



How Agricultural Innovation Delivers Unmet Consumer Pasta Needs

Leading Today's Conversation



Michael Reimer
Innovation Manager,
Value-Added Ingredients



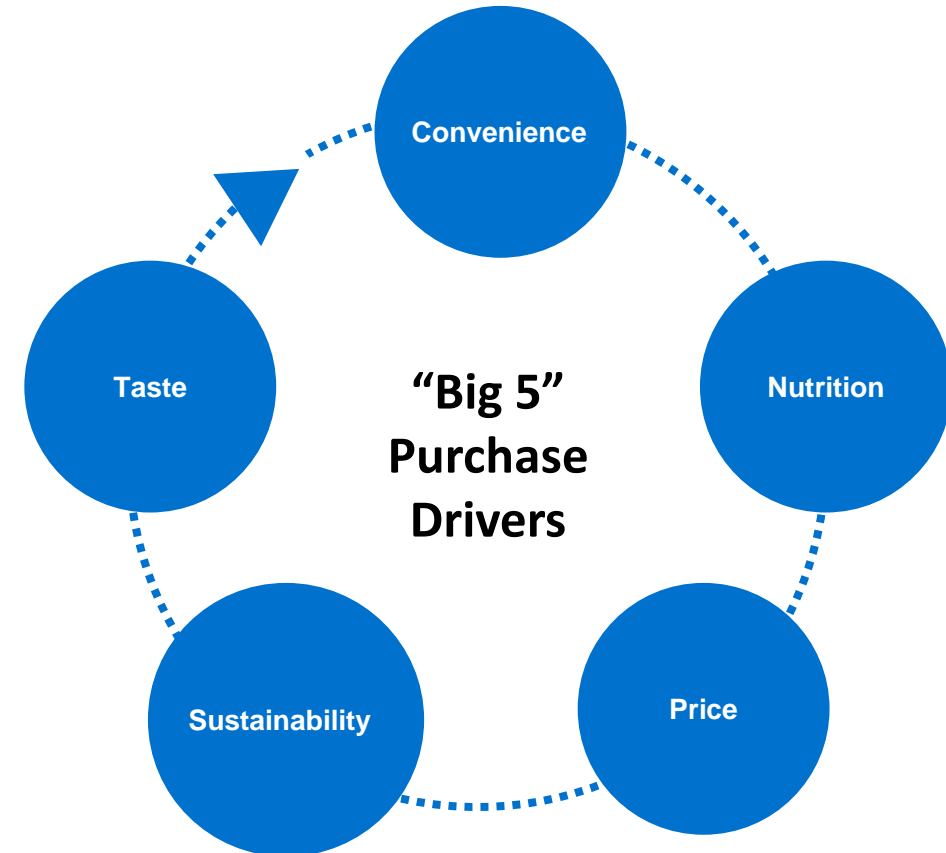
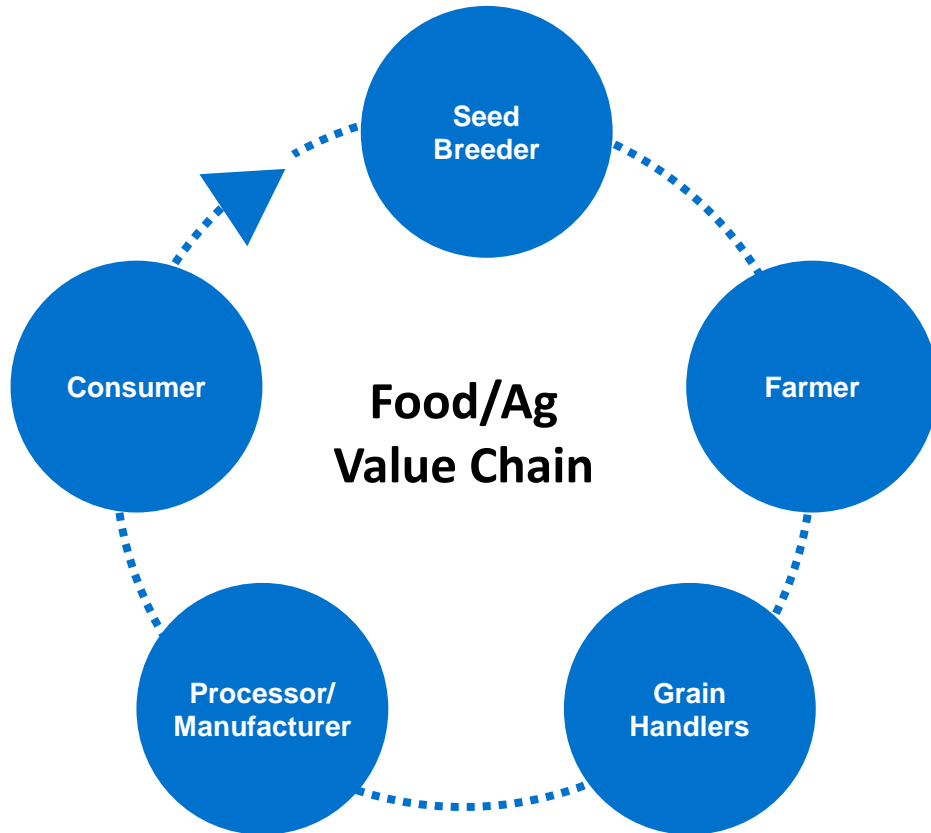
Dr. Curtis Pozniak
Director and Wheat Breeder,
Crop Development Centre



Kristie Sigler
Global Sector Lead,
Food and Agriculture



Agricultural Innovation: Intricate Connections





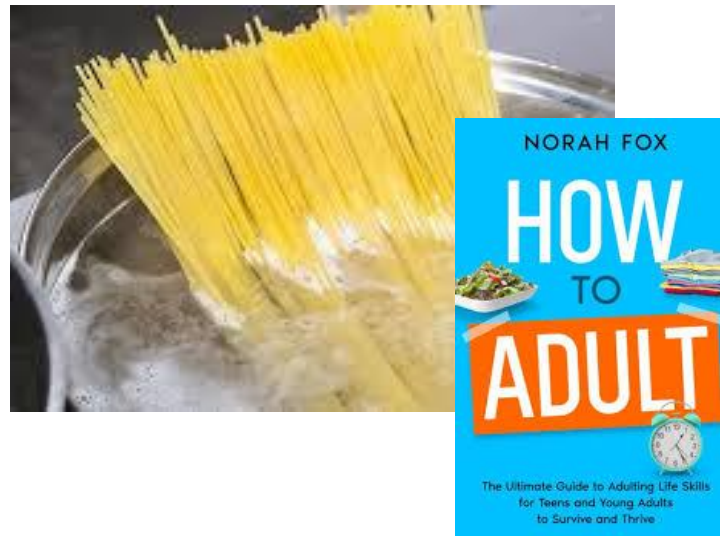
The Consumer Pasta Paradox

Agricultural Innovation as a Potential Solution

Optimizing Traits Using Seed Breeding

Meeting Consumer Needs

Pasta Is Foundational To Our Lives



delish



Marry Me Pasta

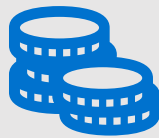
We Love Pasta For Many Reasons



It's **delicious**



It cooks **quickly** and **easily**



It's **affordable**



It's a **family favorite**

And The Numbers Prove It

96%

Of consumers have
dry pasta on hand

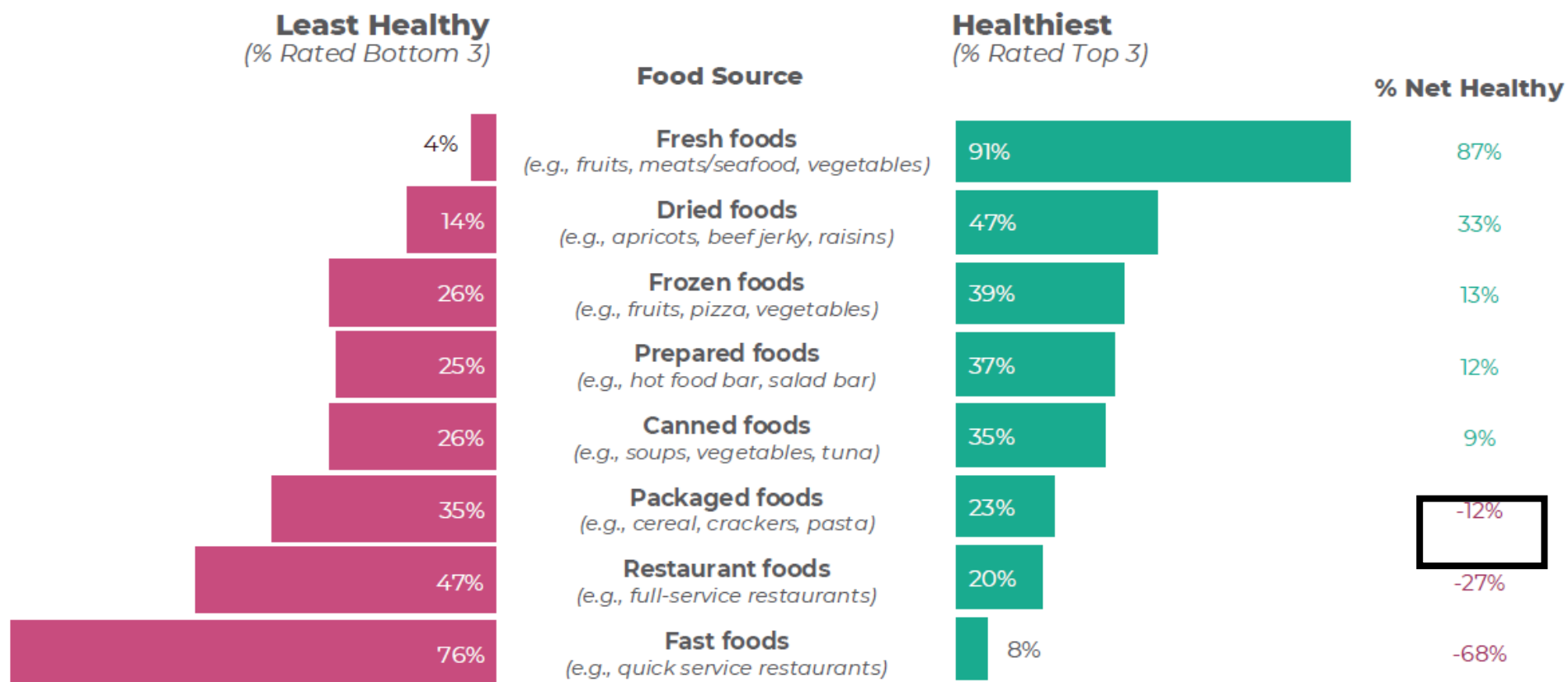
86%

Have pasta at
least once a week

36%

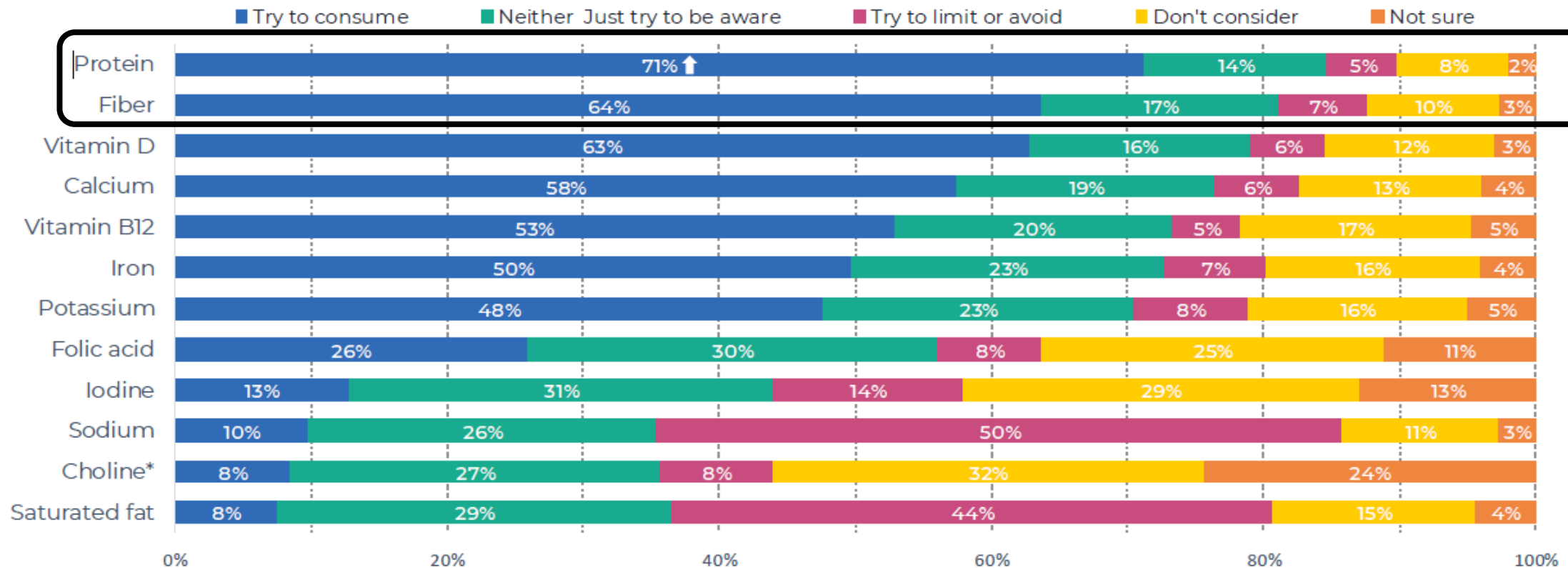
See pasta as
a comfort food

Consumers Know Pasta May Not Be Their Healthiest Choice ...



... And While Pasta Can Better Deliver Their Healthier Food Goals ...

Consumption Approach to Select Nutrients of Importance in the U.S. Dietary Guidelines



... Taste And Texture Are MUSTS For Pasta Satisfaction

*"The only thing pasta is about, really, is the texture. And **that's what ingredients screw with.**"*

(Interview #1)

*"Texture is the biggest one. You want to have the right kind of firmness, **the right kind of bite** and eating quality."*

(Interview #3)

*"It really comes down to the **taste and texture.** Anyone can put, I don't know, anything, into pasta. Sure, that's doable, but do you want to eat it? Does it taste good, **does it taste similar** to what you feel like pasta should taste like?"*

(Interview #2)

*"With all the stresses going on in the world today, what a mother does not want to do is to try a new ingredient out on the family and have people look at this, take one bite and say, '**What the hell is this,** don't ever make this again.'"*

(Interview #11)

This Puts Consumers In A “Pasta Paradox”

They wish they got
more nutritional
value from pasta ...

... yet they want **less** in
terms of added or
complicated ingredients ...

... but they will
not compromise
on taste or texture

The Industry Is Working To Manage The Paradox



Change Base Ingredient(s)

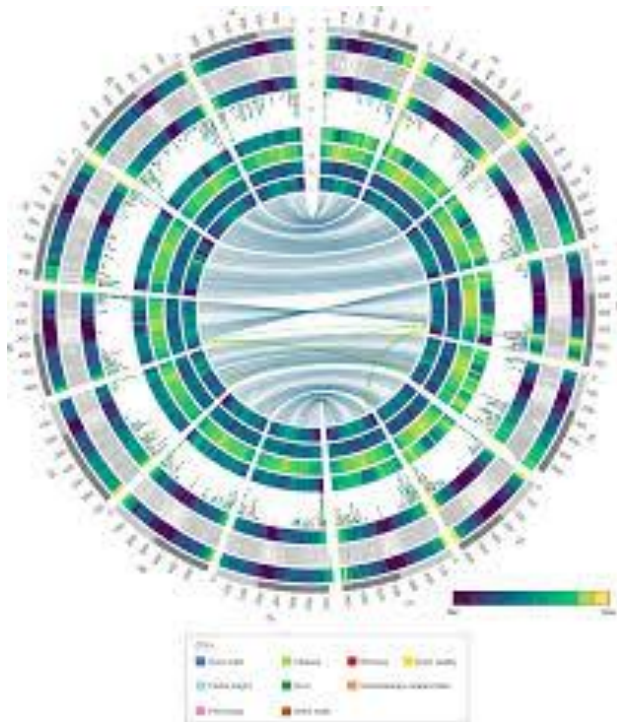


Fortification

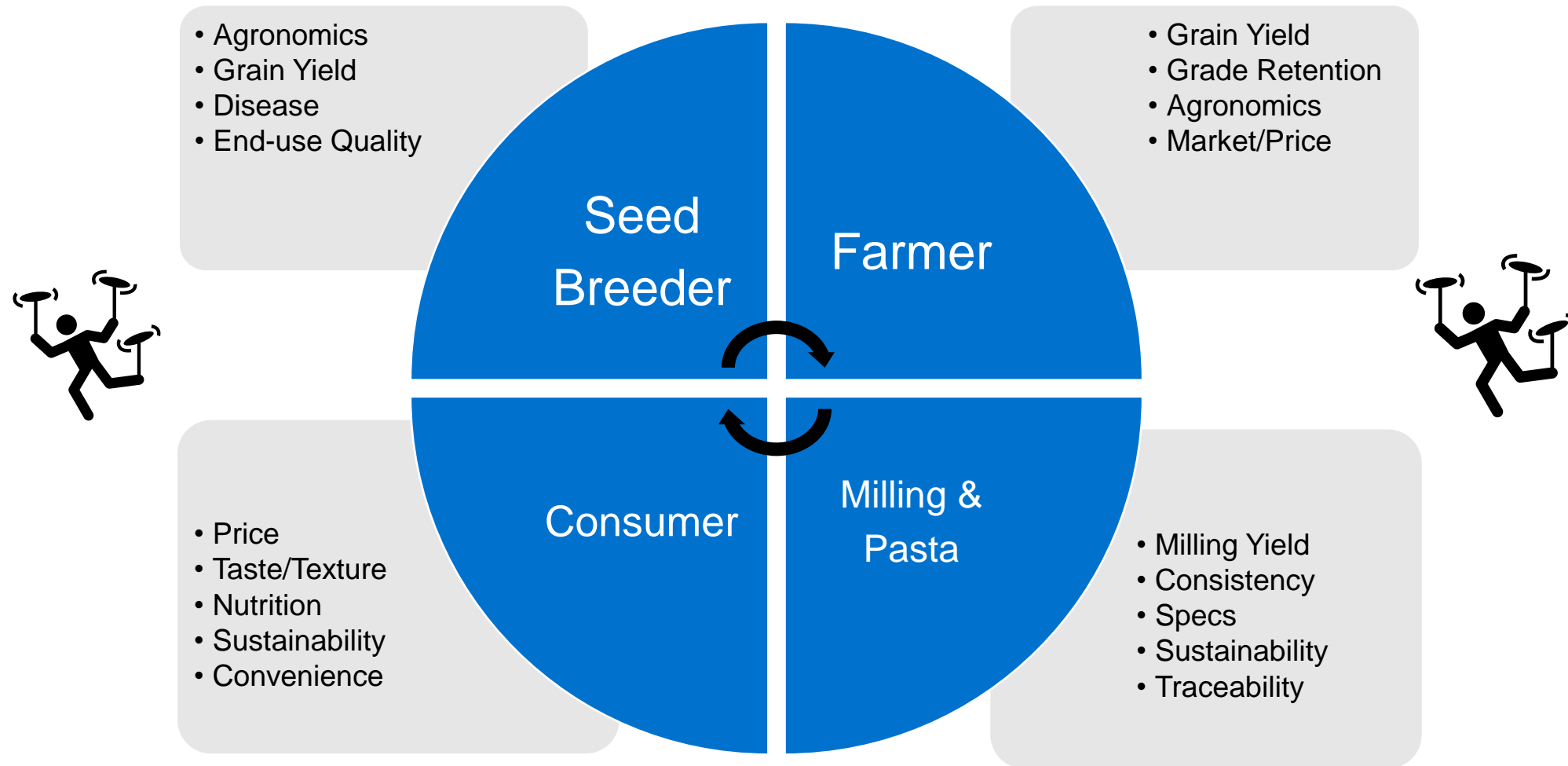


Processing Changes

But Are There Other Solutions All The Way Back At The Seed?



Wheat Innovation – Balancing Act



Durum Wheat – *History of Innovation

Grain Yield

Commercial farm yields have increased by 1.5% per year since the 1960s

Gluten Strength

Steady increase since mid-90s through standard setting and selection

Yellow Pigmentation/Low Lipxygenase

Increased endosperm yellow pigment and deletion of lipxygenase genes which was associated with an increase in pasta color

Cadmium

Reduced by ~50% since the 1990s through selection

Fusarium Head Blight

Intermediate levels of resistance

Durum Wheat Innovation - Nutrition

Nutritional innovation in durum wheat has been elusive

Challenge

Introducing a nutritional trait that enhances the value of durum wheat while maintaining all other desirable characteristics

Key to Commercial Success:

Optimize value for each stakeholder in the value chain

Farmer

- Competitive agronomic package
- Minimal/no yield drag
- Market demand

Processor/Manufacturer

- Maintain processing qualities of common durum while adding fiber
- Do more with less (no added ingredients)

Consumer

- Price
- Taste
- Convenience
- Nutrition
- Sustainability

Innovation Process: From Seed To Market

Thought process behind solving for more nutritious durum wheat



Identify Needs/ Opportunities

Consumer research
Industry intelligence



Discovery

Existing IP/research
Breeding limitations
Regulatory environment



Collaborate

Identify strategic partners
Industry leaders

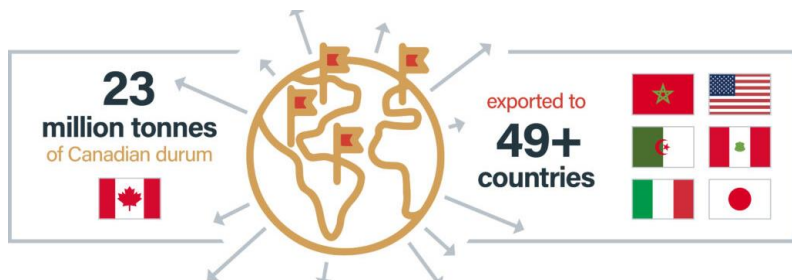


Select & Develop

Breeding targets
Route to market

10-12 years to commercialize a new wheat variety

Durum Wheat Innovation – Collaborating With Global Leaders



“Over the last five years, over 23 million tonnes of Canadian durum was exported to 49 countries, including Morocco, Algeria, Italy, the United States, Peru, and Japan.”
– source **Cereals Canada**



Cereals Canada

- Trusted independent source of technical support.
- Expertise in milling, analytical testing and end-use functionality.



U of Saskatchewan - College of Agriculture and Bioresources

- Dr. Yongfeng Ai, Ministry of Agriculture Endowed Research Chair in Carbohydrate Quality and Utilization.
- Characterization of high-amylose durum wheat and semolina to promote industrial applications.



Crop Development Centre(CDC)- U of Saskatchewan

- World leading, elite Canadian Western Amber Durum Germplasm.



University of Saskatchewan

Crop Development Centre

Est. 1971

Our Mission

Develop new crop varieties through the development and application of scientific knowledge and technologies, in partnership with stakeholders across the agriculture value chain.



100+

Grad Students

\$27M+

Funding

210

Staff

600+

Varieties

50%+

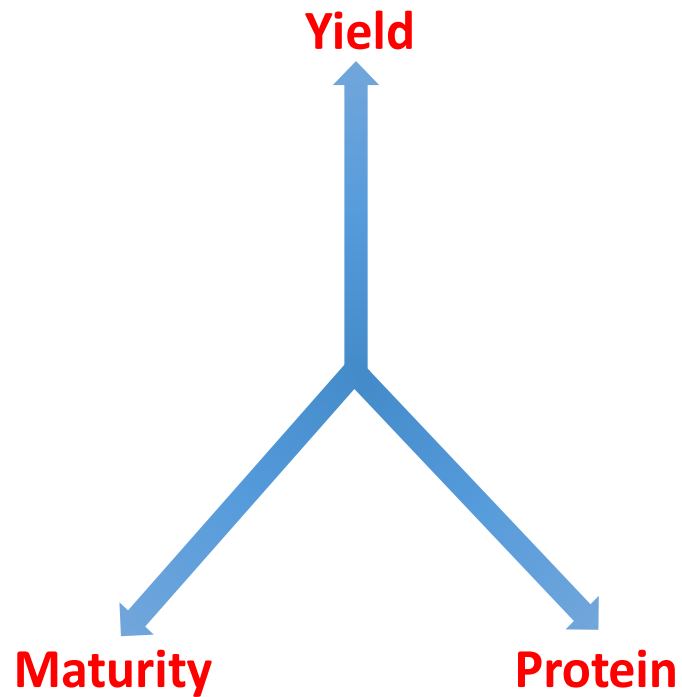
Market Share

12:1

Return On Investment

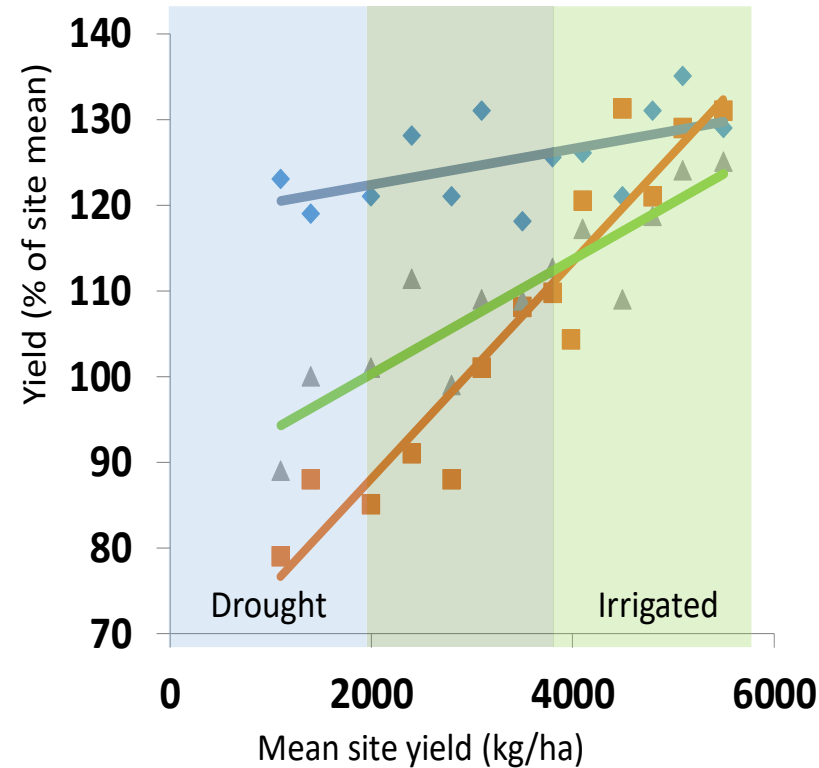
The Three Pillars Of Crop Improvement

Productivity*



*Source Dr. R. DePauw

Reliability



Marketability



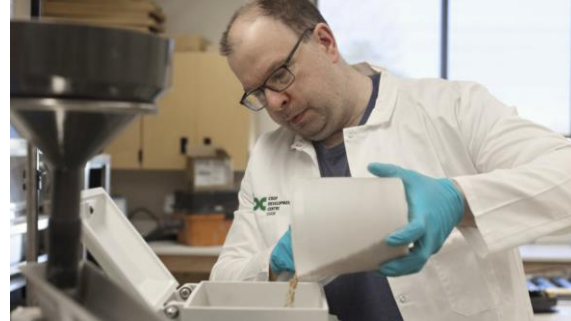
Plant Breeding Innovation



Breeding For Pest Resistance



Quality For End Use Markets



High protein

Strong(er) gluten

Extensible dough

High test weight

High semolina
milling yield

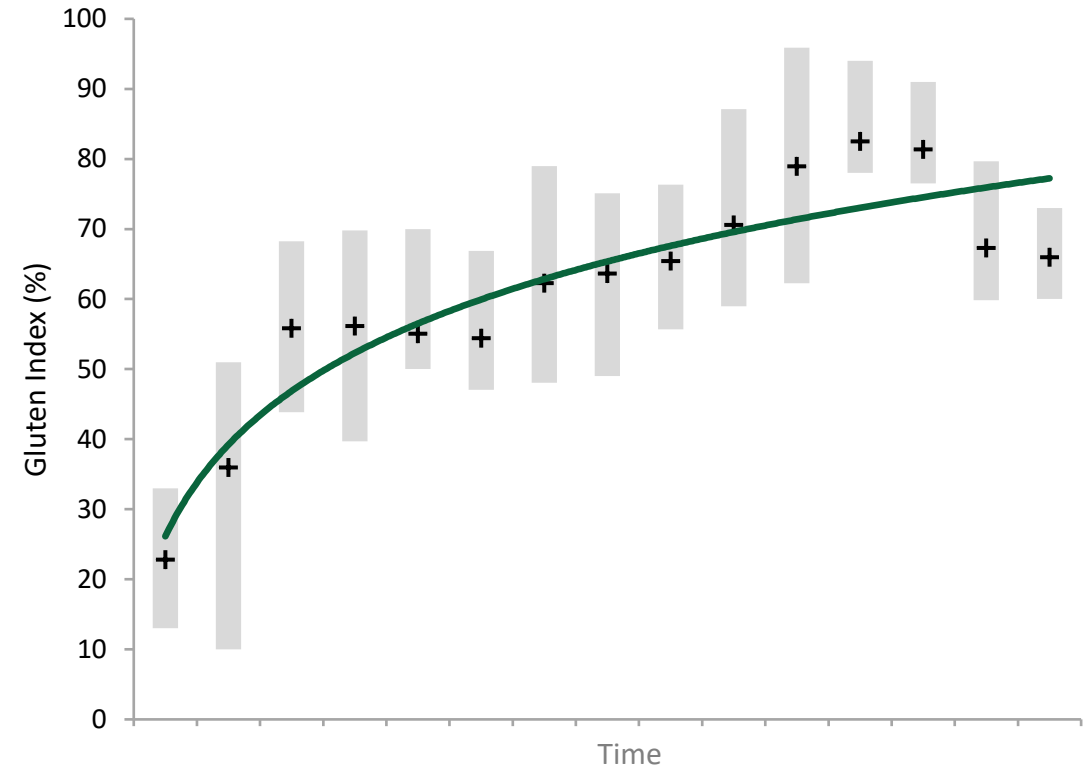
Low ash (mineral)
content

Low cadmium
content

Better semolina/
pasta color

Maintaining Protein And Gluten Strength

Variety	Year of release	Grain Protein (%)
Kyle	1984	13.7
AC Morse	1995	13.8
Strongfield	2004	14.4
CDC Verona	2008	14.2
Brigade	2007	13.6
CDC Wiseton	2023	14.4



Improving Pasta Color

Yellow Color Index (b*)

	b*
Kyle	6.8
AC Avonlea	7.8
Strongfield	8.1
AC Navigator	9.0
Brigade	9.1
CDC Vantta	11.2

Processing and Drying

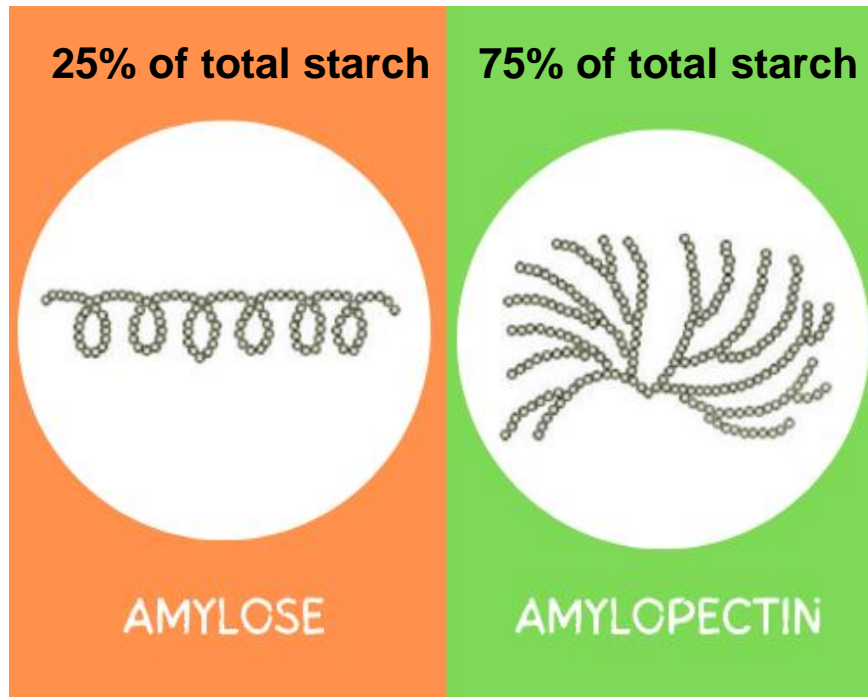


Pasta Color Losses (%)

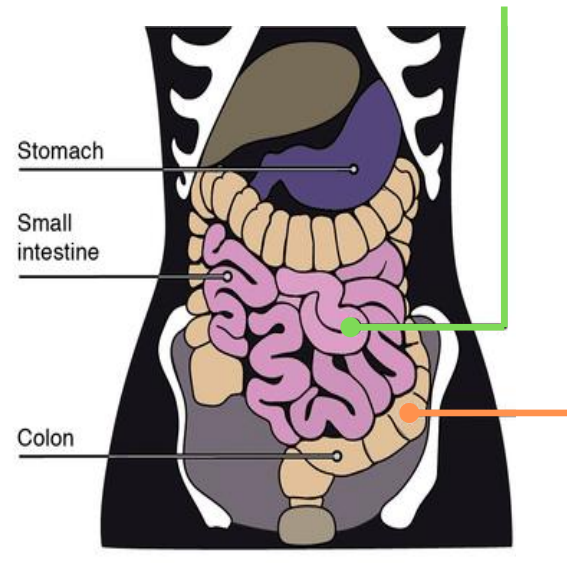
	%
Kyle	12.2
AC Avonlea	11.8
Strongfield	9.4
AC Navigator	2.2
Brigade	9.1
CDC Vantta	0.9

Developing A “Healthier” Durum Wheat

Wheat Starch (60% of wheat kernel)



AMYLOPECTIN is “easy” to digest in the stomach and small intestine, leading to rapid absorption of sugars



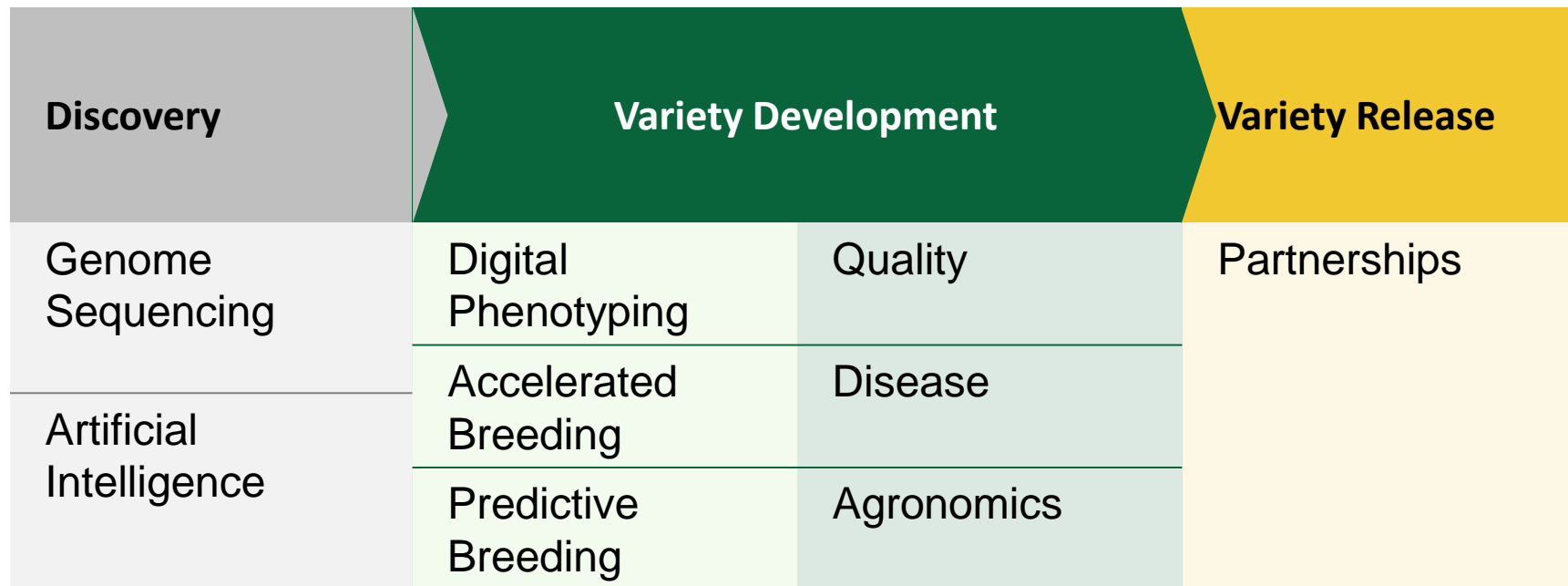
AMYLOSE is a “resistant starch” and is fermented in the colon, leading to a slow release of sugar into the blood – acts like a “Fiber”



CDC Innovation Pipeline



Lab



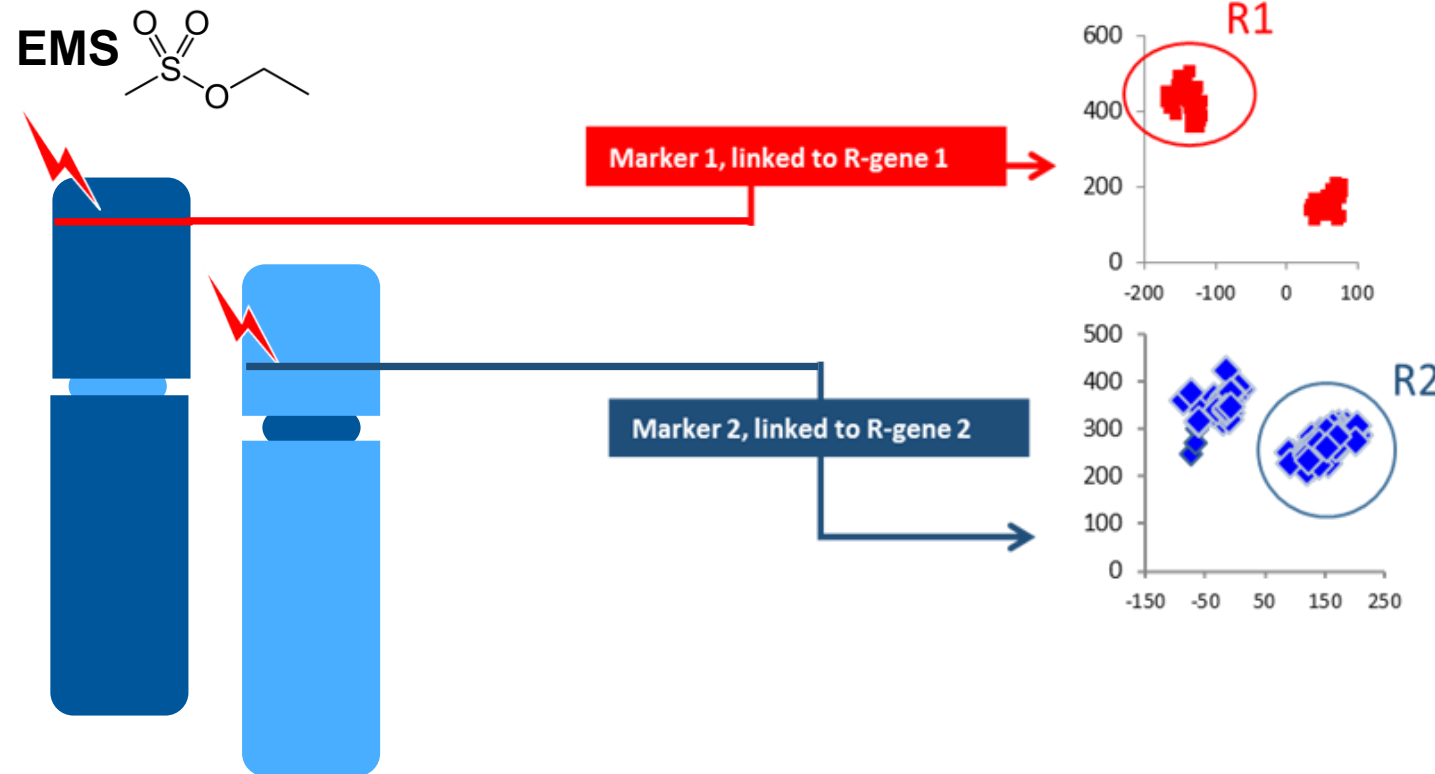
**Farmer
Fields**

Non-Transgenic Innovation

Mutation Breeding

Marker Assisted Selection

Phenotypic Expression



ID	Resistant Starch (%)
Strongfield	24.3
CDC Precision	25.4
D23.00.001	33.2
D23.00.003	36.1
D23.00.006	41.2
D23.00.008	60.3
D23.00.009	58.2
D23.00.010	53.3

CDC Innovation Pipeline

TRUSOURCE™ WHEAT

2019



Lab

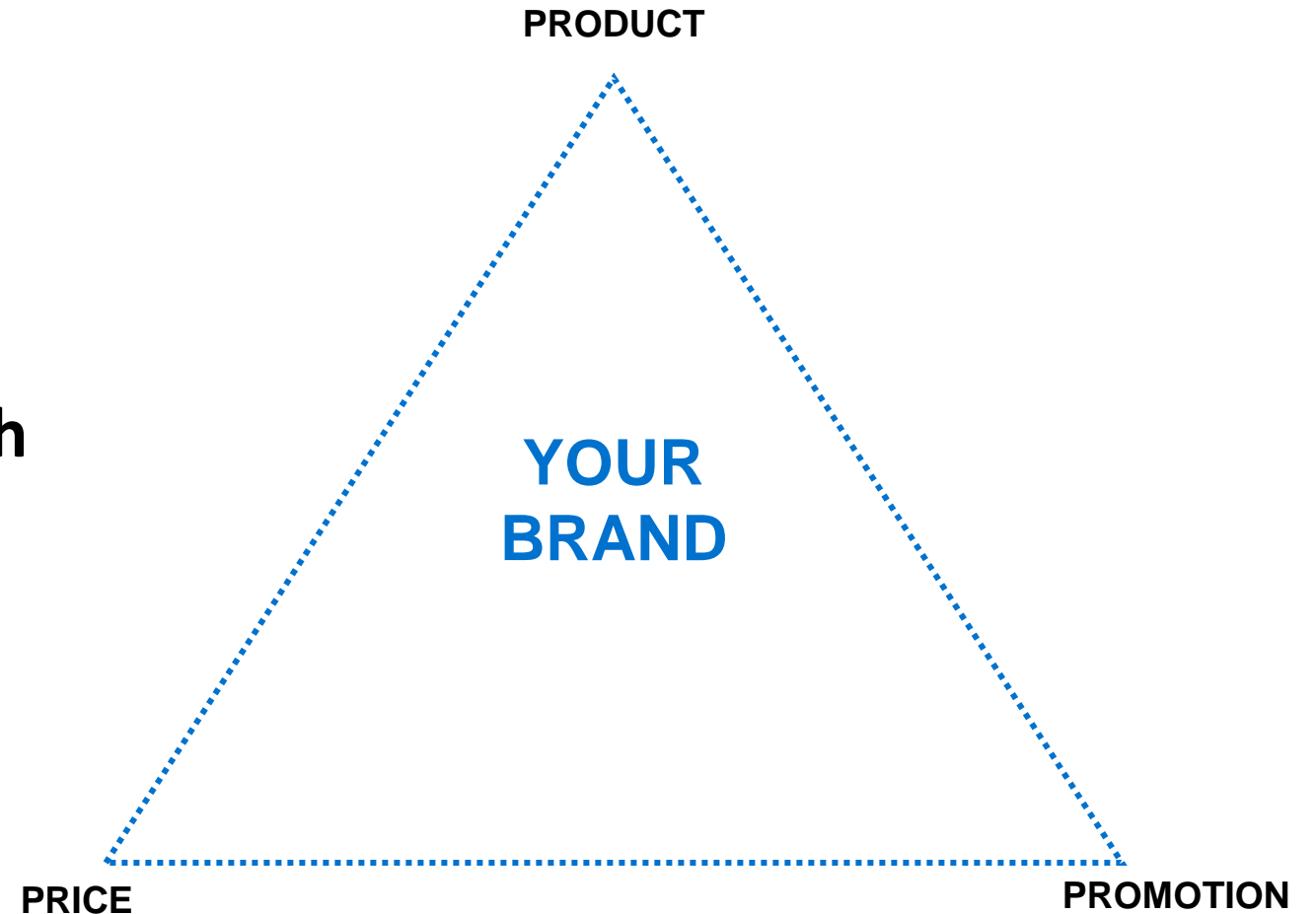
Discovery	Variety Development		Variety Release
Genome Sequencing	Digital Phenotyping	Quality	Partnerships
	Accelerated Breeding	Disease	
Artificial Intelligence	Predictive Breeding	Agronomics	



Farmer
Fields



Opportunities Exist to Change Consumer Pasta Perceptions with Trusource™



North American Durum Wheat Allows Sustainability Messaging

-30%

Lower Carbon
Footprint

-85%

Less Irrigation

Source: Cereals Canada Environmental Sustainability of Canadian Durum Wheat, 2024

Identity Preservation System Enables Traceability of Trusource™ From Farm To Flour



Trusource™ Delivers Against Innova's Top Food Trend for 2025

TREND #1: Ingredients and Beyond



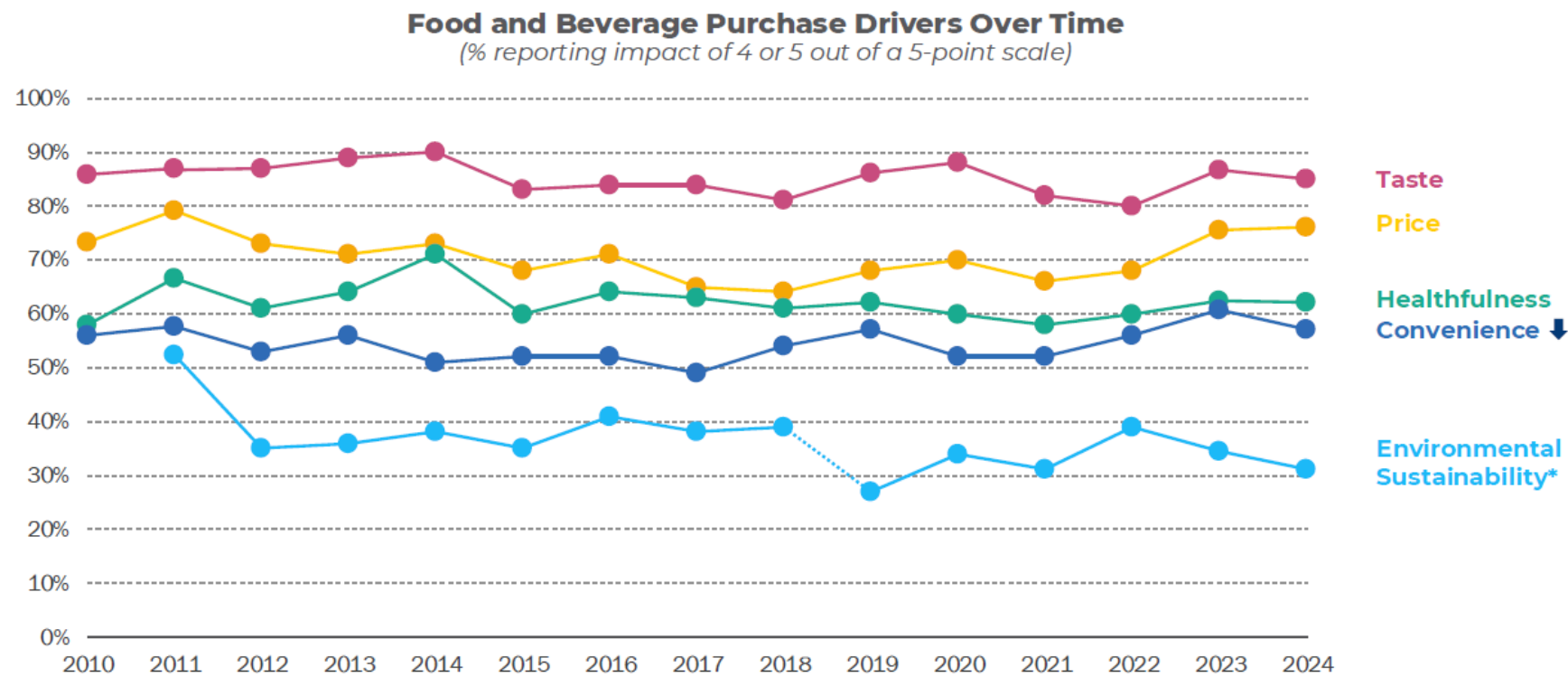
This trend acknowledges the **critical role of ingredient quality in consumer purchasing decisions.**

The top trend for 2025 underscores the necessity **for companies to captivate consumers by enhancing the quality attributes of their ingredients.**

“Freshness, nutrition, health benefits, and ingredient sourcing are paramount to consumers.”

“**Brands can distinguish themselves in the market by offering superior quality ingredients.**”

Trusource™ Will Deliver All Five Key Consumer Food Purchase Drivers



Select And Develop: A Major League Baseball Example

Development and Scouting

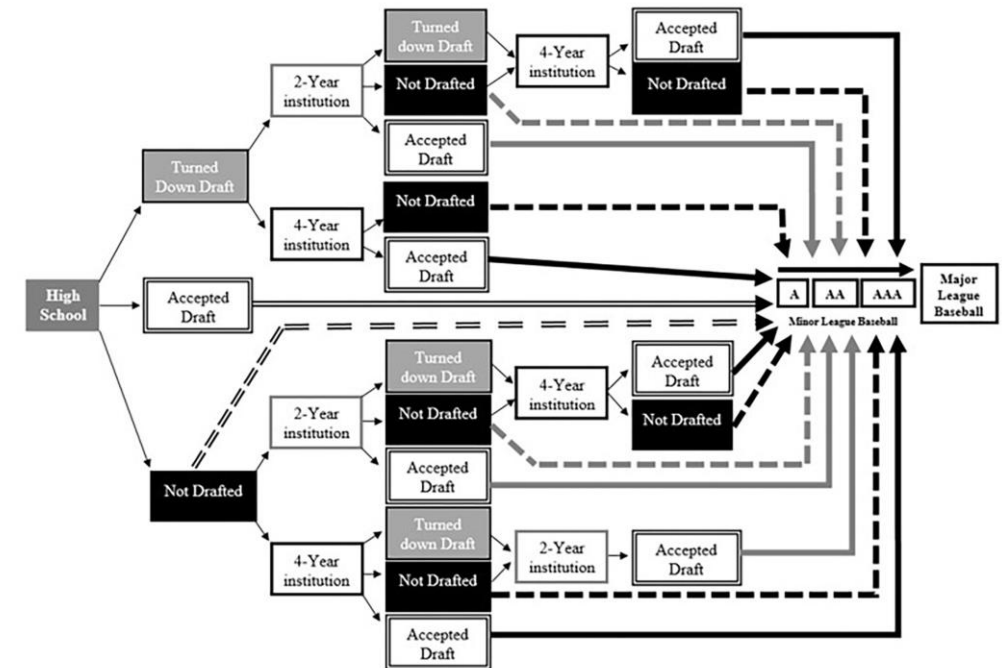
- Need to be forward looking
- Selection criteria/targets: New candidate durum lines evaluated annually – range of characteristics
- Move forward with those showing the most promise and best address needs – move through the pipeline

Making it to the Big Leagues

- Collaboration with Industry Partners
- Scaling and Commercialization

Building a roster

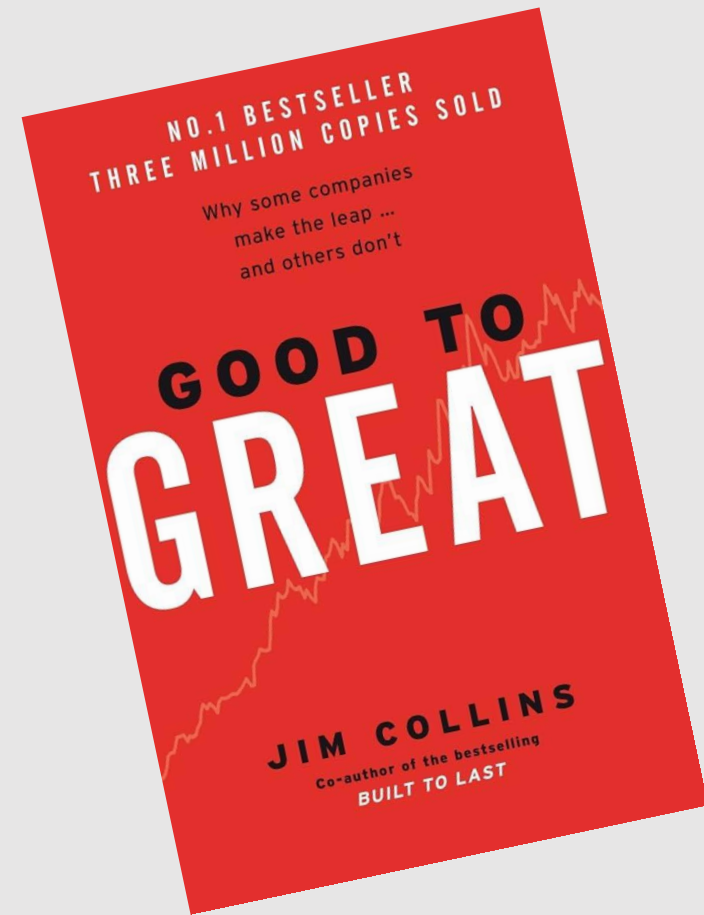
How wheat innovation is like building an MLB team ...



Meeting Needs Through Agricultural Innovation

The Brutal Facts:

- Innovating in wheat is complex and take time
- To meet industry needs, more investment in wheat innovation is required
- Innovation does not occur in a vacuum ... collaboration is key
- Rate of change is accelerating
- Consumer needs/expectations are complex



“Productive change begins when you confront the brutal facts.”

Commitment To Innovation

*“You must maintain unwavering faith that you can and will prevail in the end, regardless of the difficulties, **and at the same time, have the discipline to confront the most brutal facts of your current reality, whatever they might be ...**”*



Corteva invests **nearly \$4 million in innovation** every day.

Corteva Launches Corteva Catalyst

New Investment and Partnership Platform Will Accelerate Next Generation Ag-tech Innovation



Fostering collaboration across the value chain.



Press release – Paris, France, 17th September 2024

Danone set to double global partnerships to drive co-innovation throughout value chain

Let's Keep the Conversation Going!



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THANK YOU!