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# **Bundling Innovations for Agri-Food Systems Transformation: Some Reflections for Canadian Leaders**

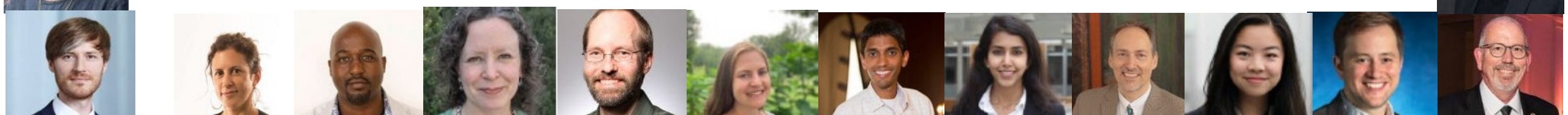
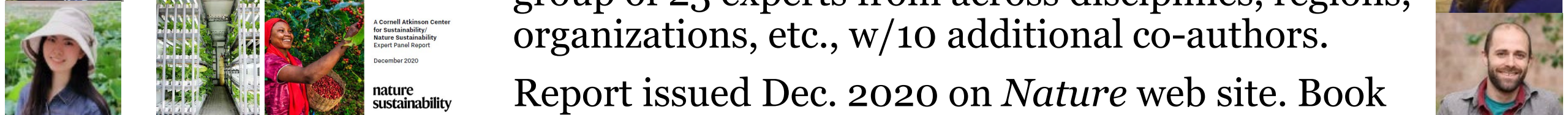
**Christopher B. Barrett  
Cornell University**

**Canadian Agri-Food Policy Institute  
Big Solutions Forum  
May 11, 2021**



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# Expert panel



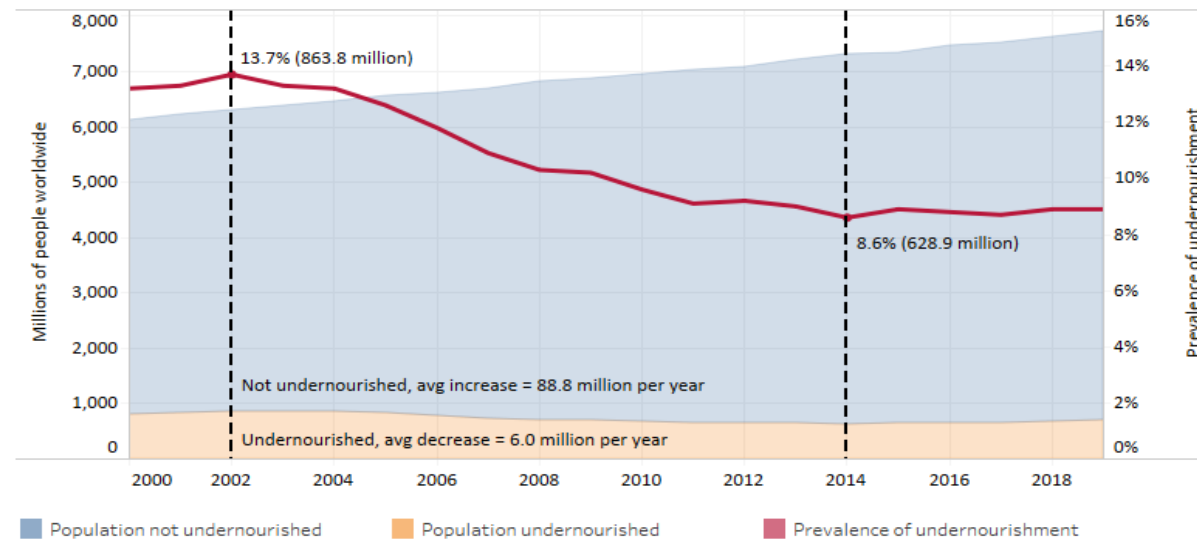
Cornell Atkinson – *Nature Sustainability* 2020 expert panel on “Innovations to Build Sustainable, Equitable, Inclusive Food Value Chains,” a diverse group of 23 experts from across disciplines, regions, organizations, etc., w/10 additional co-authors.

Report issued Dec. 2020 on *Nature* web site. Book forthcoming in Palgrave Macmillan SDG series.



We must hold two fundamental truths firmly in mind:

(1) 1960s/70s objectives – grow supply of staple cereals to avert famine – sparked AFS innovations that enabled huge advances in human well-being.



(2) Those innovations also had major, adverse, unsustainable spillover effects on climate, natural environment, public health/nutrition, social justice.

We must update objectives, accelerate/reorient innovations for 21<sup>st</sup> century.



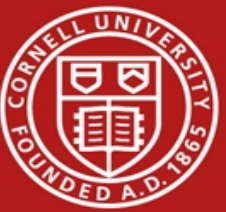
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## Key conclusions

Build around a shared vision of HERS agri-food systems.  
Must embrace multiple objectives simultaneously:

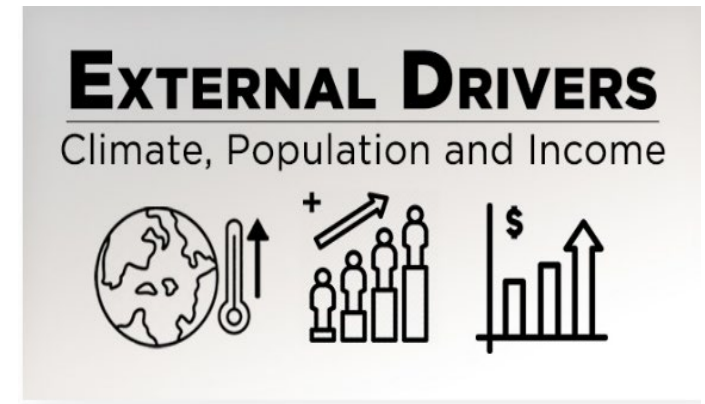






Must design for future states, not today's. Looking 25-50 yrs ahead (past 2030 SDGs, to scaled impact of emergent and ideated innovations), 3 major changes loom:

- Climate change
- Population shifts – urbanization, aging
- Income growth

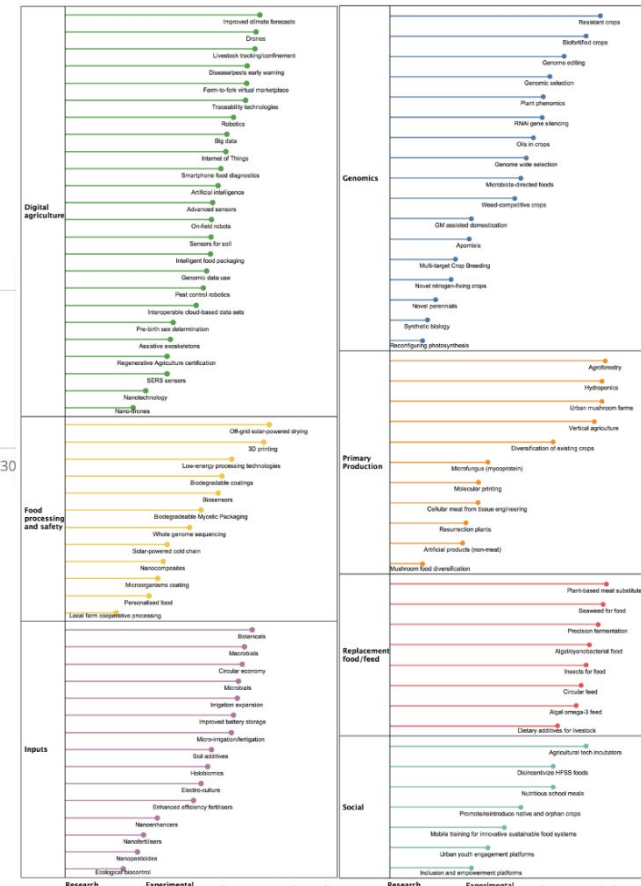
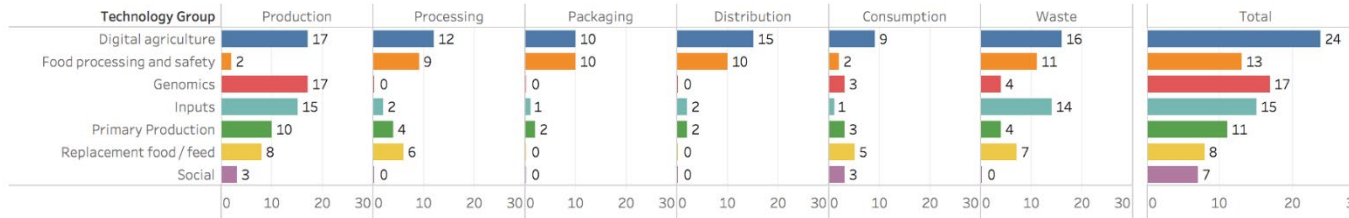


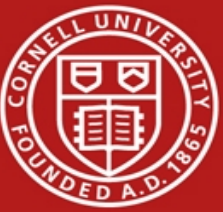
**Two key implications:**

- 1. Pay FAR more attention to Africa ... will account for >50% of global food demand growth to 2100**
- 2. Canada relatively favorably positioned – bilingual, net agronomic gains, land for post-ag rural economy**



A profuse pipeline exists of promising (natural and social) science advances at various stages of deployment readiness. Span value chains and geographies.

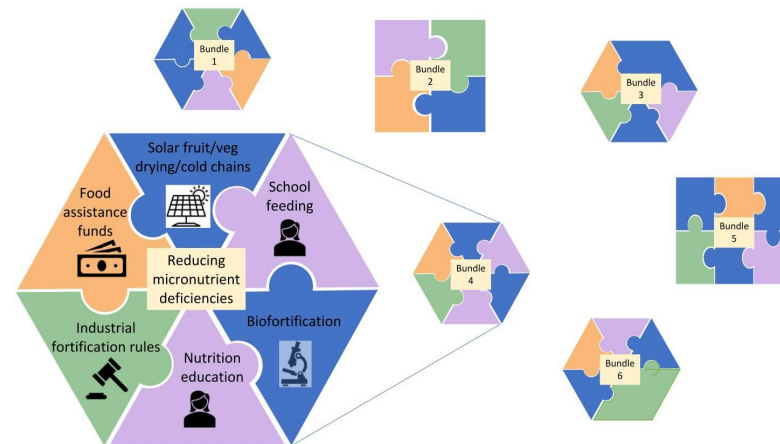




## 1. Develop socio-technical innovation bundles

No magic bullets exist. Need to bundle in order to:

- (i) realize synergies needed to adapt/scale (Green Revolution lesson)
- (ii) address political economy arising from spillovers (alt protein lesson)
- (iii) meet heterogeneous needs (micronutrient deficiencies lesson)





## 2. Reduce the land and water footprint of food

Decoupling food production from land is increasingly necessary, as well as culturally, economically, technologically feasible.

Challenge: Managing de-agrarianization's creative destruction.

Canada has some advantages in this transition if it moves quickly.



Photo: Gerry Machen/Creative Commons



Photo: Betterindia.com



Photo: Beck Deifenbach/Reuters





## 3. Reconfigure public support for AFSs

Two key roles for gov'ts:

1. invest in essential public goods and services: e.g., NSF-funded research
2. facilitate dialogue to find cooperative solutions: e.g., workshops like this!

Much current government AFS spending is wasteful (\$2bn/day!)

Must redirect towards social protection programs, agri-food research, and physical and institutional infrastructure.

Foster civil society dialogues to identify and support contextually appropriate socio-technical bundles.

Again, Canada seems to have some advantages here over EU, US, Japan, BRICS



**4. Commit to co-creation with shared and verifiable responsibility** Agreed KPMs, safety nets, penalties can accelerate beneficial innovation and minimize adverse unintended consequences.

**5. Deconcentrate power**  
Reducing market and political power imbalances and broadening participation in innovation dialogues can accelerate innovation.

**6. Mainstream systemic risk management**  
COVID-19 underscores the rising importance of effective systemic risk management. Need innovative risk reduction and risk transfer mechanisms.

**7. Develop novel financing mechanisms**  
AFS innovations require \$\$\$ (hundreds of billions annually).  
How to mobilize private resources beyond public spending/philanthropy?

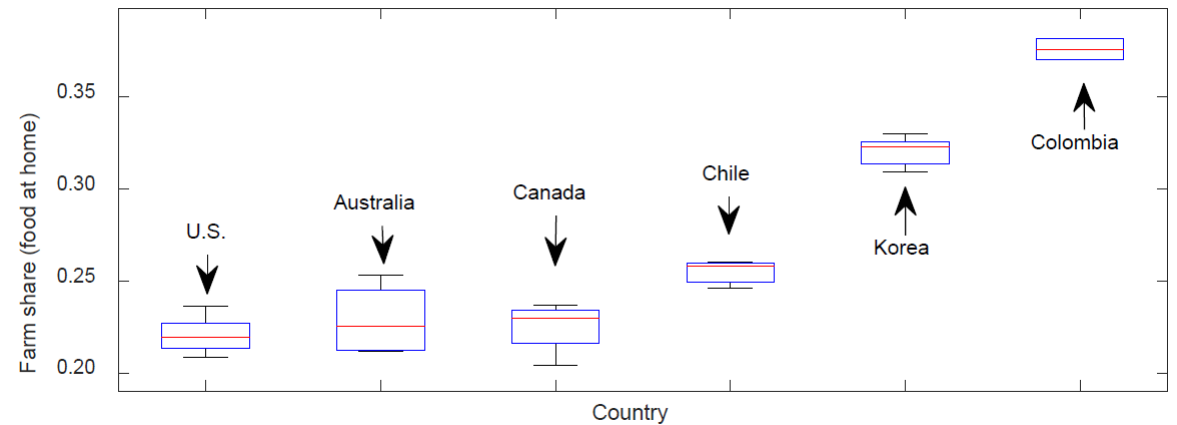
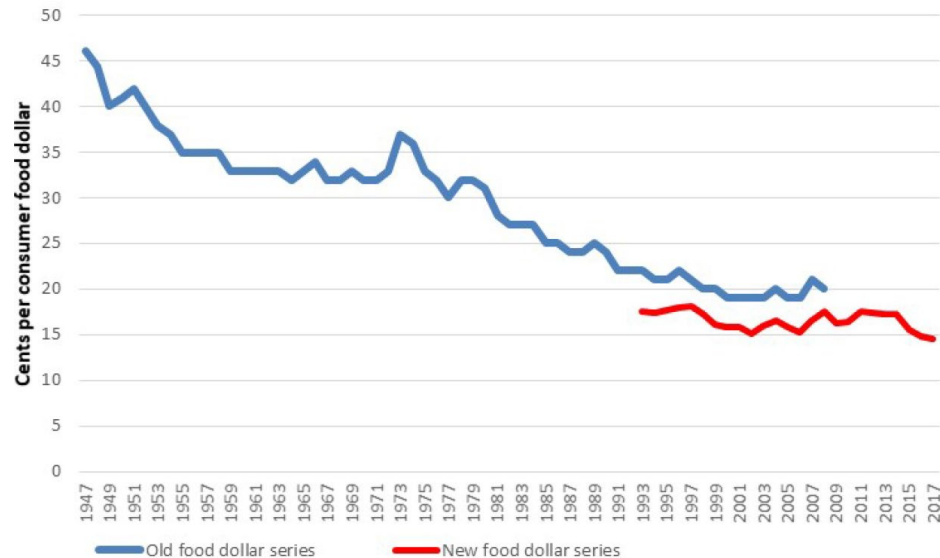
**Latent Canadian advantage:** trusted agent – low-cost verifiability of product attributes:  
ESG (GHG, water, chemicals, labor); healthful foods,





## Post-harvest value addition

Globally, 73% of consumer spending on FAH (91% on FAFH) accrues to post-harvest value chain actors. Post-harvest share will inevitably continue growing. Must build value addition capacity for export markets.

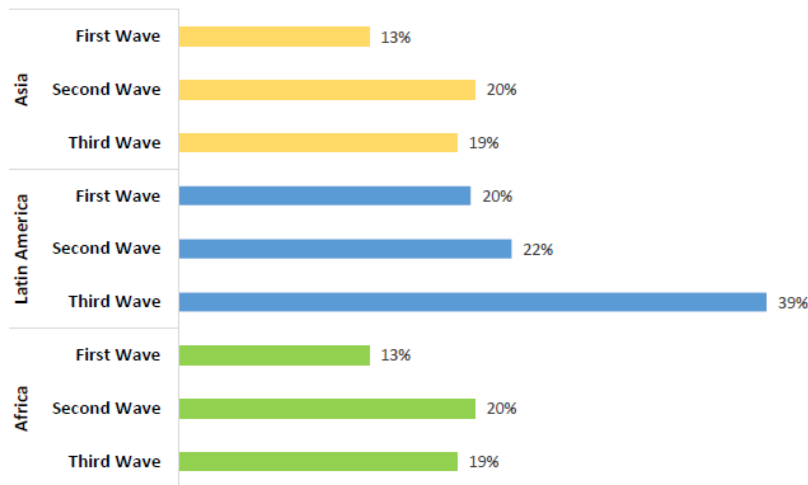




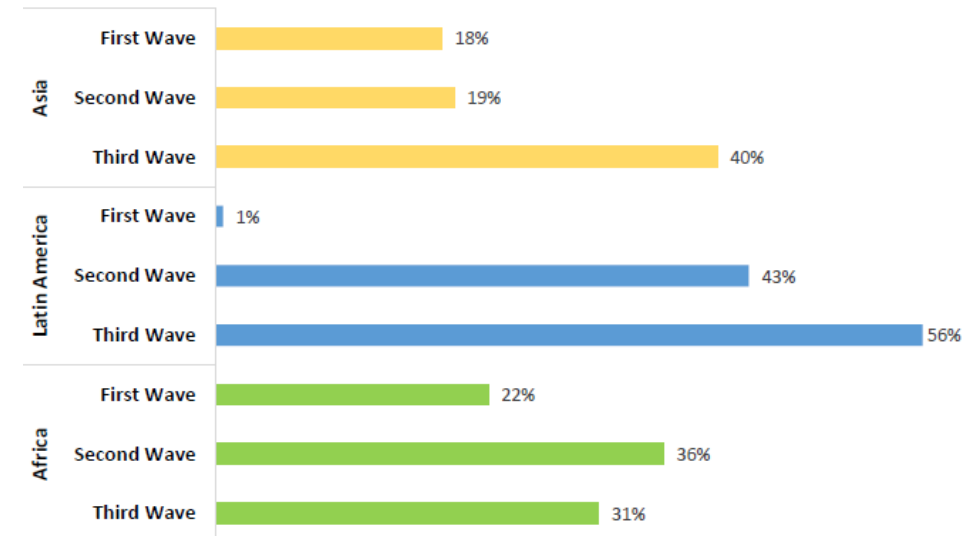
## Connecting to food retail and food service in LMICs

Extremely rapid agri-food value chain transformations happening in LMICs, esp. downstream. Brands and FDI, not just commodity trade, keys to mkt expansion.

Leading grocery chains' edible sales, average real annual growth, 2002-18



Multinational food service chains real annual sales growth, 2008-2018



Source: Barrett et al. *Journal of Economic Literature* in press





**Dramatic transformation of agri-food systems is both needed and essential.**

**Bundling social and technological changes is key.**

**Canada has some natural advantages: geography, reputation, culture/language**

**Also some challenges: must build post-harvest value addition and presence in consumer-facing LMICs agri-food value chains that are the main growth markets.**





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Thank you

Report and associated journal articles, videos, etc. available at <https://blogs.cornell.edu/nature-sustainability/>

Thank you for your time and interest!

### Bundling innovations to transform agri-food systems

NATURE SUSTAINABILITY | VOL 3 | DECEMBER 2020 | 974-976 | www.nature.com/natsustain

Coupling technological advances with sociocultural and policy changes can transform agri-food systems to address pressing climate, economic, environmental, health and social challenges. An international expert panel reports on options to induce contextualized combinations of innovations that can balance multiple goals.

Amer. J. Agr. Econ. 103(2): 422-447; doi:10.1111/ajae.12160

## OVERCOMING GLOBAL FOOD SECURITY CHALLENGES THROUGH SCIENCE AND SOLIDARITY

CHRISTOPHER B. BARRETT

### Articulating the effect of food systems innovation on the Sustainable Development Goals



Mario Herrero, Philip Thornton, Daniel Mason-D'Croz, Jeda Palmer, Benjamin L. Bodirsky, Prajal Pradhan, Christopher B. Barrett, Tim G. Benton, Andrew Hall, Ilje Pikaar, Jessica R. Bogard, Graham D. Bonnett, Brett A. Bryan, Bruce M. Campbell, Svend Christensen, Michael Clark, Jessica Fanzo, Cecile M. Godde, Andy Jarvis, Ana Maria Loboguerrero, Alexander Mathys, C. Lynne McIntyre, Rosamond L. Naylor, Rebecca Nelson, Michael Obersteiner, Alejandro Parodi, Alexander Popp, Katie Ricketts, Pete Smith, Hugo Valin, Sonja J. Vermeulen, Joost Vervoort, Mark van Wijk, Hannah HE van Zanten, Paul C. West, Stephen A. Wood, Johan Rockström



Food system innovations will be instrumental to achieving multiple Sustainable Development Goals (SDGs). However, major innovation breakthroughs can trigger profound and disruptive changes, leading to simultaneous and

Lancet Planet Health 2021; 5:e50-62



editorial

### Bundling agri-food innovations

Our expert panel on food value chains now shares recommendations on how to transform agri-food systems.