



Covid-19 and Resilience in Food Supply Chains

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Outline

01

Where are things at?

6+ months into Covid-19

02

What went wrong?

Lack of supply chain resilience

03

What can we do now?

Guidance from research

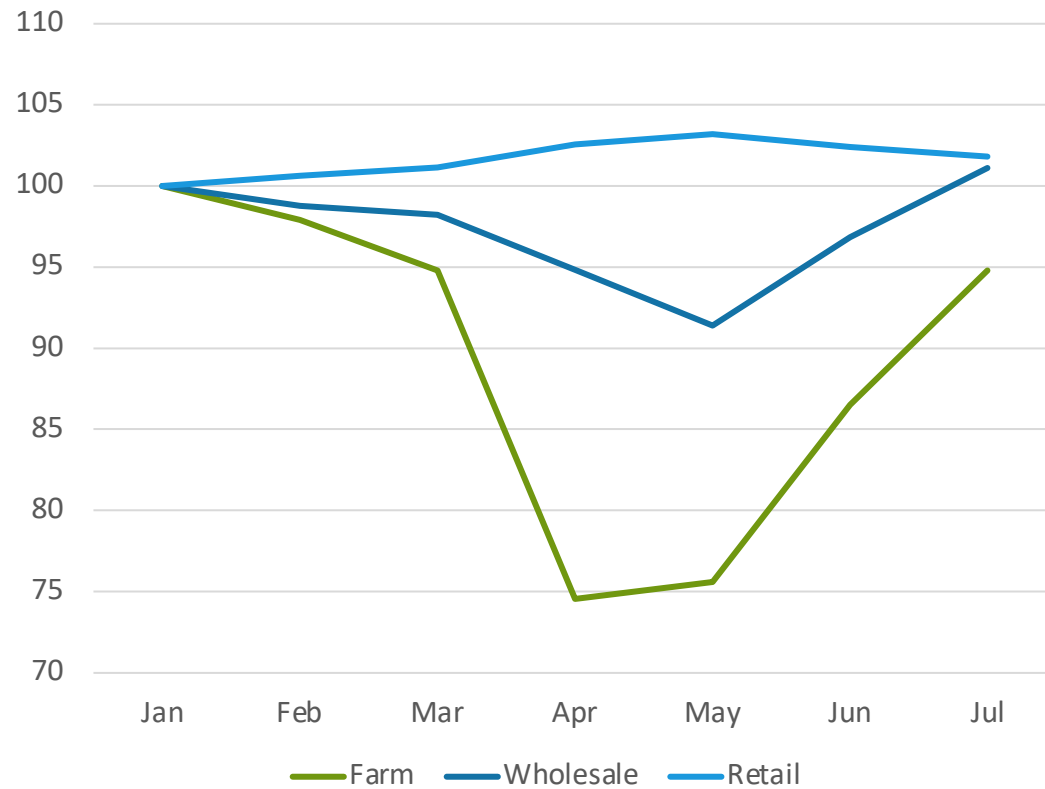


What's the current status of U.S. food supply chains?

**Better than this spring, but still far from
pre-Covid normal**

Dairy Supply Chains

Monthly 2020 Dairy Prices (Jan 2020=100)

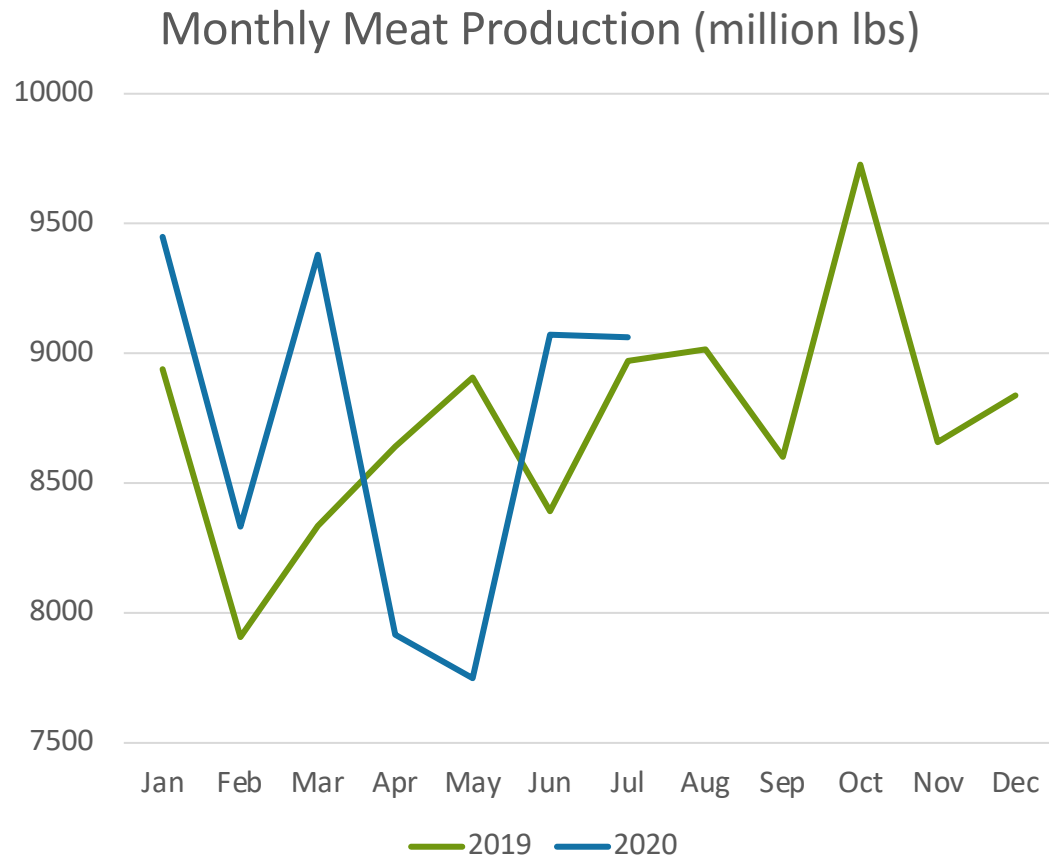


Data sources: USDA AMS (2020), U.S. BLS (2020a, 2020b)



Source: Leake (2020)

Meat Supply Chains



Data source: USDA ERS (2020)

Temporary meat plant closures

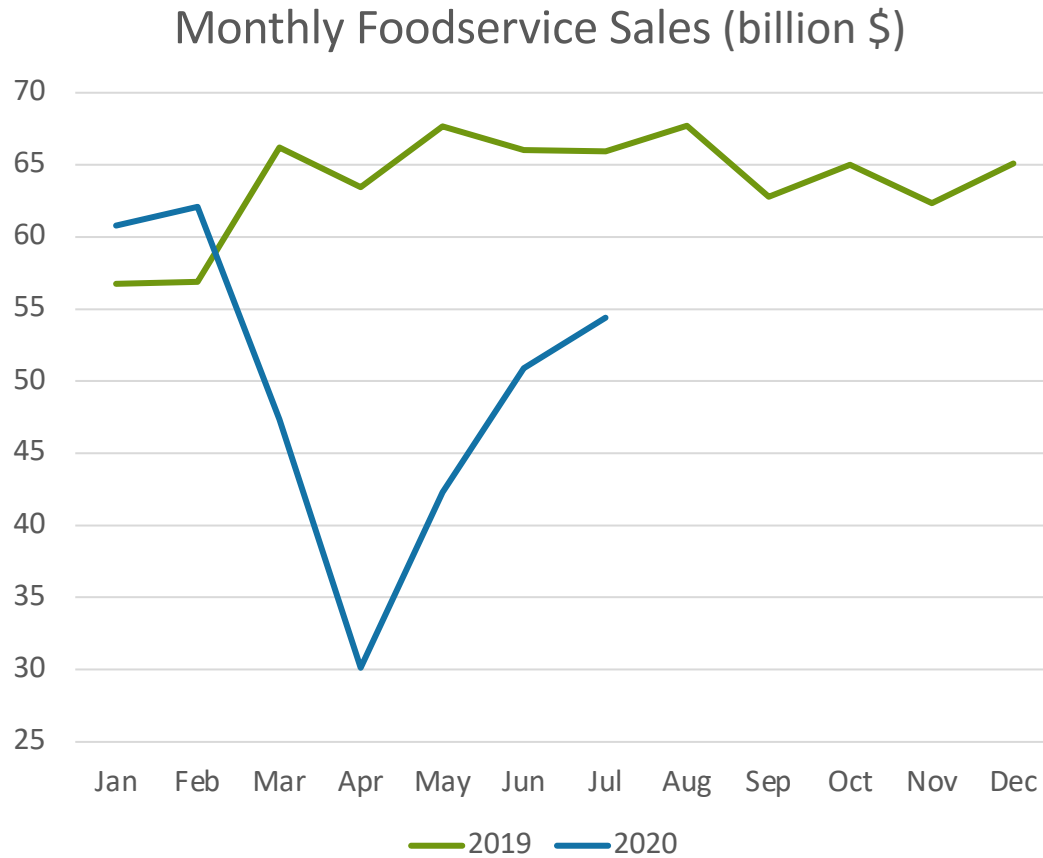
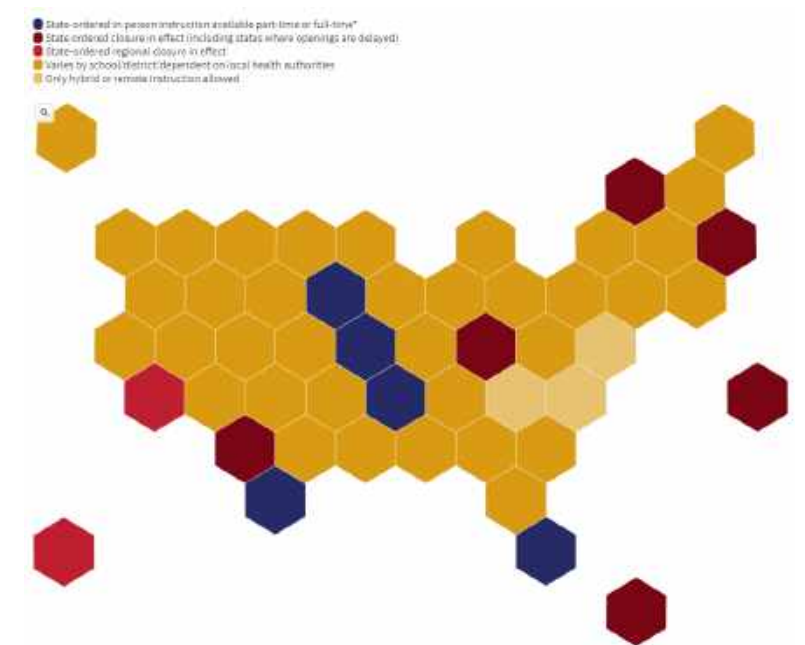
Updated August 31



Sources: McCarthy and Danley (2020), Devlin (2020)

Foodservice Supply Chains

State Map of K-12 School Openings and Closures, Fall 2020



Data source: U.S. Census Bureau (2020)



Sources: Harris (2020), Guerrero (2020)

Direct-to-Consumer Supply Chains

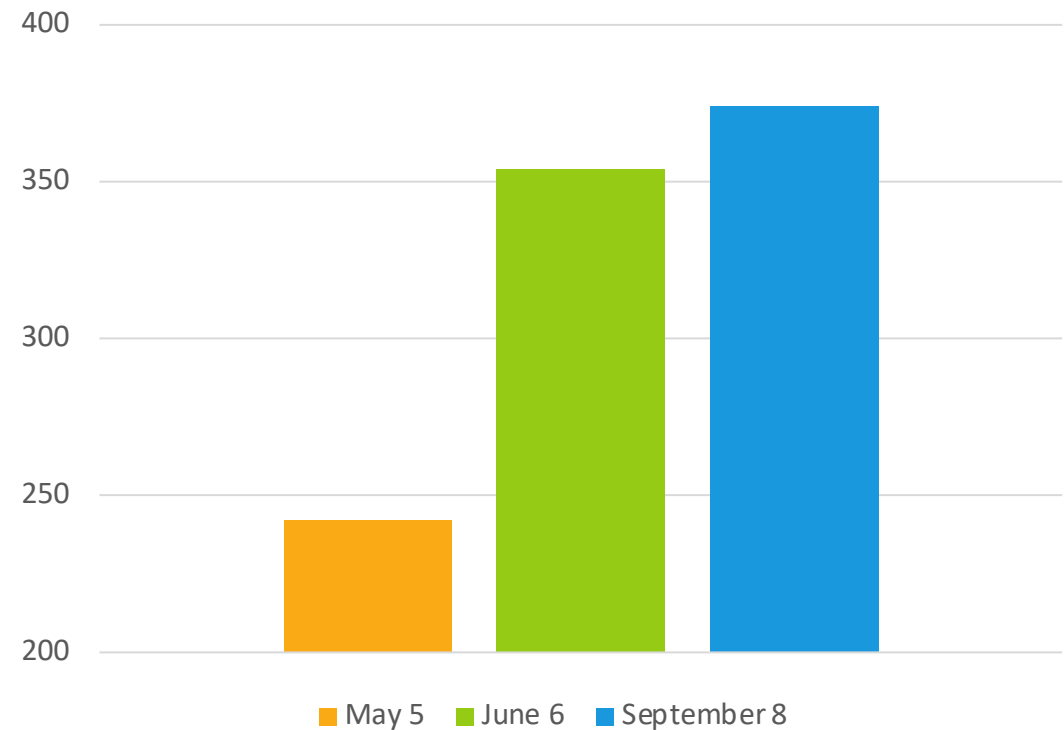
Supply chain configurations (2015 market shares)

- On-farm stores (44%)
- Farmers' markets (23%)
- Roadside stands (8%)
- CSAs (7%)
- Online (6%)
- Other (12%)



Sources: USDA NASS (2016), Goot Essa (2020)

Number of Florida Farms Selling Direct to Consumers, 2020



Sources: Florida Farm Bureau (2020), Internet Archive (2020)



What went wrong with U.S. food supply chains?

Pursuit of efficiency at the expense of resilience

Separate Supply Chains

Grocery vs foodservice supply chains: different ...

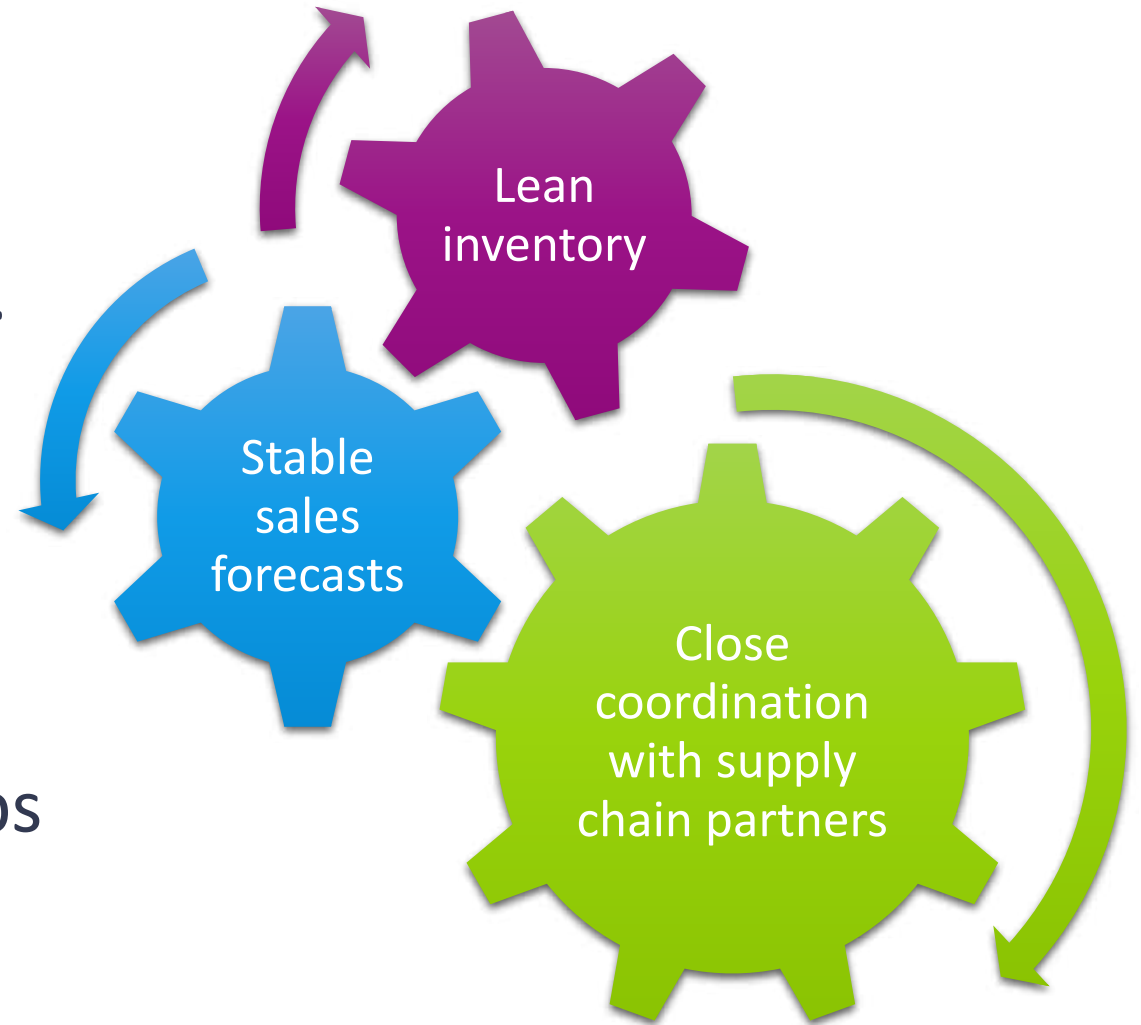
- Farms
- Processors
- Sizes
- Packaging
- Labeling

Grocery	Foodservice
	
	
	

Little Margin for Error

Relatively stable food supply chains prior to Covid-19 led to ...

- Optimized supply chains with minimal inventory
- Close matching of incoming demand and outgoing supply
- Stable buyer-seller relationships
- Optimized truck fleets with minimal excess capacity



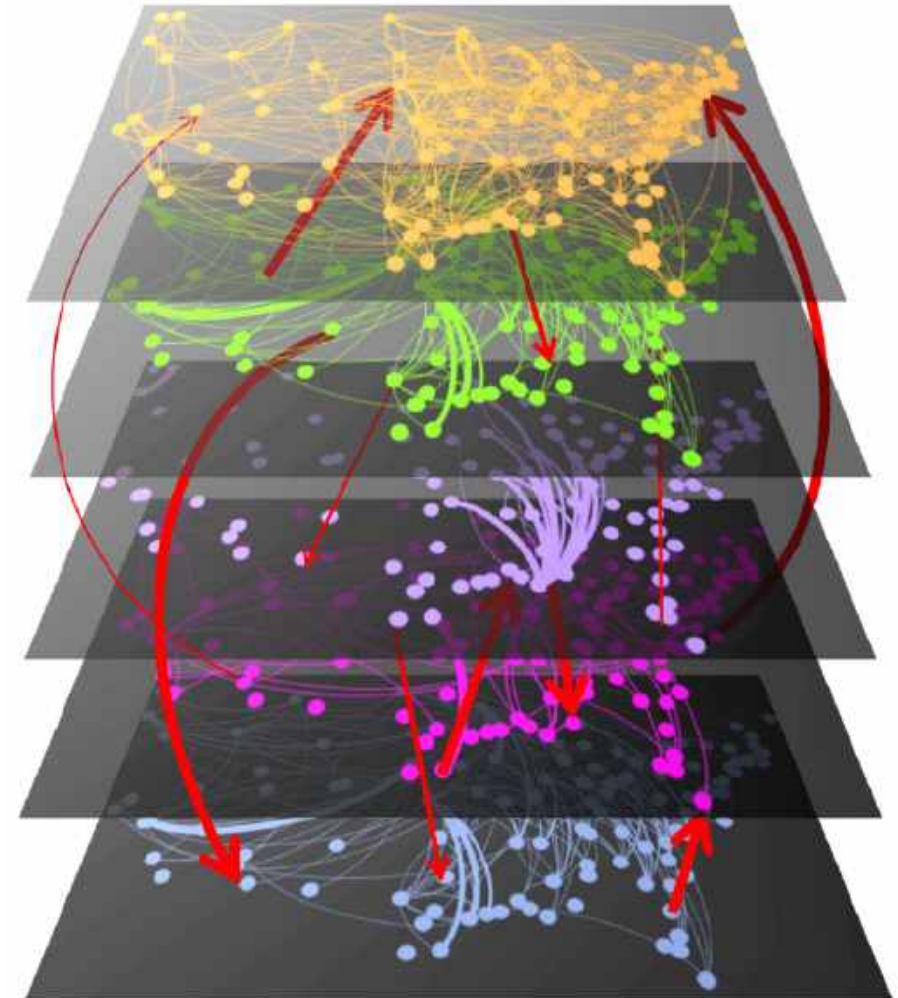


What can be done now to improve food supply chain resilience?

Guidance from recent research

Multilayer Network Model

- Captures product and service flows across sectors and locations
- Currently 41 sectors and 115 locations
- Models the propagation of supply and demand shocks along supply chains
 - Shock propagates from a source node to other nodes by reducing supply and demand flows to other nodes



Sources: Garcia et al. (2020a, 2020b), Gomez et al. (2020)

Preliminary Network Model Results

Fragility Risk of Selected Sectors

High	Medium	Low
Animal feed	Fertilizers	Alcoholic beverages
Food manufacturing	Fruits and vegetables	Chemical products
Live animals	Grains	Electronics
Meat	Transport equipment	Machinery
Milled grains	Utilities	Motor vehicles
Pharmaceuticals		Plastics and rubber
Retail		Textiles and leather
Tobacco products		
Transportation		

- *Fragility Level:*
The possibility of a small failure at one node leading to a large avalanche of failed nodes
- *Fragility Risk:*
Interaction between fragility level of a node and its exposure to supply and demand shocks

Sources: Garcia et al. (2020a, 2020b), Gomez et al. (2020)

Implications of Network Model Results

For businesses

- More supply chain partners, and more geographically diverse partners
- More flexibility to shift between grocery and foodservice markets
- Maintain larger inventories
- Reduce exposure to shocks at each node of the supply chain
- Stress tests of supply chain resilience

For governments

- Financial support to develop and pilot-test supply chain initiatives that increase resilience
- Regulatory flexibility during crises to facilitate shifts between grocery and foodservice

Thank You!

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