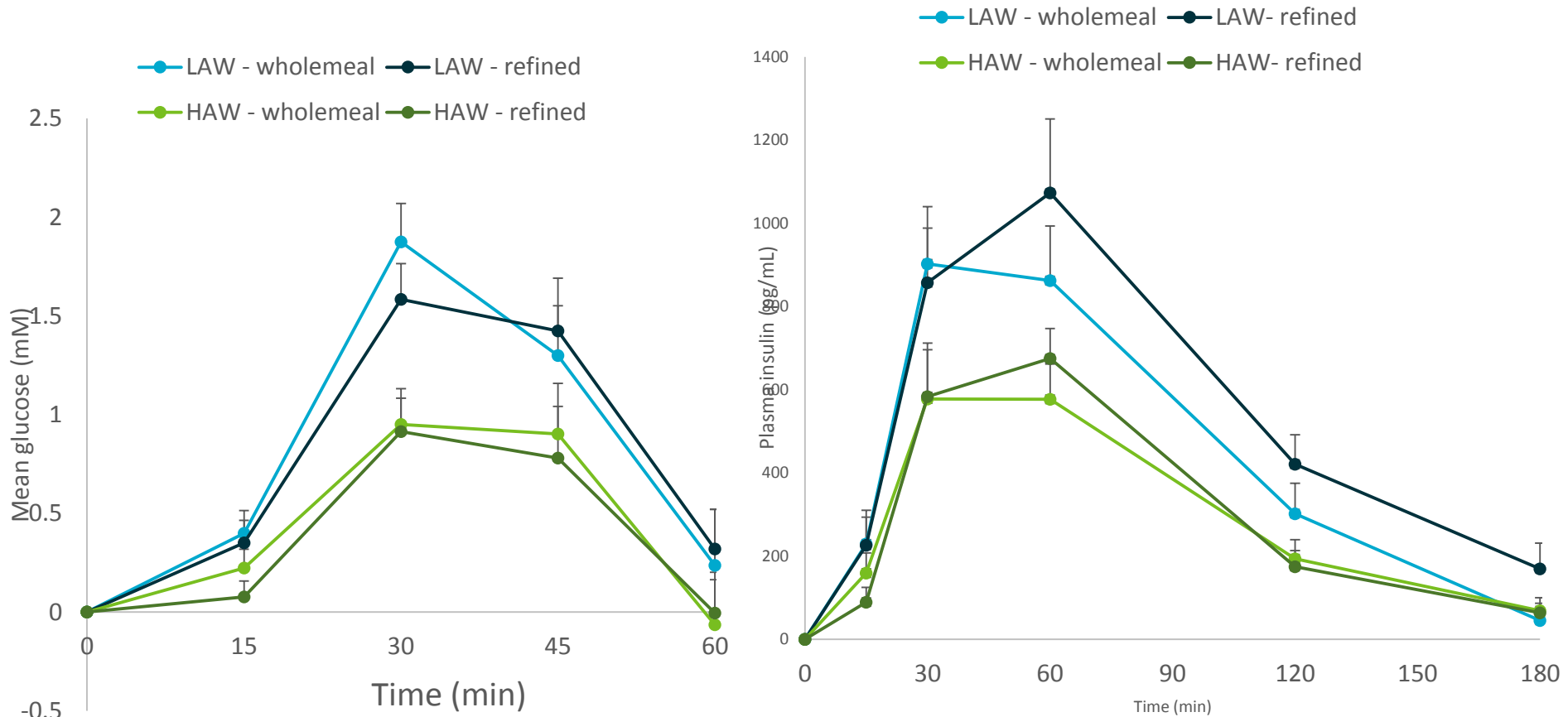
Formation of RS3 during processing

- **Change in TDF (AOAC 991.43) plotted as % difference between theoretical and actual values**
- **Results indicate varying levels RS₃ gain during processing**



RS₃ formed

HAW bread lowers glycemic and insulinemic response in humans





[INGREDIENTS](#)

[SOLUTIONS](#)

[INNOVATION](#)

[ABOUT](#)

Bay State Milling Company Launches Wheat Flour with Fiber Benefits



Fiber claim ①

✓ Quantity of Fiber in refined flour:

High Amylose Wheat X
10 times standard wheat

Fiber analysis in
flour → Method
AOAC 2011-25

Wheat type	Dietary fiber in flour
High Amylose	40 %
Standard	3 %

Fiber claim ②

- ✓ Natural, but also **Native** fiber
Comes directly from the wheat grain, as a natural component.



"Fiber from the Farm, not from the Factory"

Not comparable to an added ingredient like inulin or a processed added fiber such as corn resistant starch extract.

→ "clean label" de facto for this criteria

Fiber claim ③

✓ Fermentable fiber

Not a simple buffer, but also **digestible** through the large bowel

- No energy loss
- Prebiotic effect : fuel for the healthy bacteria in the gut
- Positive action on guts cells through butyrate secretion



Fiber claim ④

- ✓ Internal fiber, less prone to external contamination



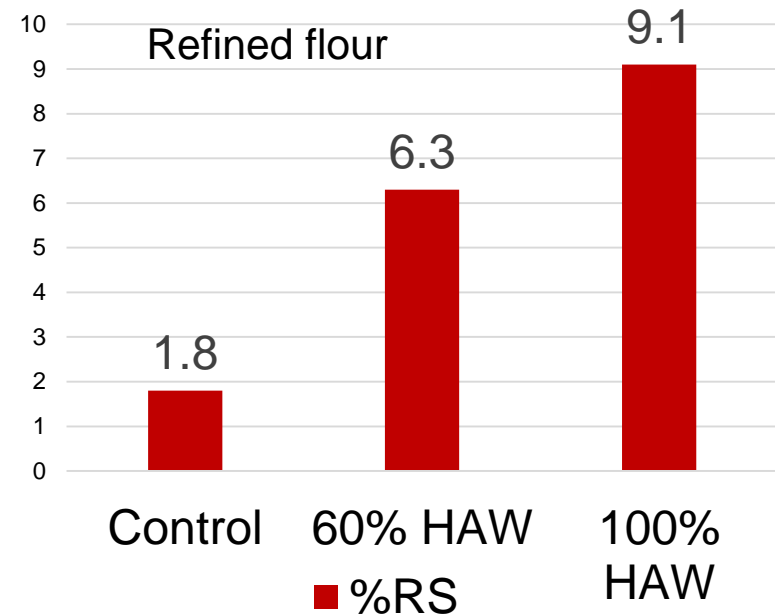
Unlike cereals bran layers, this fiber is *inside the grain* ; external heavy metal residues, contact pesticides or mycotoxins contaminations are less likely to be found.

Easy Fiber Diet ⑤

(Western diets)

✓ The **lost** fiber

In the past, fiber was supplied through standard bread or cereal products, which were consumed in much bigger amounts than nowadays.



HAW bread contributes to recover the **missing** fibers through **our current bread intake**
→ Easy way to close the Fiber gap

ACKNOWLEDGEMENTS



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