MP AGRILYTICS
DELIVERING DATA, DEBATING OUTCOMES

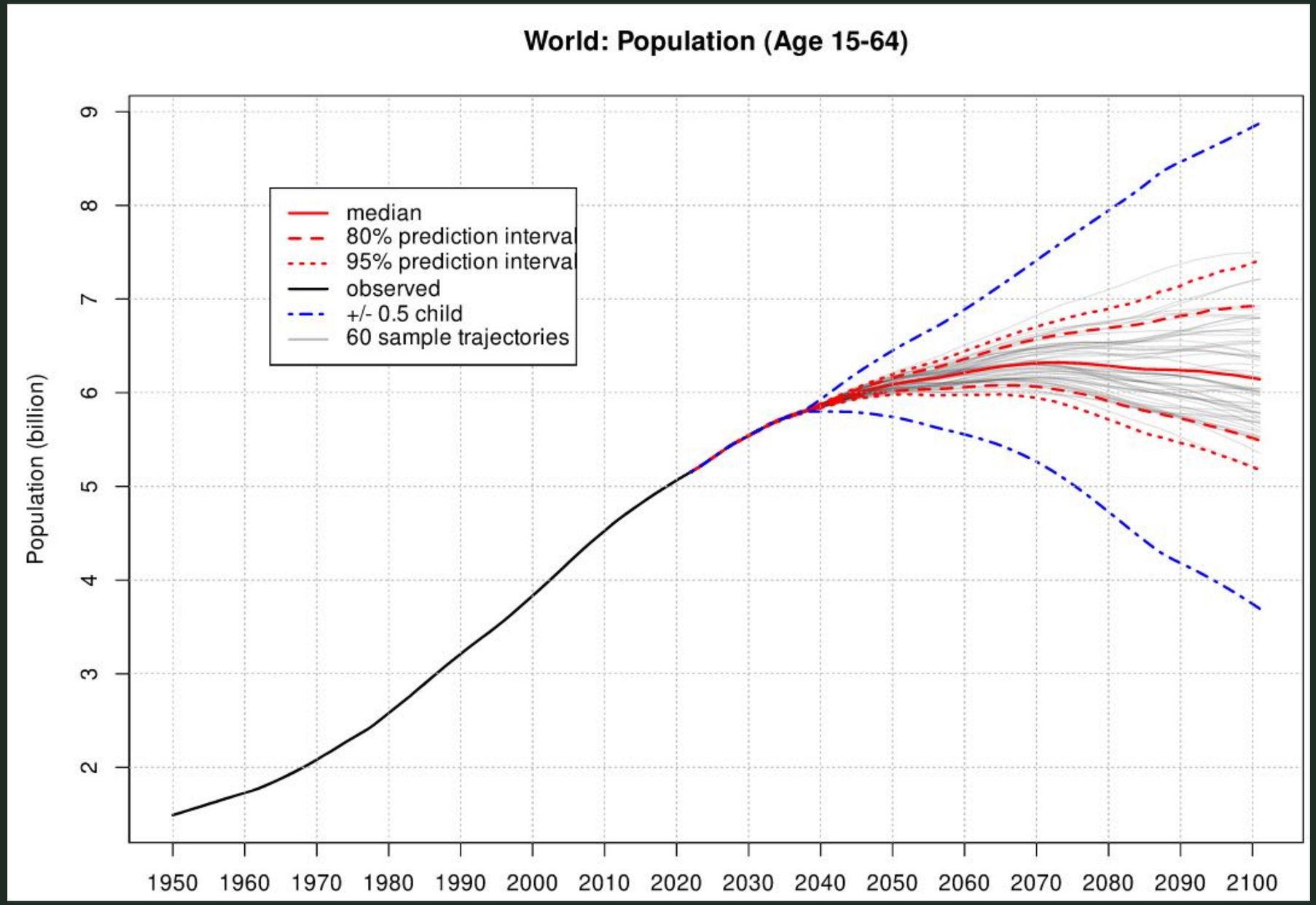
International Supply and Demand Summary

- Populations are shrinking in most places. India, Africa and Oceania are really the only places growth are expected longer term today.
- China is the elephant in the room and must be watched closely. They have absorbed the growth in global production over the past decade. That said the U.S. is the #2 importer in the world and if China slows, we are likely where that product lands today.
- Brazil is the competition down the road.

Domestic Demand Summary

1. Much different than last cycle where we could not push prices onto consumer. This was validated with margins. Exactly opposite today.
2. We don't know if this will last or not. We are "sky" high vs what supply typically would suggest.
3. Broader economy is still very much a concern. A lot of ugly macro charts to point at. Do we really think demand stays this good?

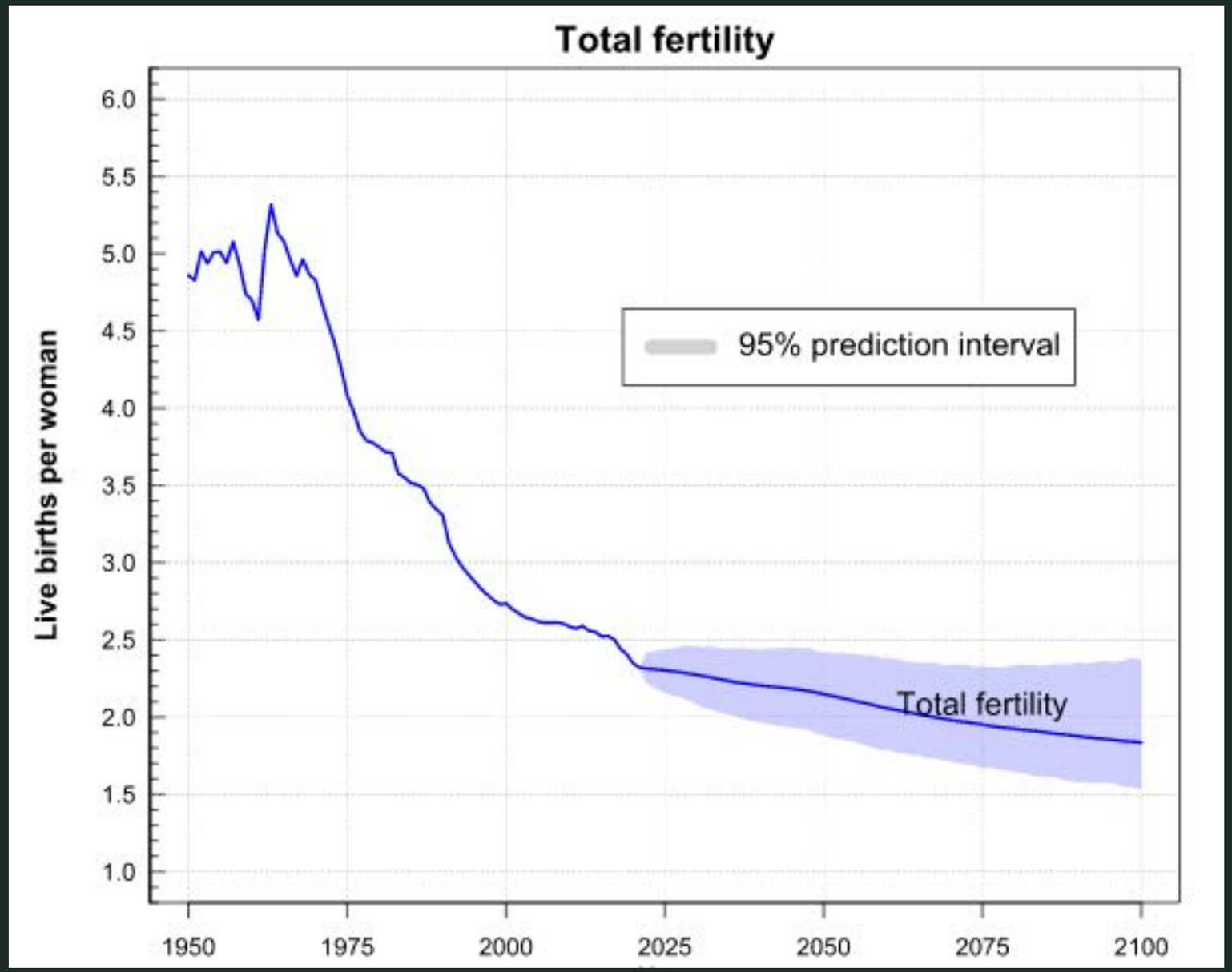
World Population



NOTEWORTHY:

World Population is likely to peak in 2070. This is not the non linear growth of the past.
Birth control, and people having less kids in general for a variety of reasons is 1/4 of what it was at the turn of the last century.

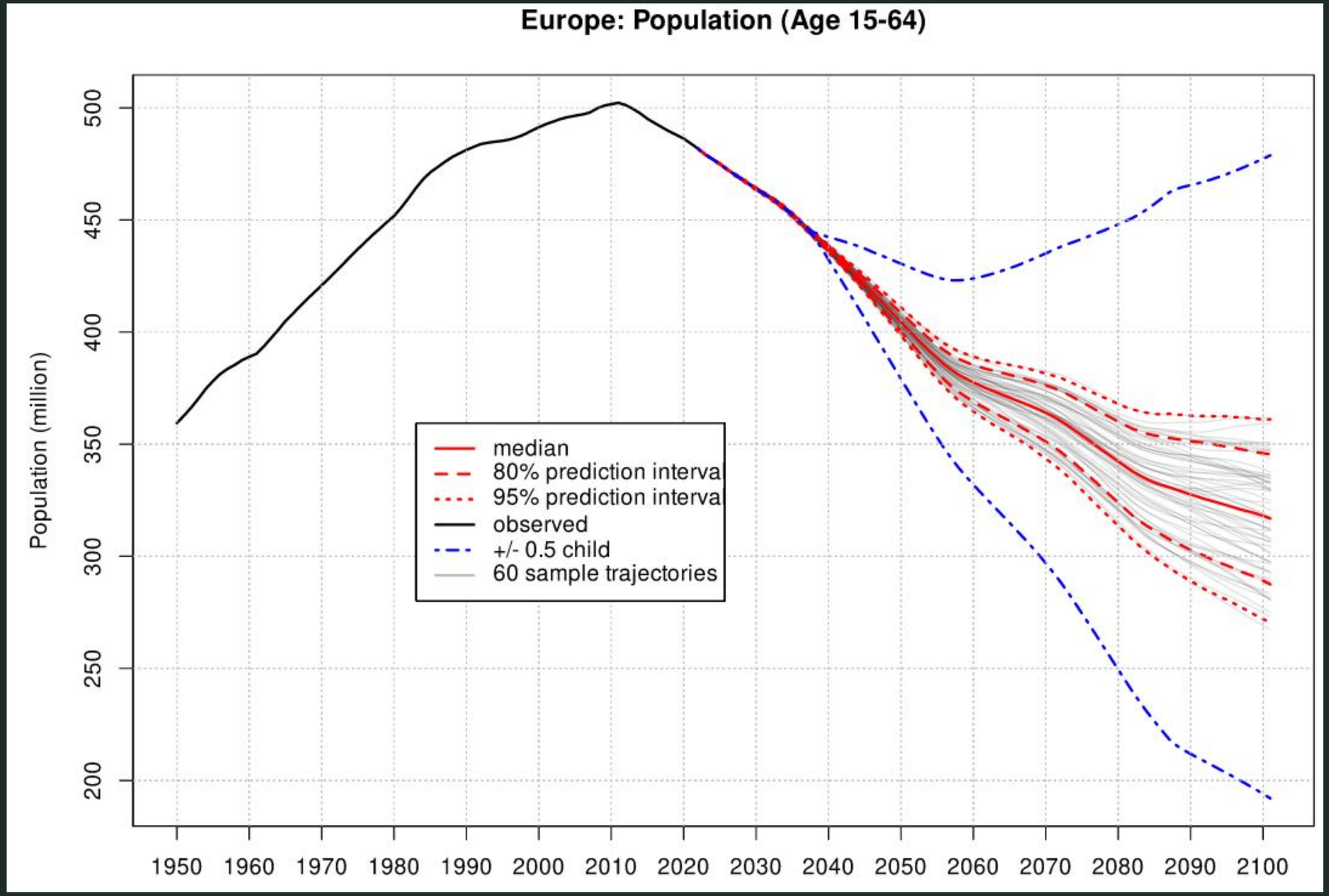
Global Fertility Rates cut in 1/2



NOTEWORTHY:

This is rather significant vs history.

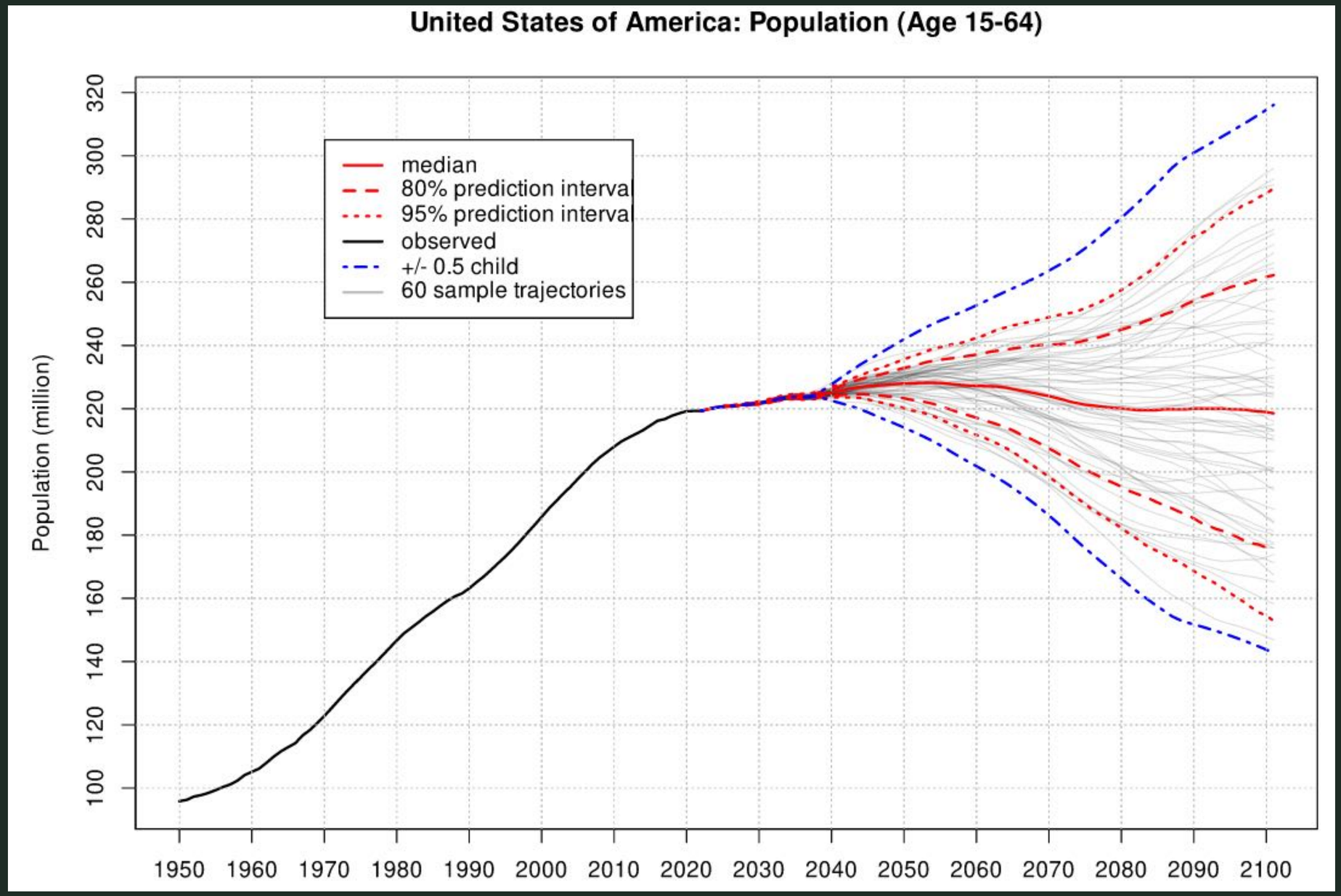
Europe Population



NOTEWORTHY:

This is where population first peaked in 2010.

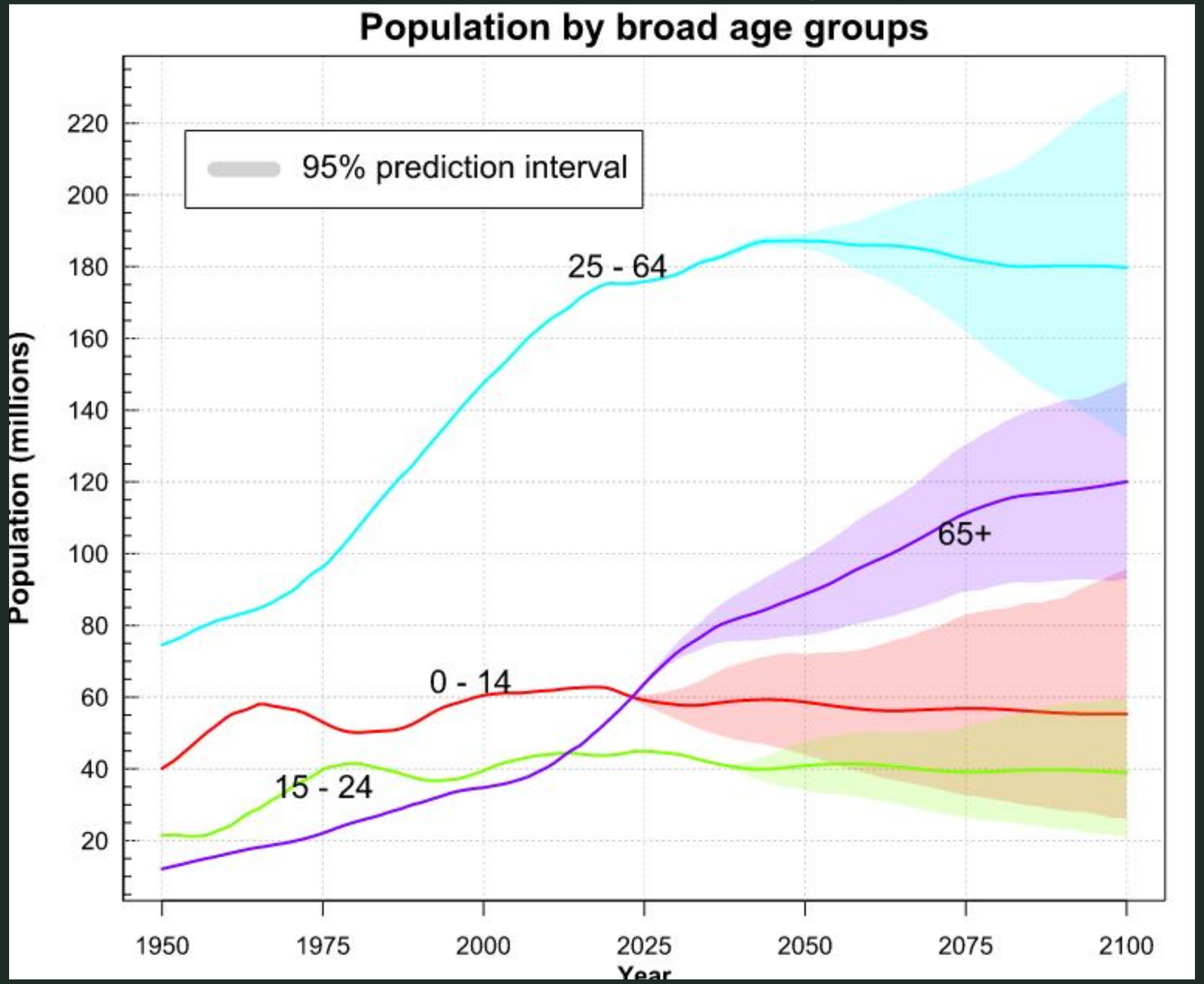
U.S. Population



NOTEWORTHY:

US growth expected to stagnate between 2050 and 2060.

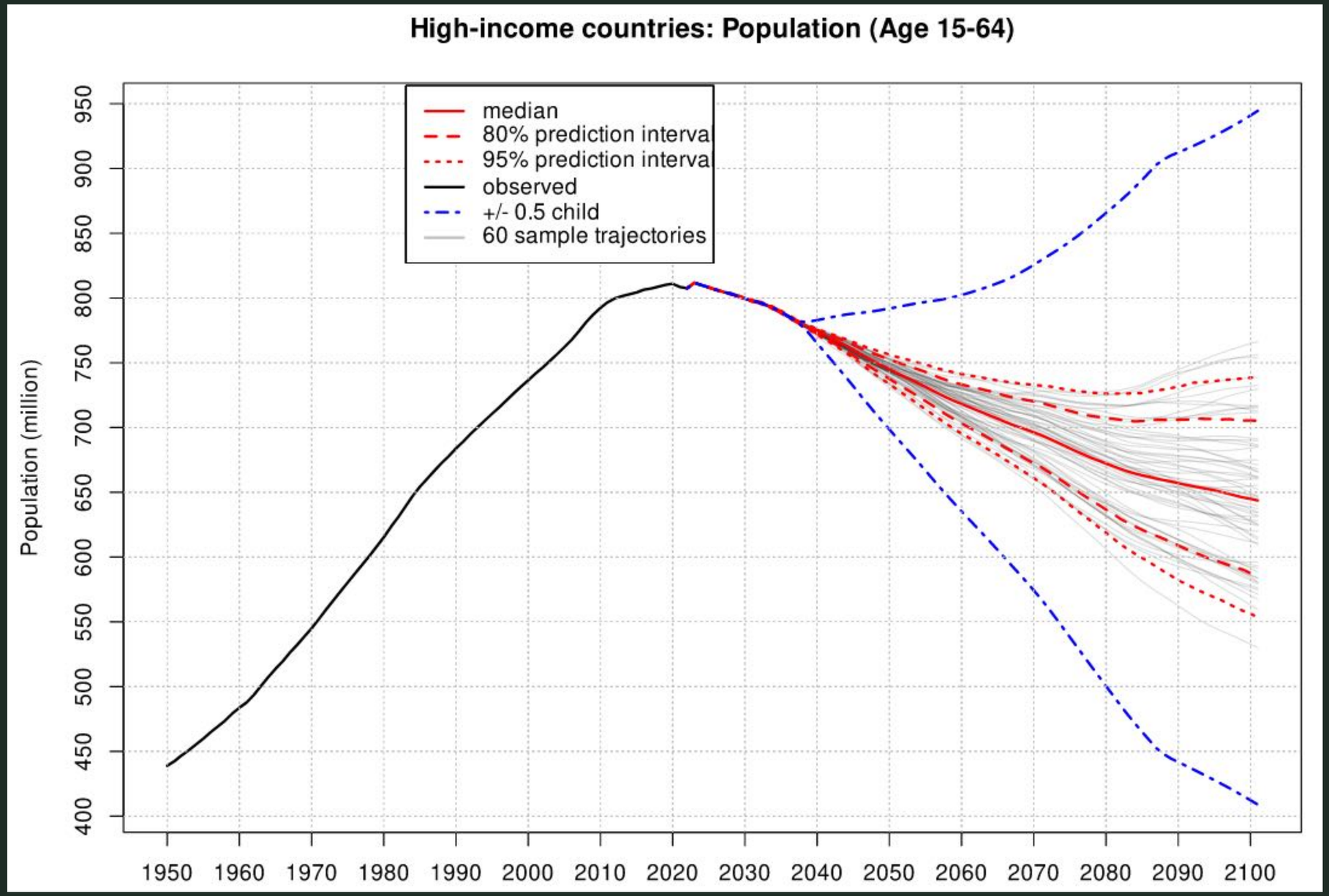
U.S. Population Demographics



NOTEWORTHY:

Much more retiries to come in the next 25 years (30% more).

High Income

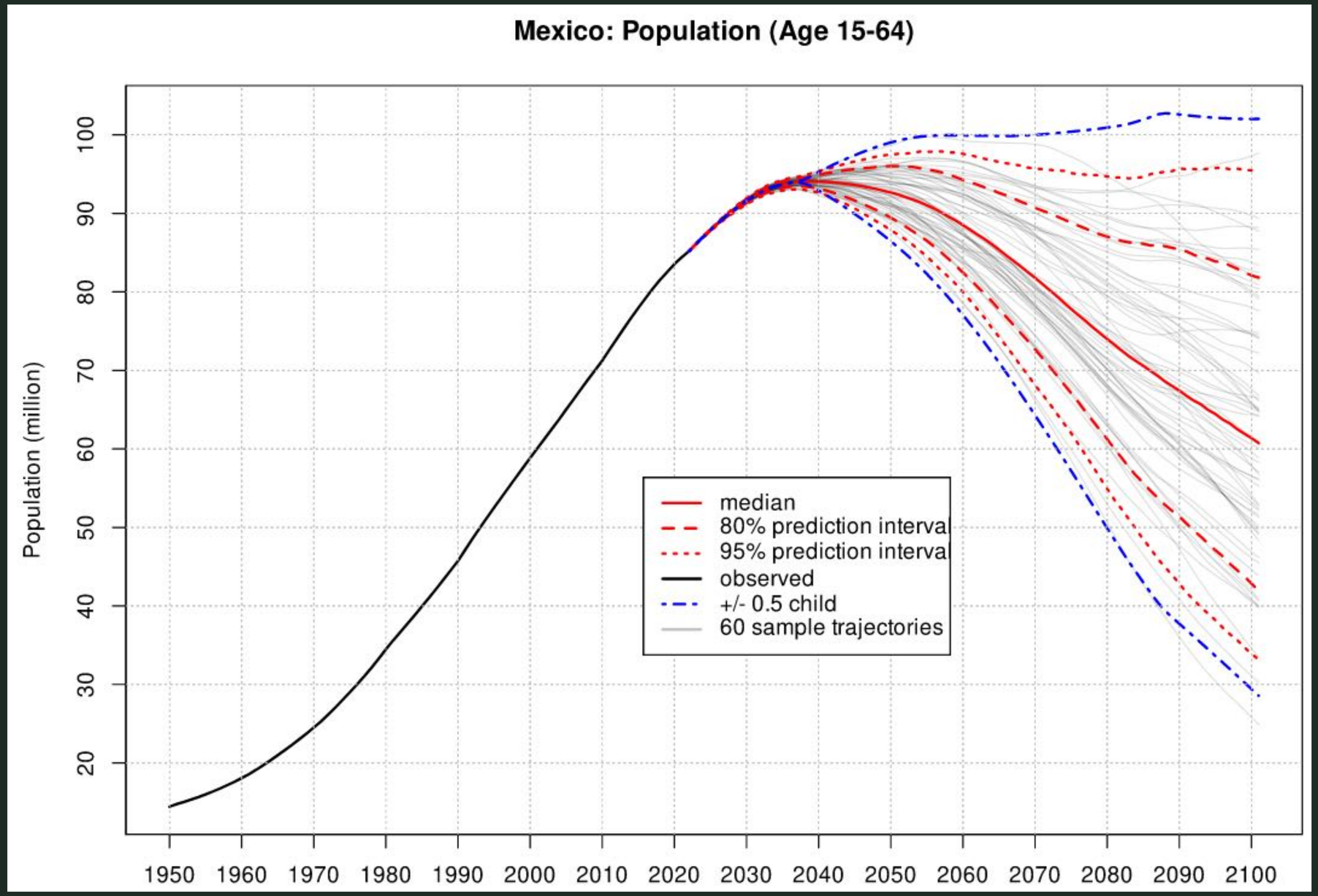


NOTEWORTHY:

*This is NOT the expectation for high income people, just the countries today. We don't really have a good way of predicting middle class globally.

Declining numbers of potential beef customers?

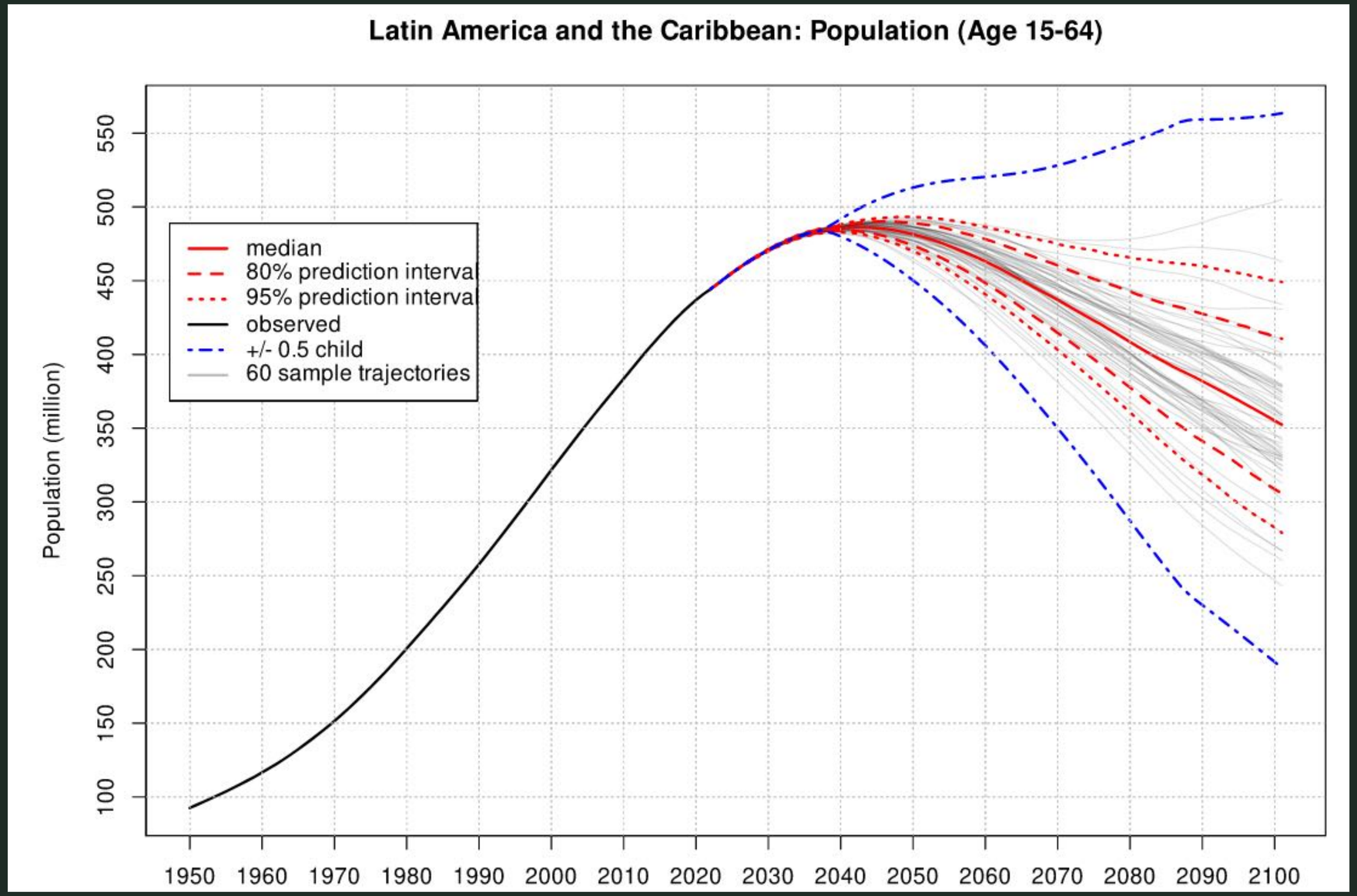
Mexico Population



NOTEWORTHY:

Maybe another decade?

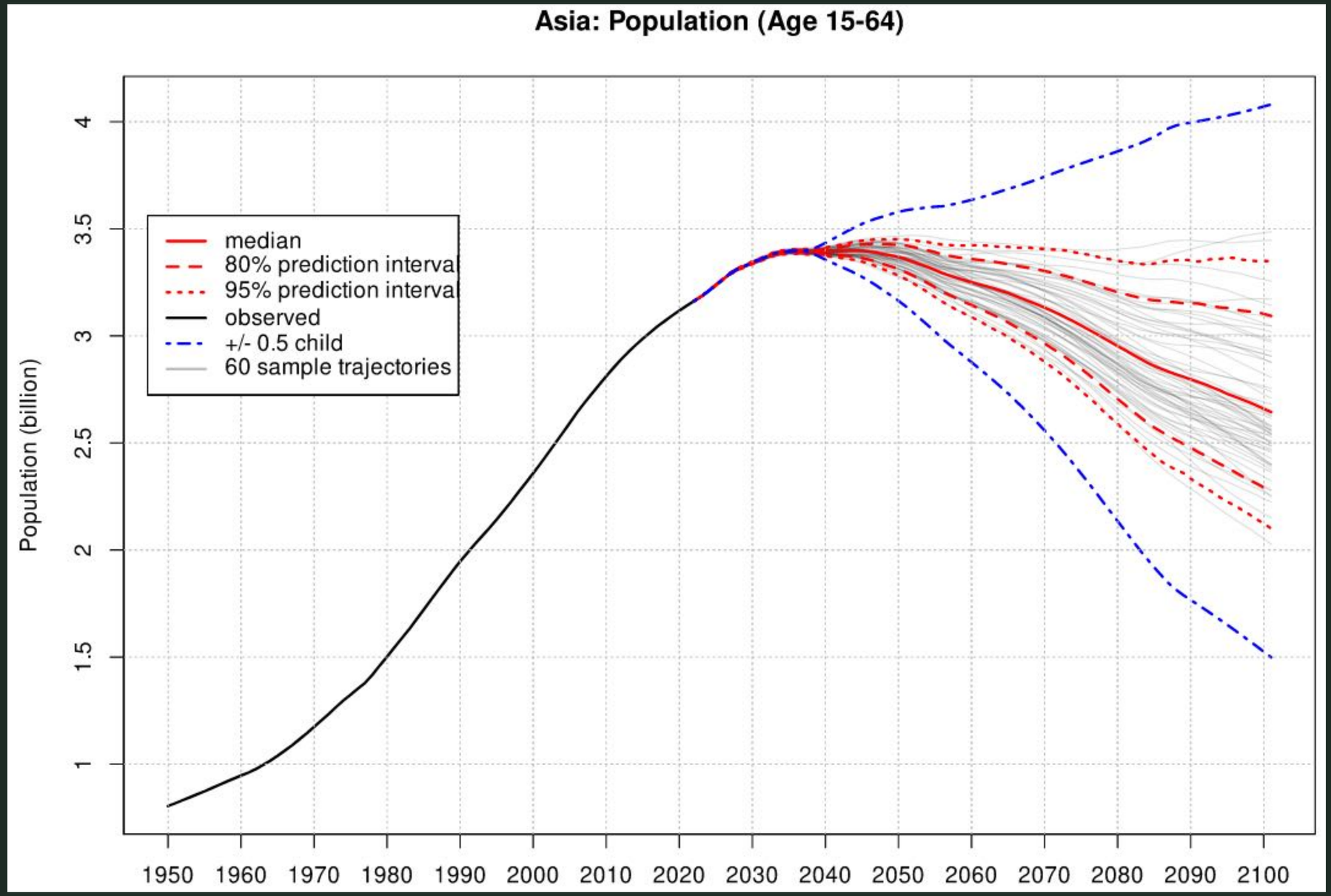
Latin America



NOTEWORTHY:

Better than Mexico and the US but very similar story.

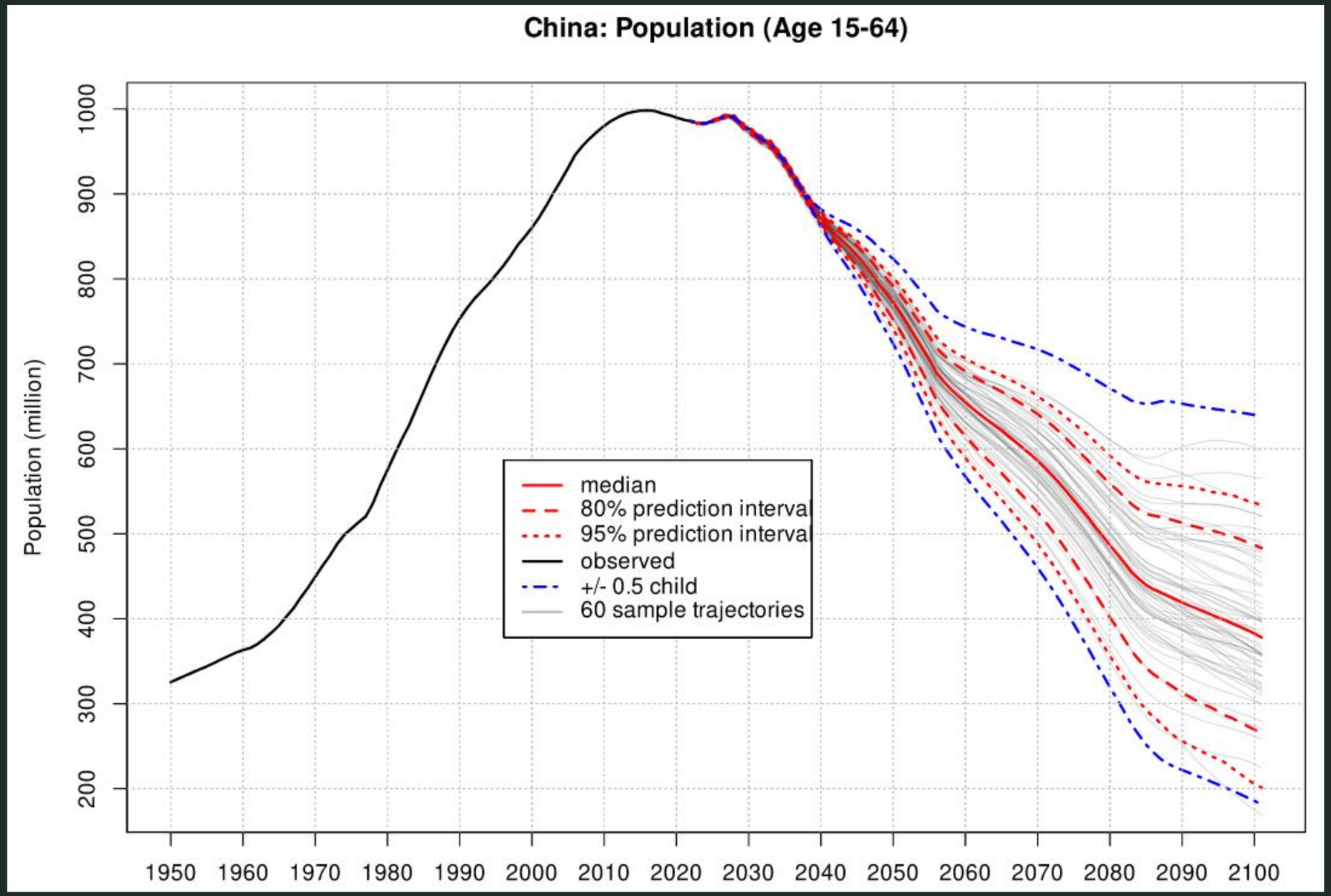
Asia



NOTEWORTHY:

Not the story that you typically hear on the news. This is not going "parabolic" anytime soon.

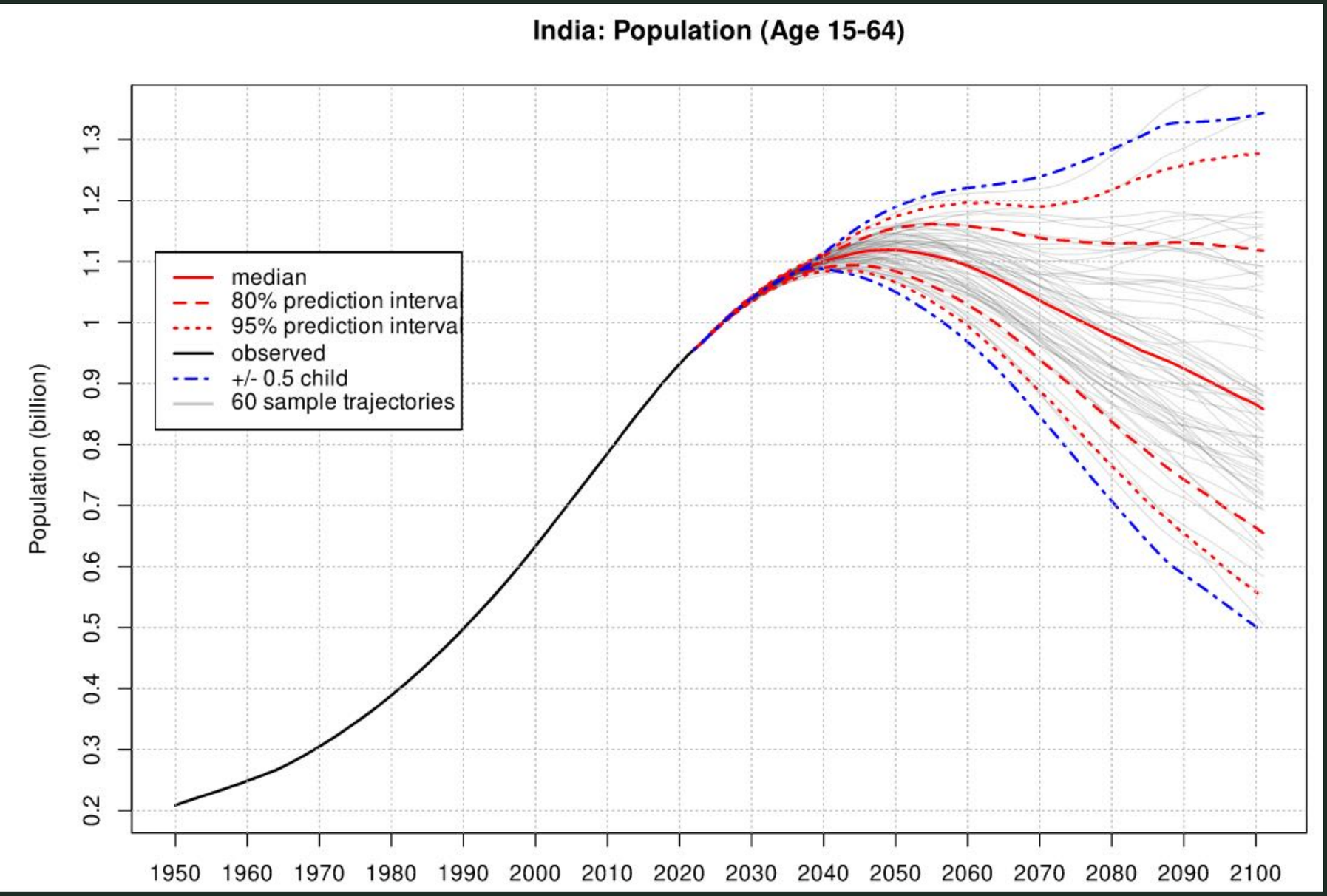
China



NOTEWORTHY:

China has probably peaked.

India



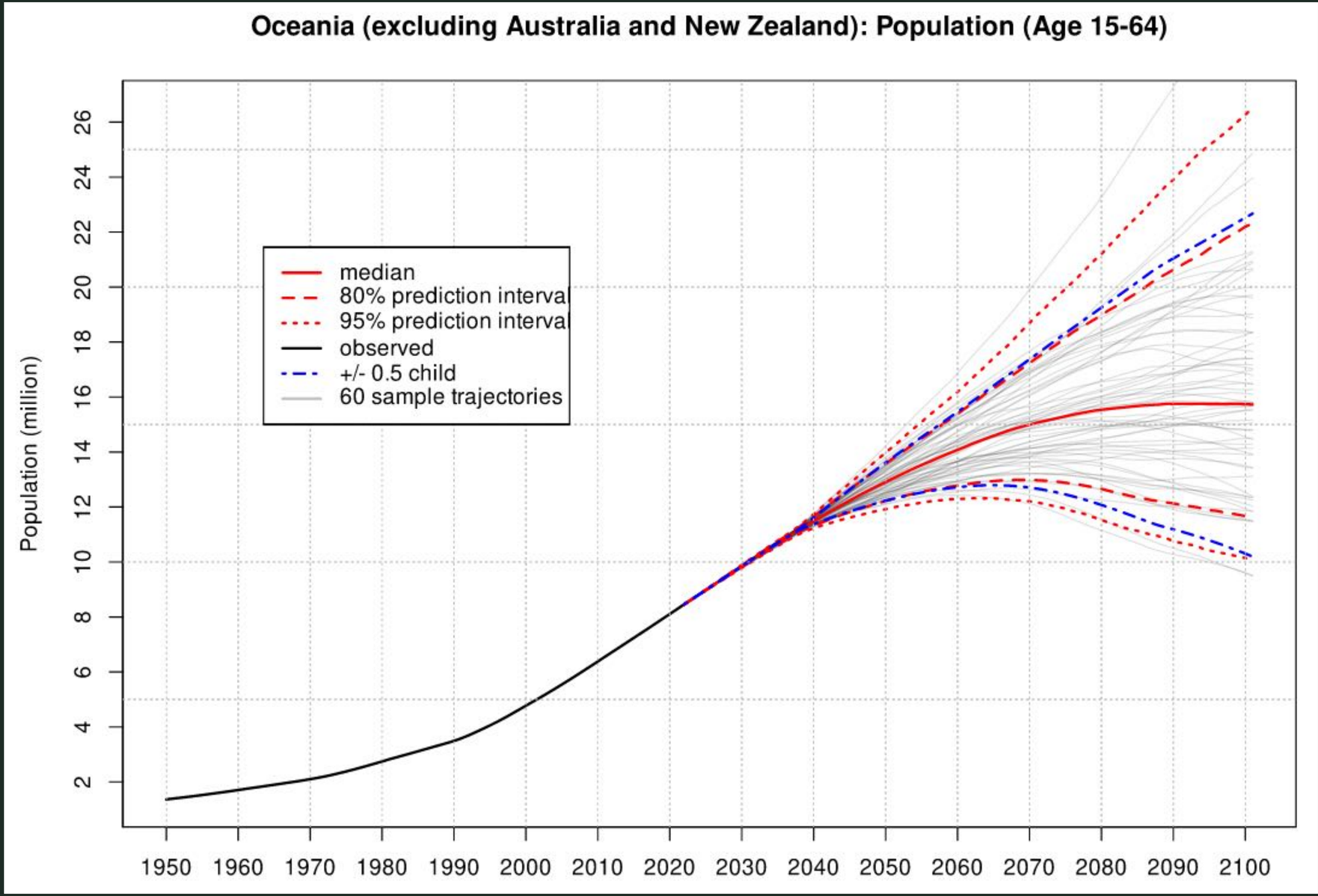
NOTEWORTHY:

Data suggests India peaks around 2050.

Despite the population growth, Hindu dietary laws likely do not point to significant increases in meat consumption, and certainly not beef.

Around 40% of Indians claim to be vegetarian.

Oceania

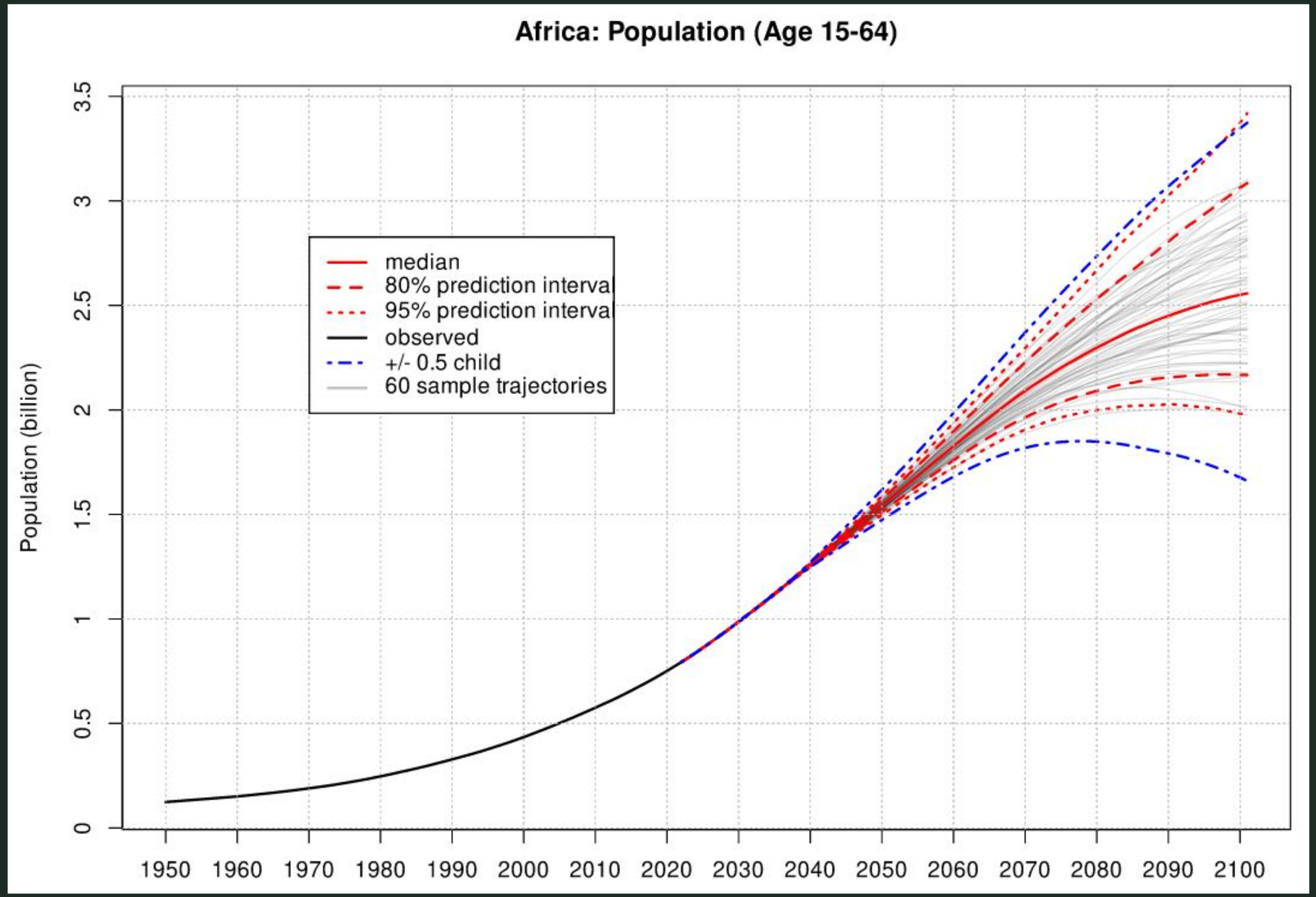


NOTEWORTHY:

Finally! An area of growth.

However, we are only talking 20-30M people.

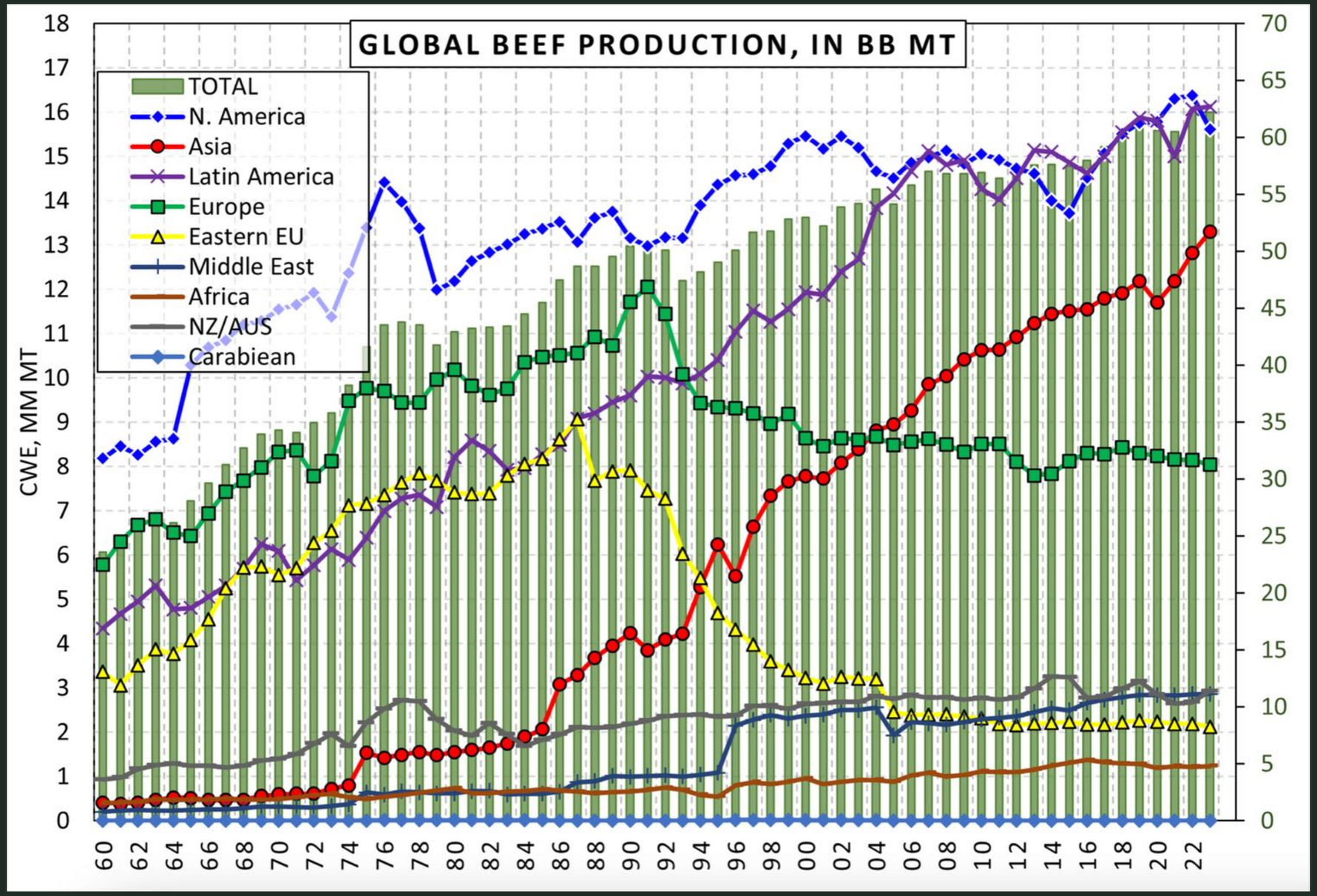
Africa



NOTEWORTHY:

The only really significant growth in population expected is in Africa. This could be 1-1.5Billion people, but there is huge risk around this forecast.

International Supply & Demand

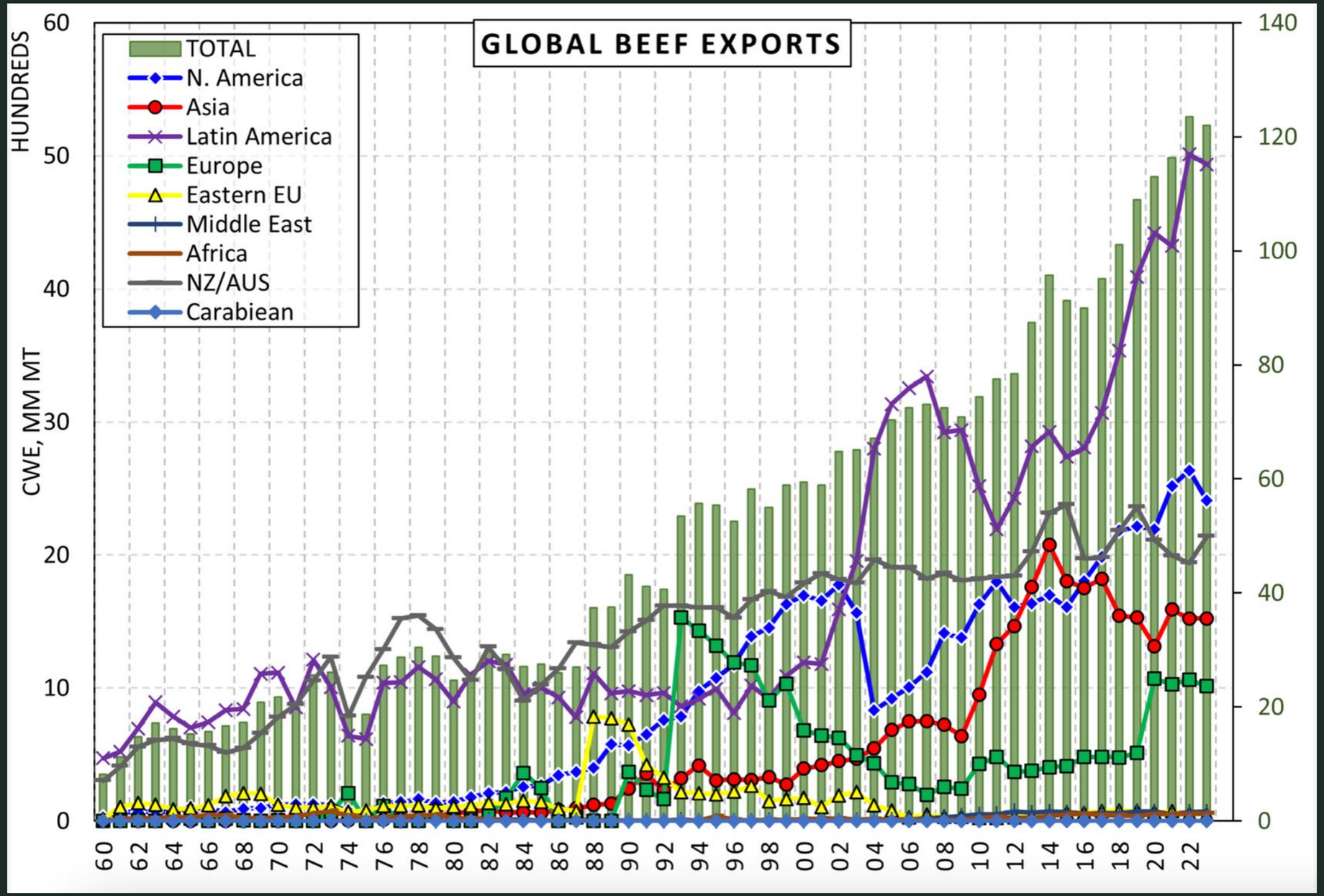


NOTEWORTHY:

North America and Central/South America neck-and-neck for top beef producer.

Asia growing the fastest, adding ~2.4%/yr since 2010.

International Supply & Demand



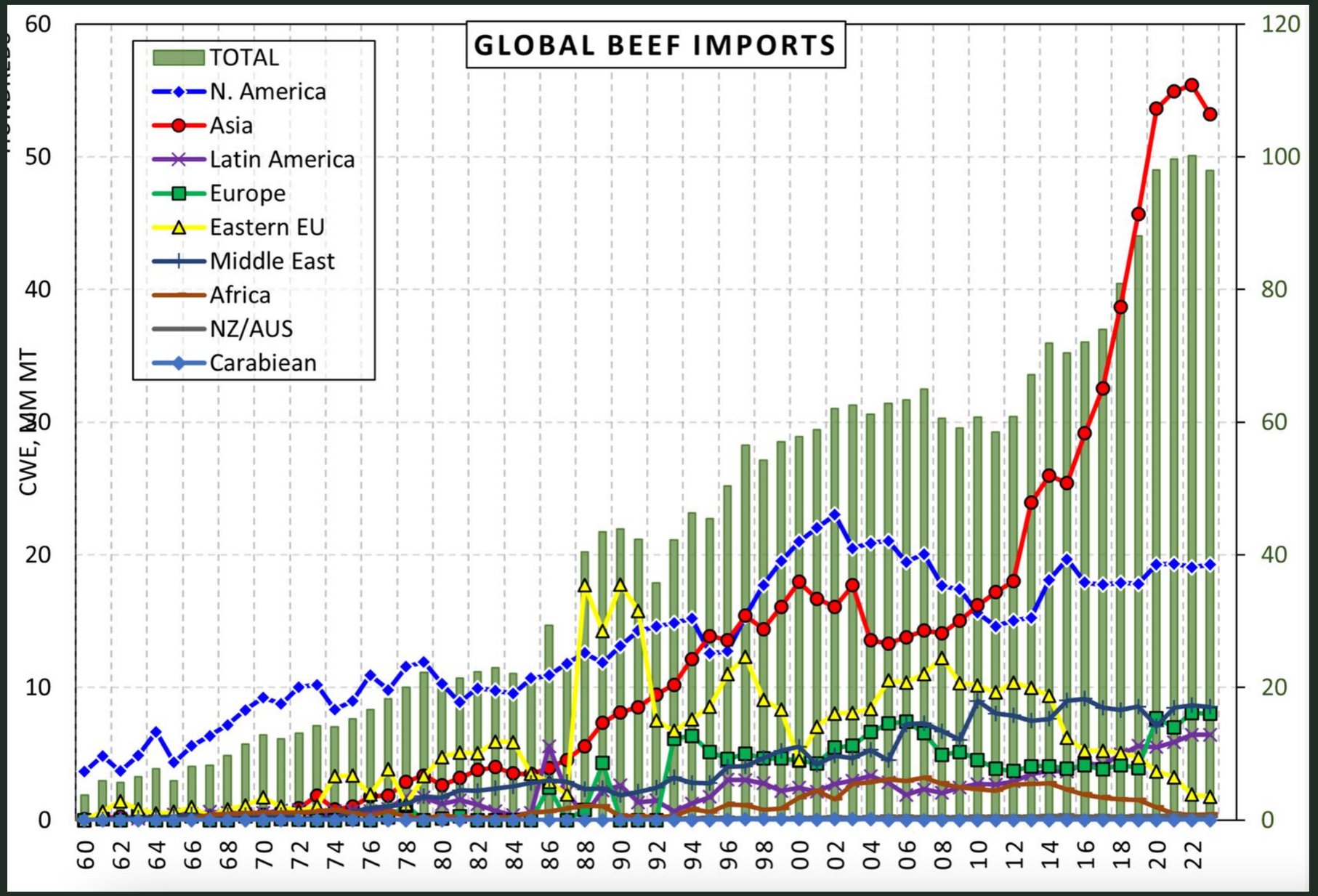
NOTEWORTHY:

North America is 2nd to Central/South America for beef exports.

North America is expected to export about half of what Latin America ships in 2023.

Australia is the only major expected to grow in 2023.

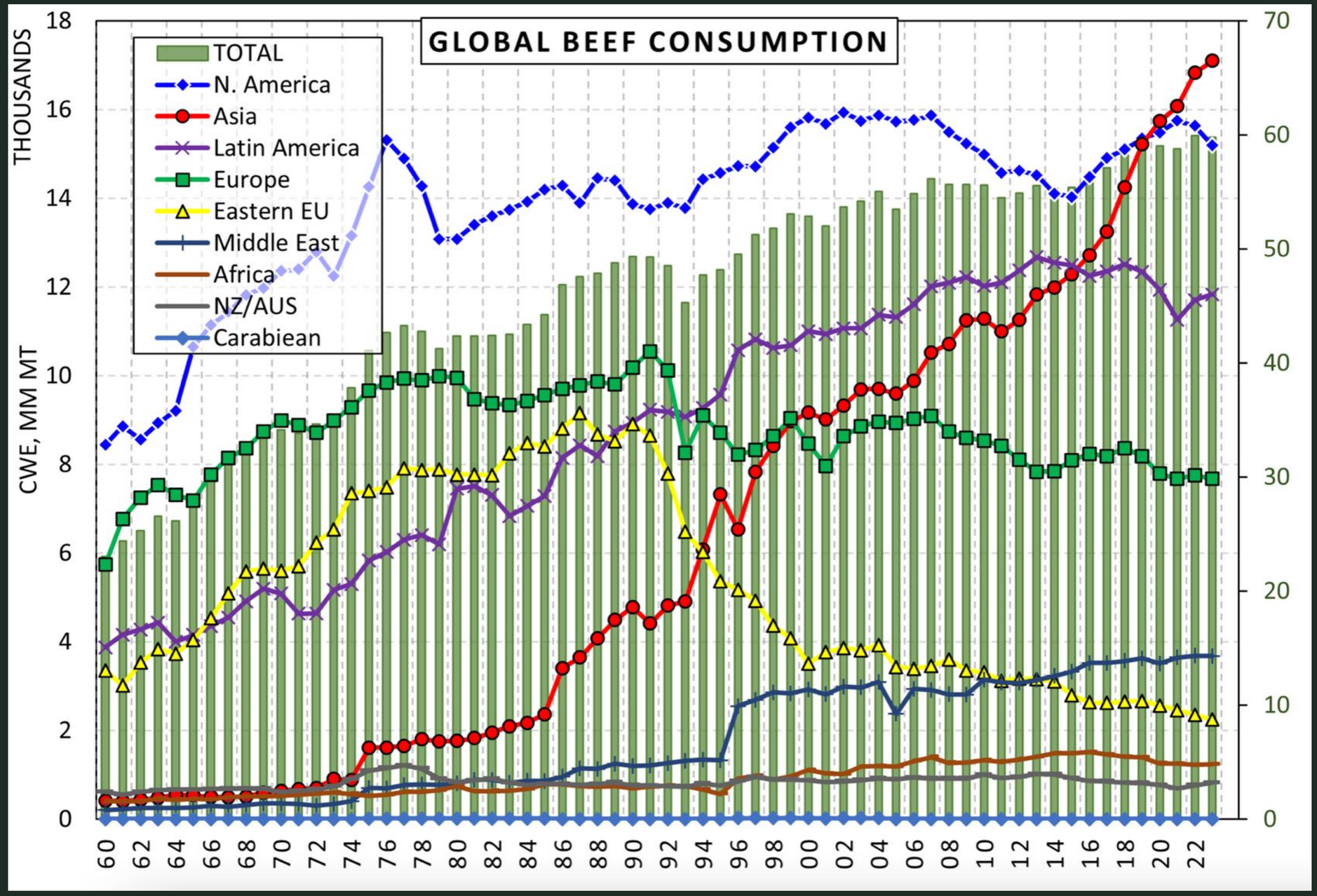
International Supply & Demand



NOTEWORTHY:

Yes, China is the bulk of "Asia," making the region the largest importer in the world, more than 2.5X that of North America and more than half of all global beef imports.

International Supply & Demand



NOTEWORTHY:

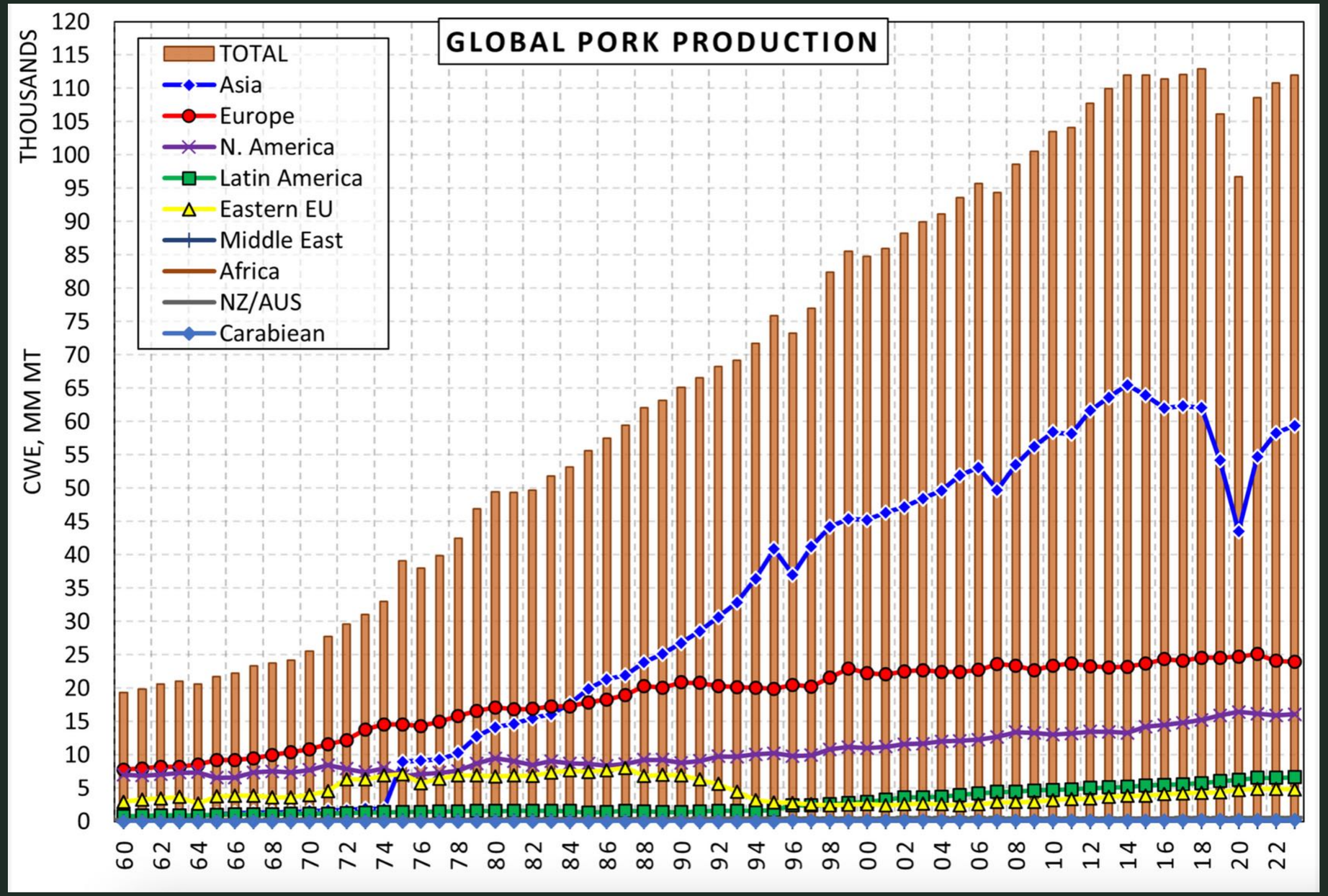
Global consumption is estimated to be flat in 2023, with North America falling though Asia growing.

Asia surpassed North America in 2020.

Since 2000, Asian beef consumption has grown by ~3.9%/yr.

Latin America and EU falling.

International Supply & Demand

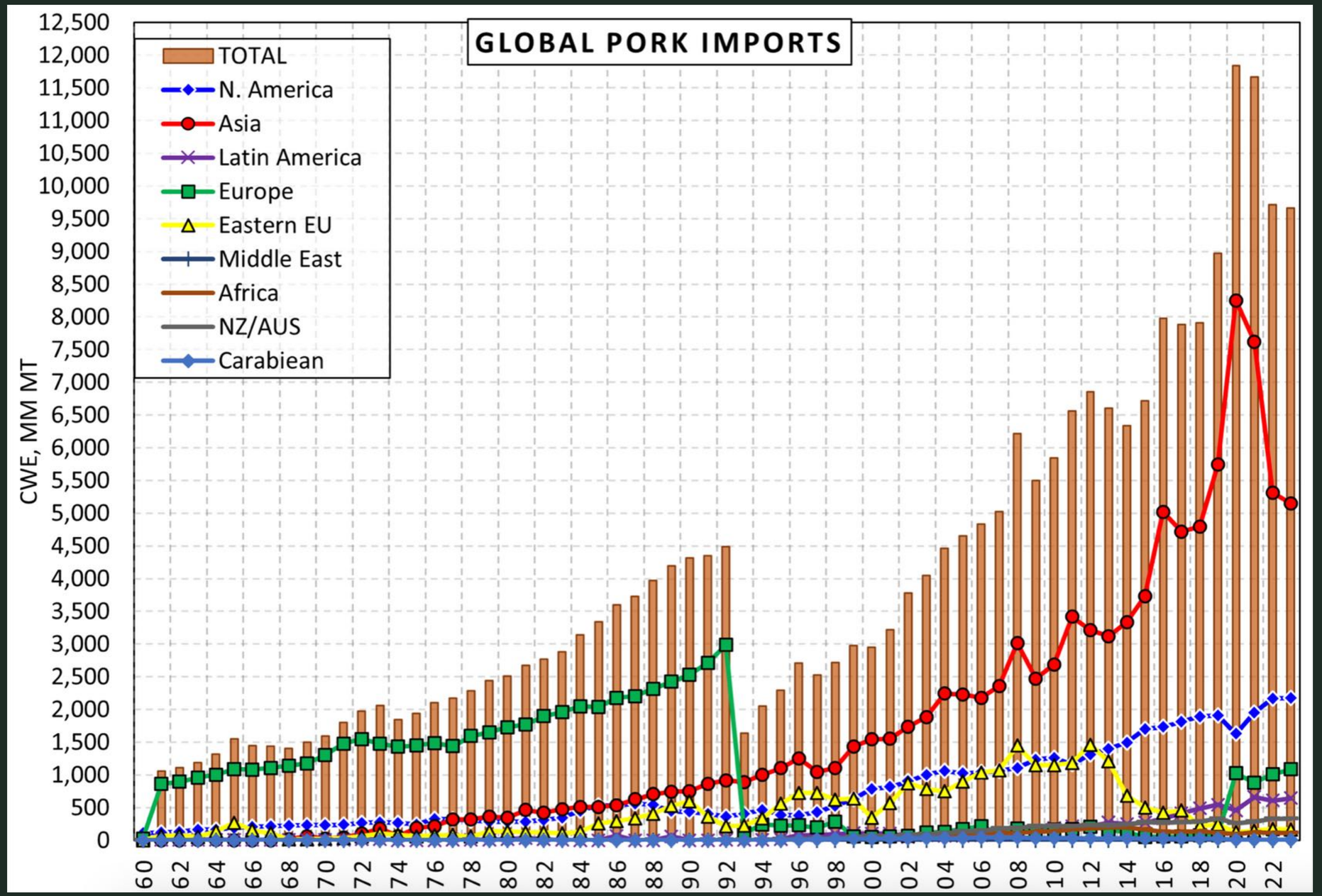


NOTEWORTHY:

Global pork production has been virtually flat since 2014, ignoring the obvious ASF decline in 2018/19.

Asian pork production is still about 8% below 2014 peak levels.

International Supply & Demand

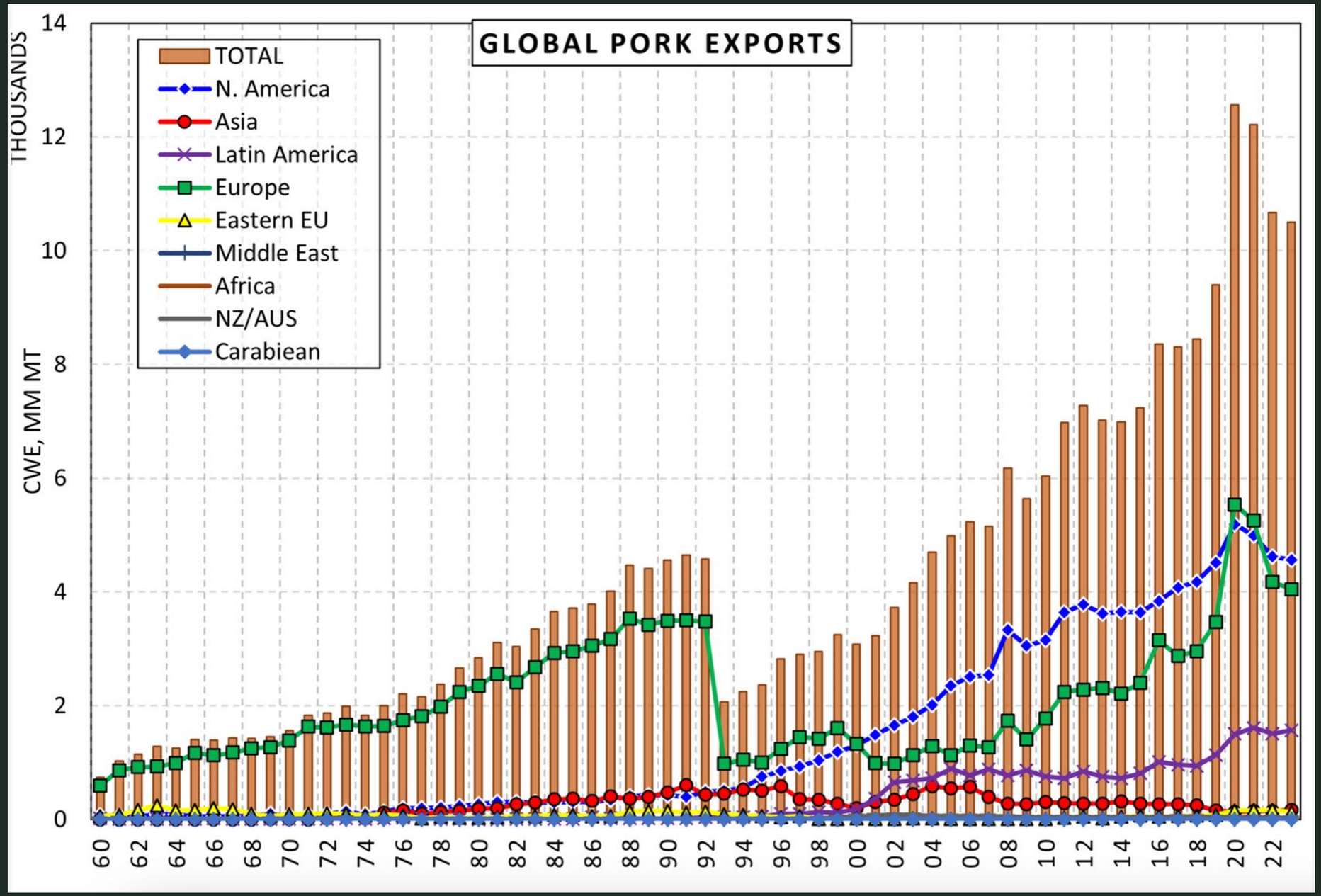


NOTEWORTHY:

Flat is the expectation for North American pork imports in 2023, and China is forecast to be down about 5%.

China is practically back to pre-ASF levels.

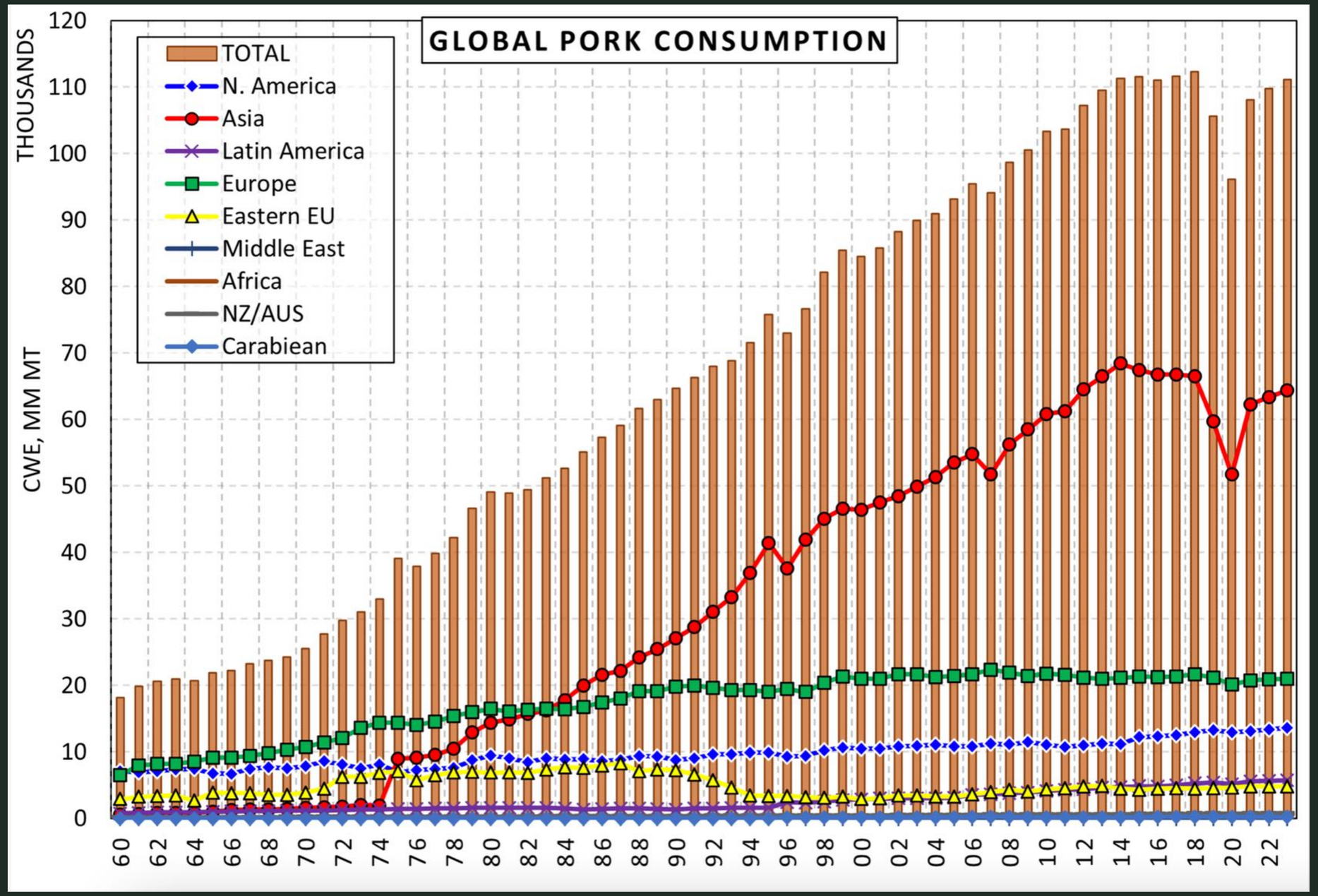
International Supply & Demand



NOTEWORTHY:

Total pork exports are called slightly smaller in 2023, with both the US and EU falling fractionally.

International Supply & Demand

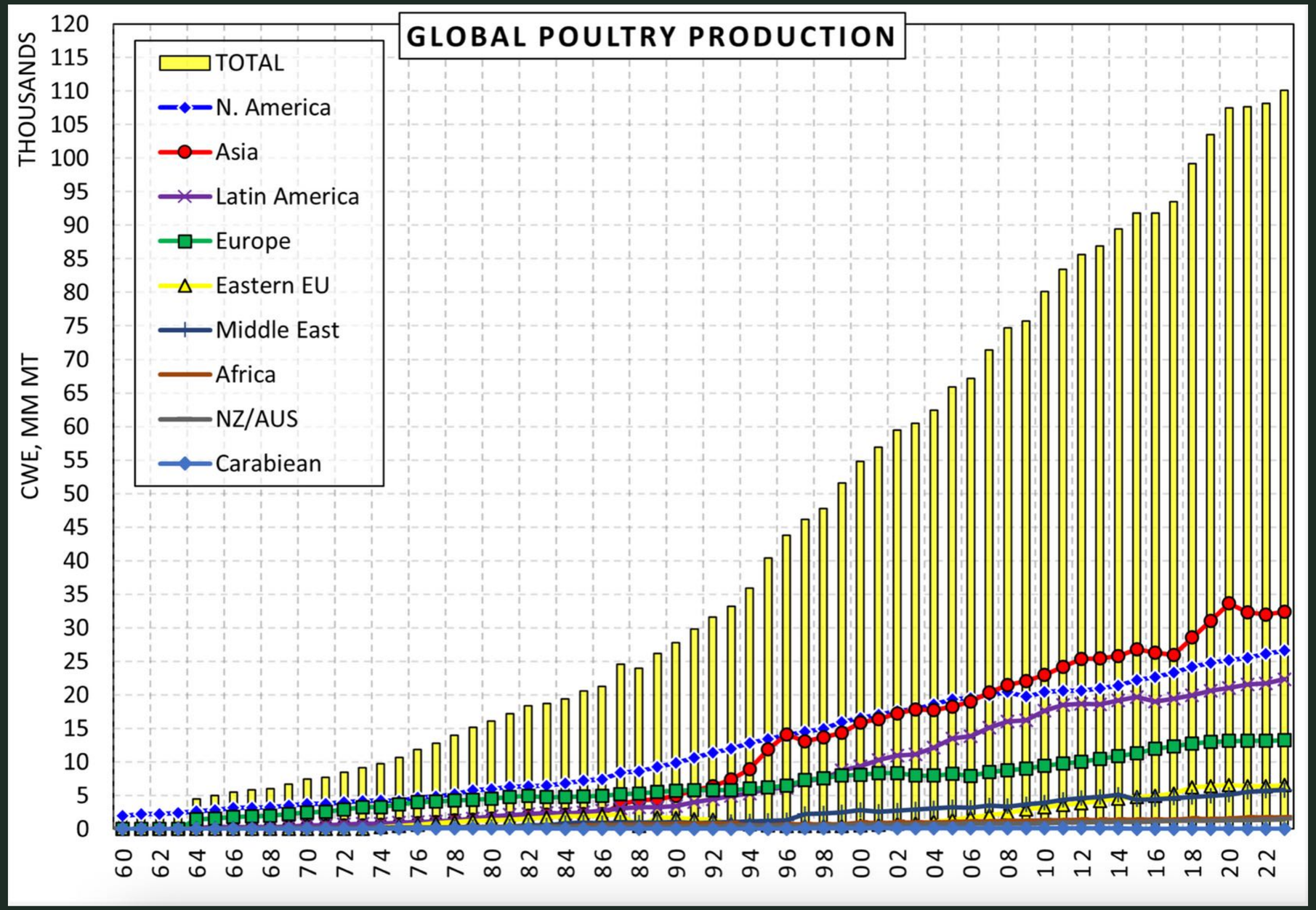


NOTEWORTHY:

Global pork consumption was flat from 2014 through 2018, leading up to ASF.

Consumption is estimated to be up less than 1% in 2023 and still below the 2014-18 levels.

International Supply & Demand

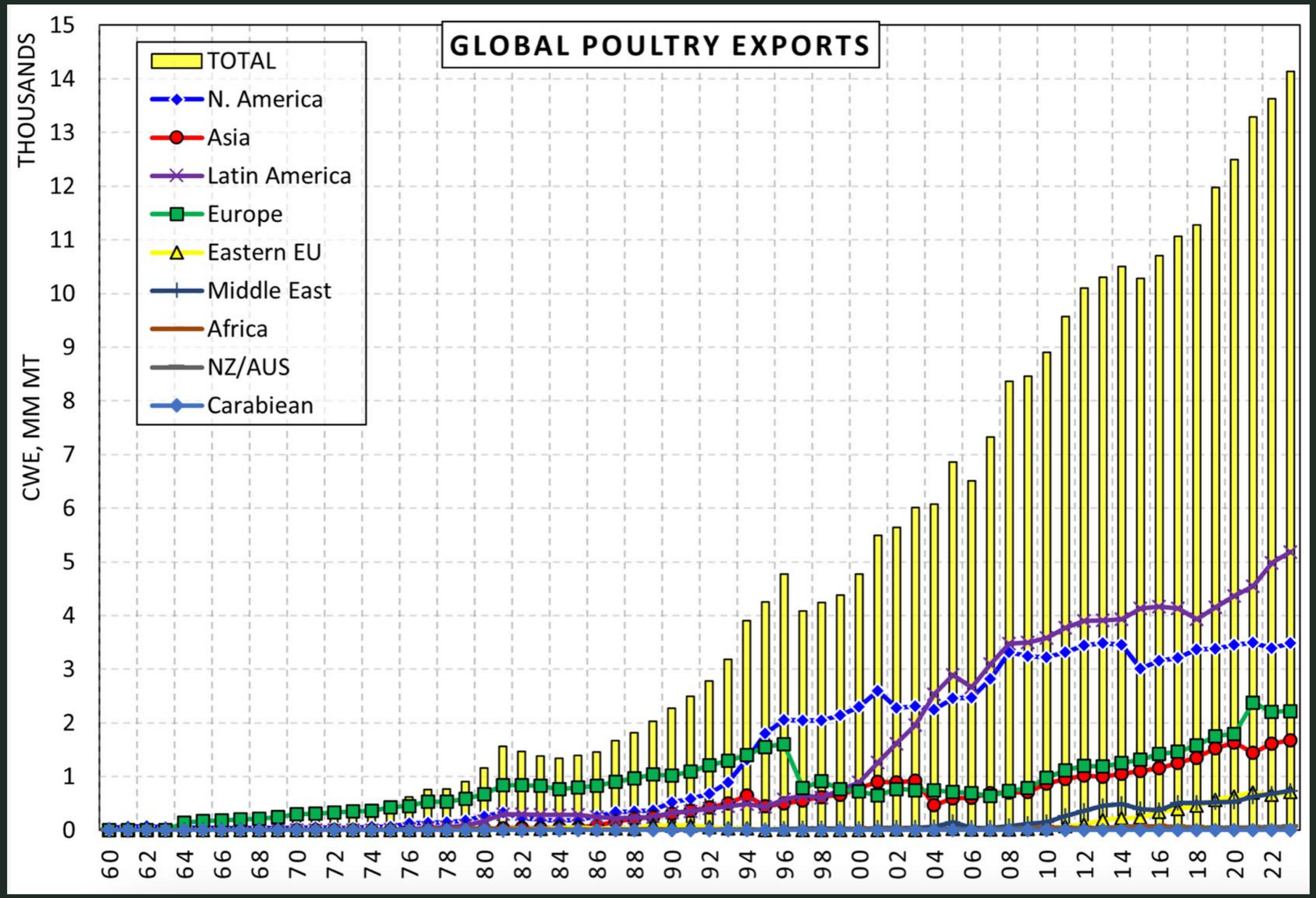


NOTEWORTHY:

Death, taxes, and 2-3% growth in poultry.

Global poultry production forecast 2.8% higher in 2023, and North America is forecast to be up nearly 3%.

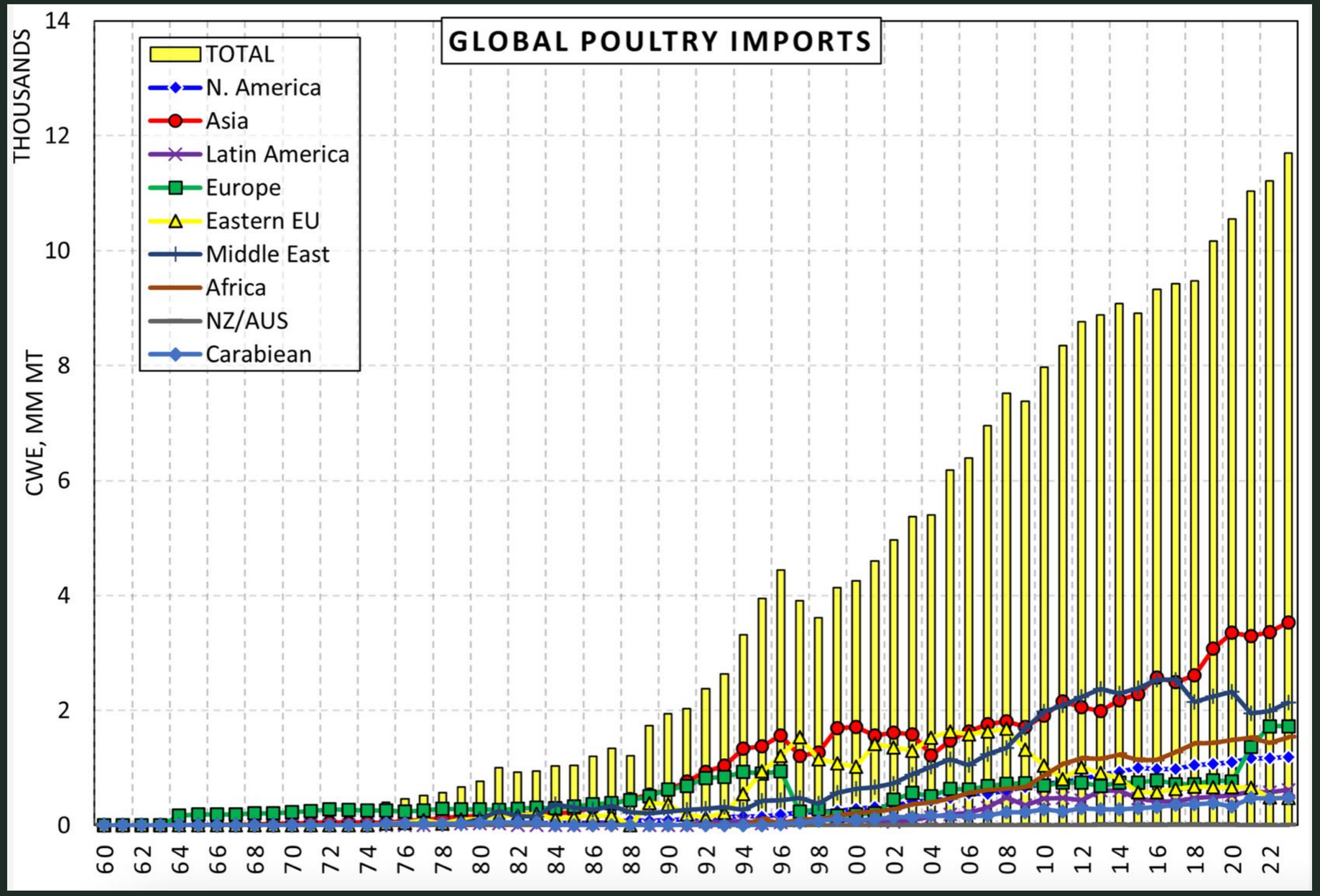
International Supply & Demand



NOTEWORTHY:

North America may produce more than Latin America, but Latin America exports about 48% more than North America.

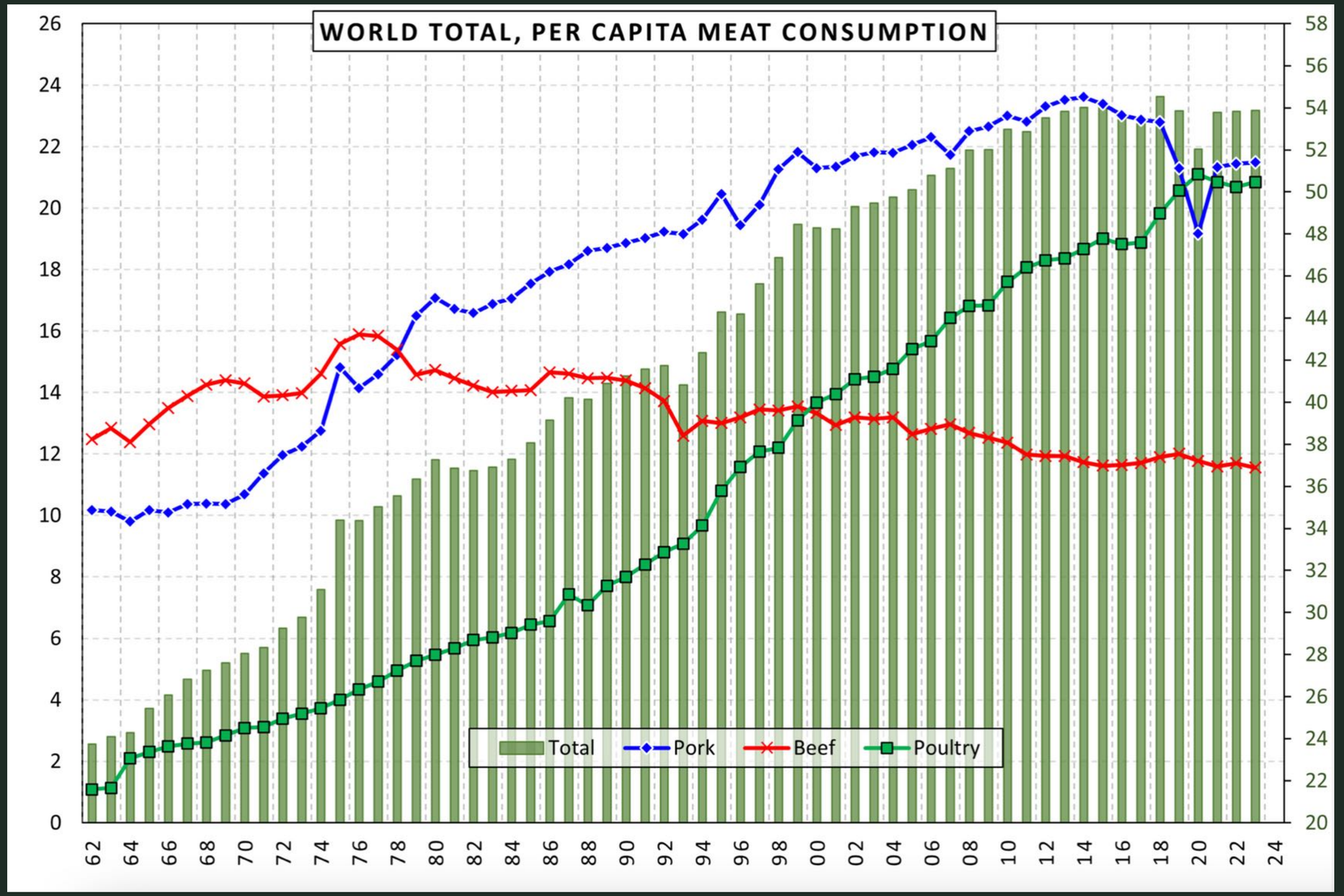
International Supply & Demand



NOTEWORTHY:

Total poultry imports are forecast to be up about 1.7% in 2023, with primary growth coming from China and the Middle East.

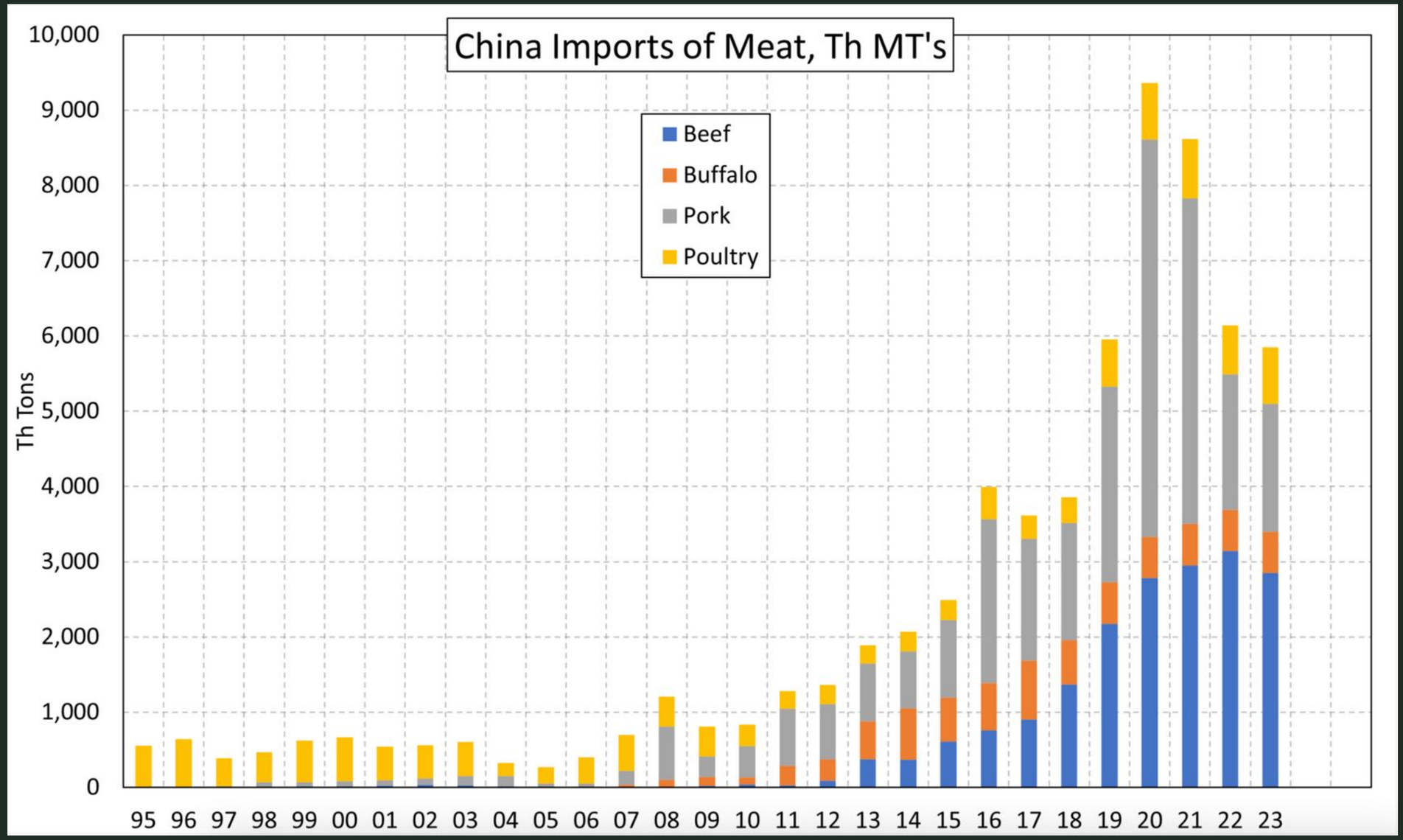
International Supply & Demand



NOTEWORTHY:

Global consumption of beef, pork and poultry is forecast to be flat in 2023.

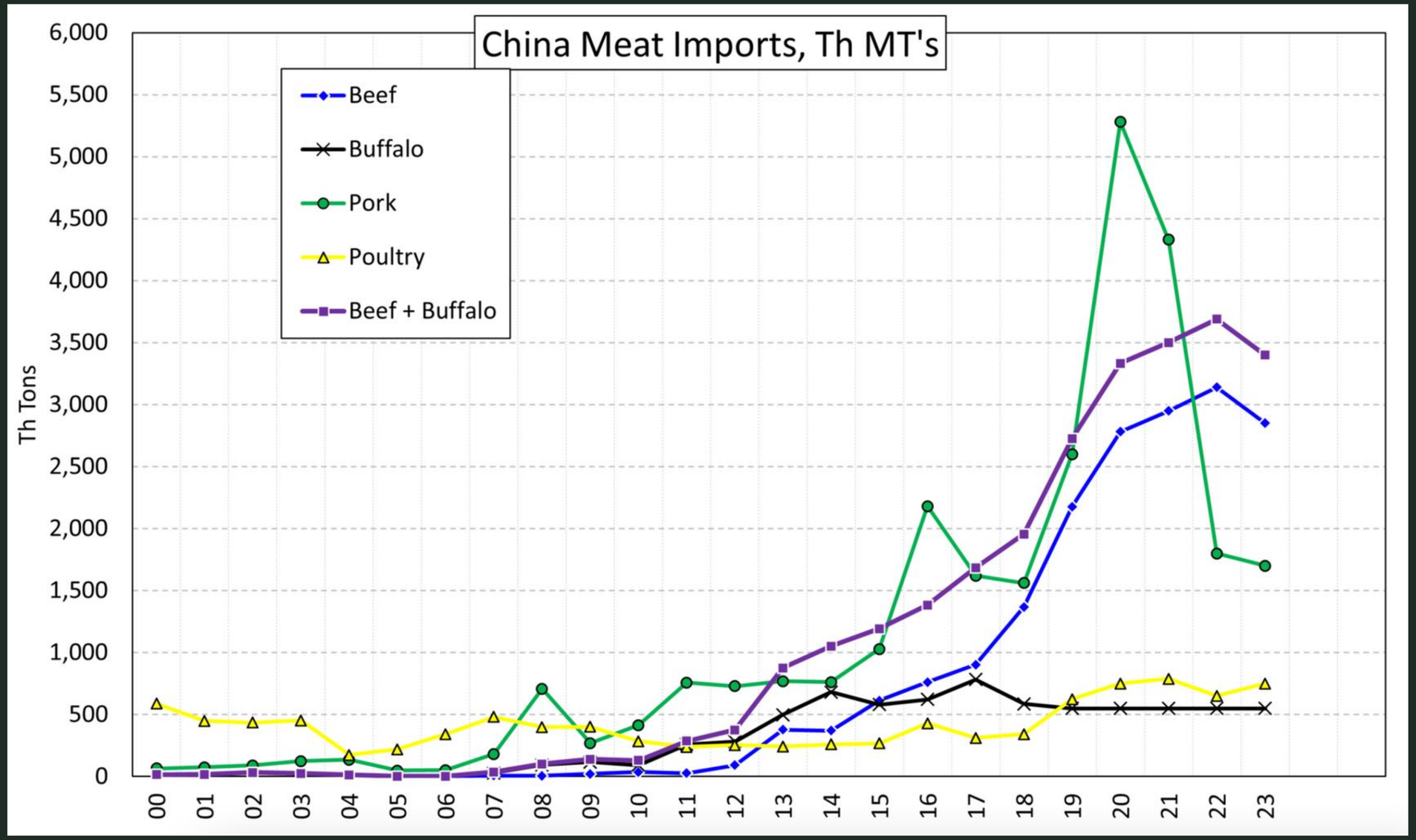
International Supply & Demand



NOTEWORTHY:

Total imports of meat are forecast to be just under 6 mil MT in 2023, a decline of ~5%.

International Supply & Demand



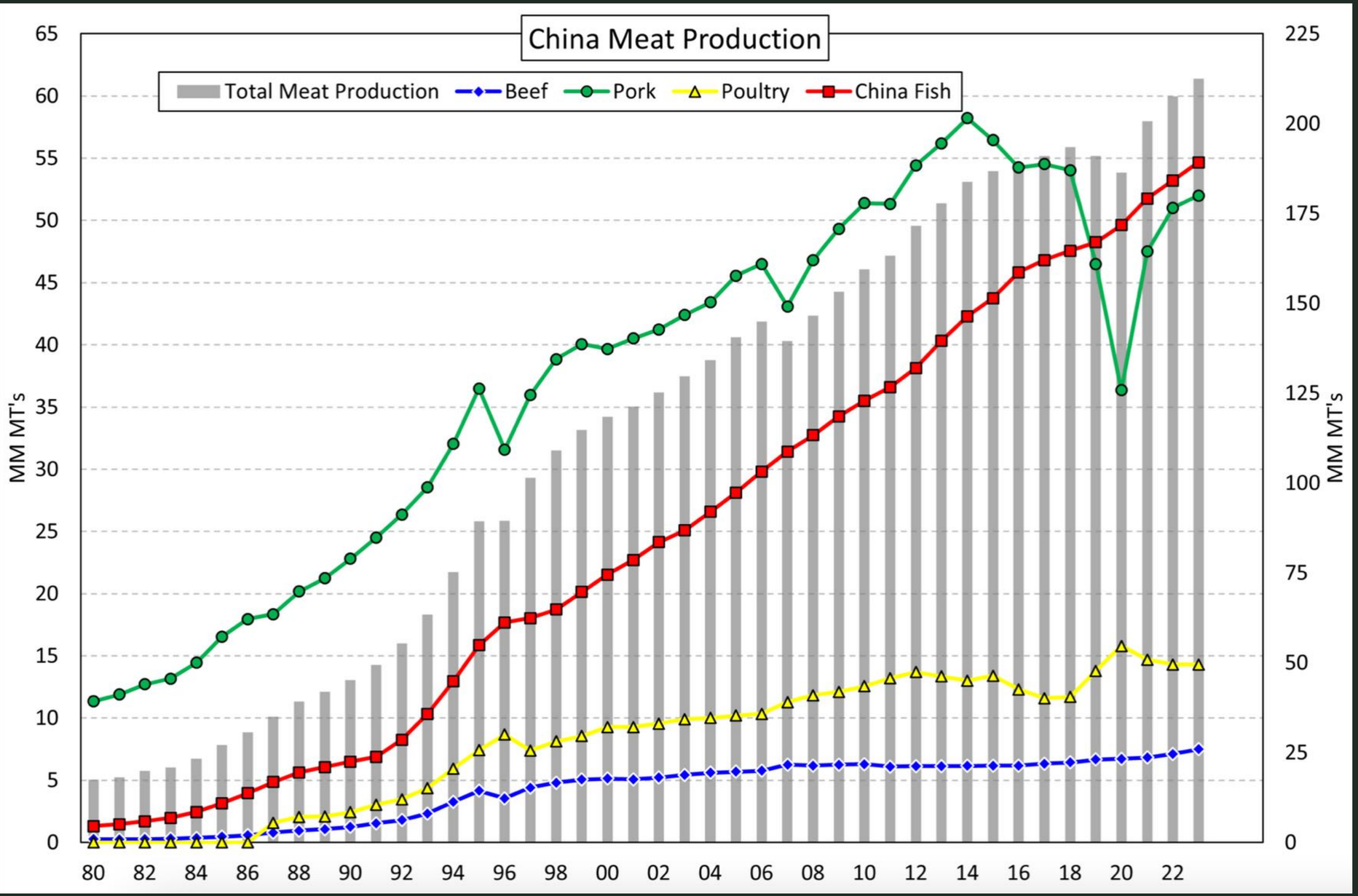
NOTEWORTHY:

Poultry is the only item forecast to be higher in 2023.

Beef and pork are forecast down 12% and 6%, respectively.

Chinese pork imports are back to 2016-18 levels.

International Supply & Demand

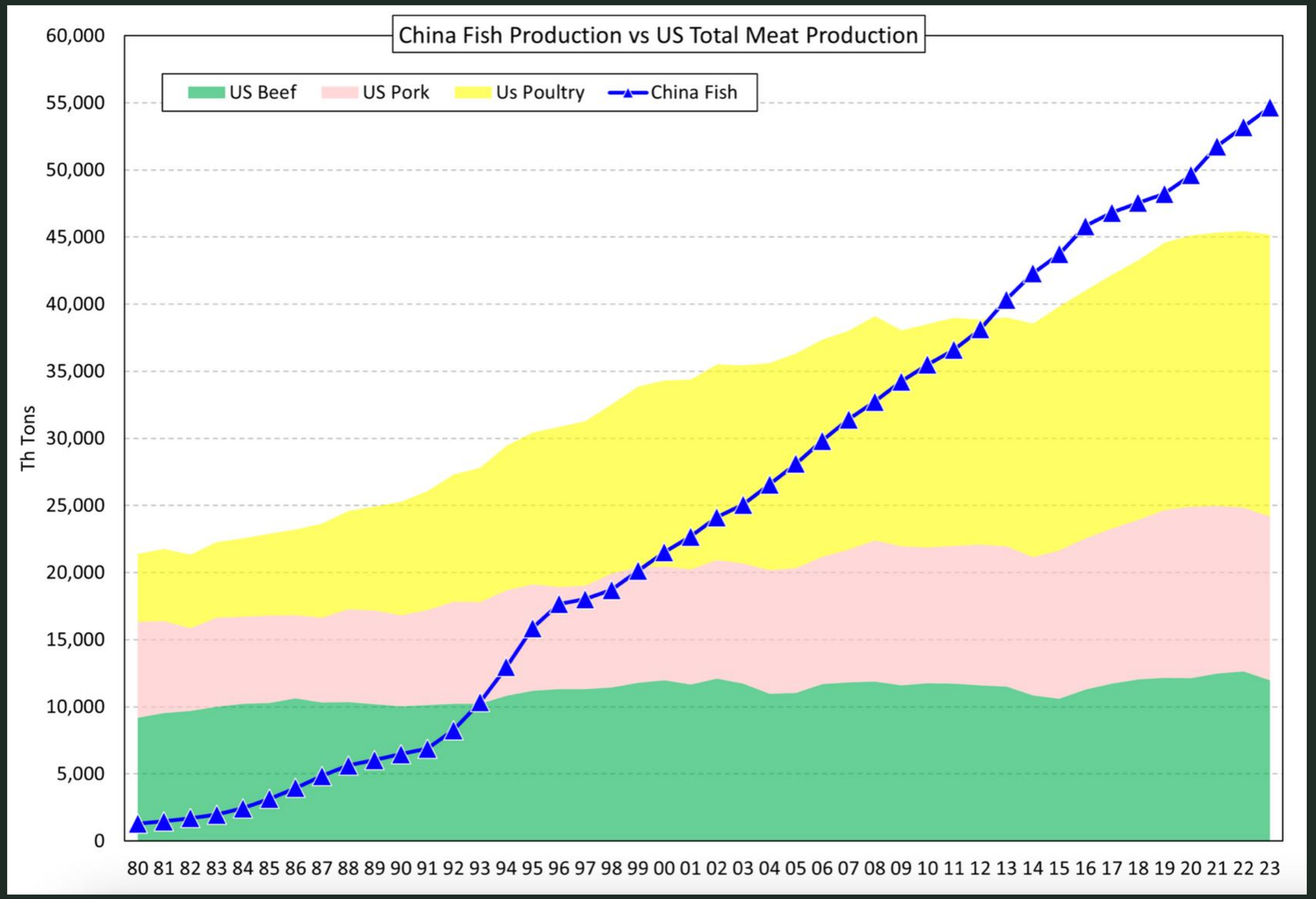


NOTEWORTHY:

Fish remains China's largest protein production and is forecast to grow by almost 2% this year.

Pork is forecast to increase about 2% as well.

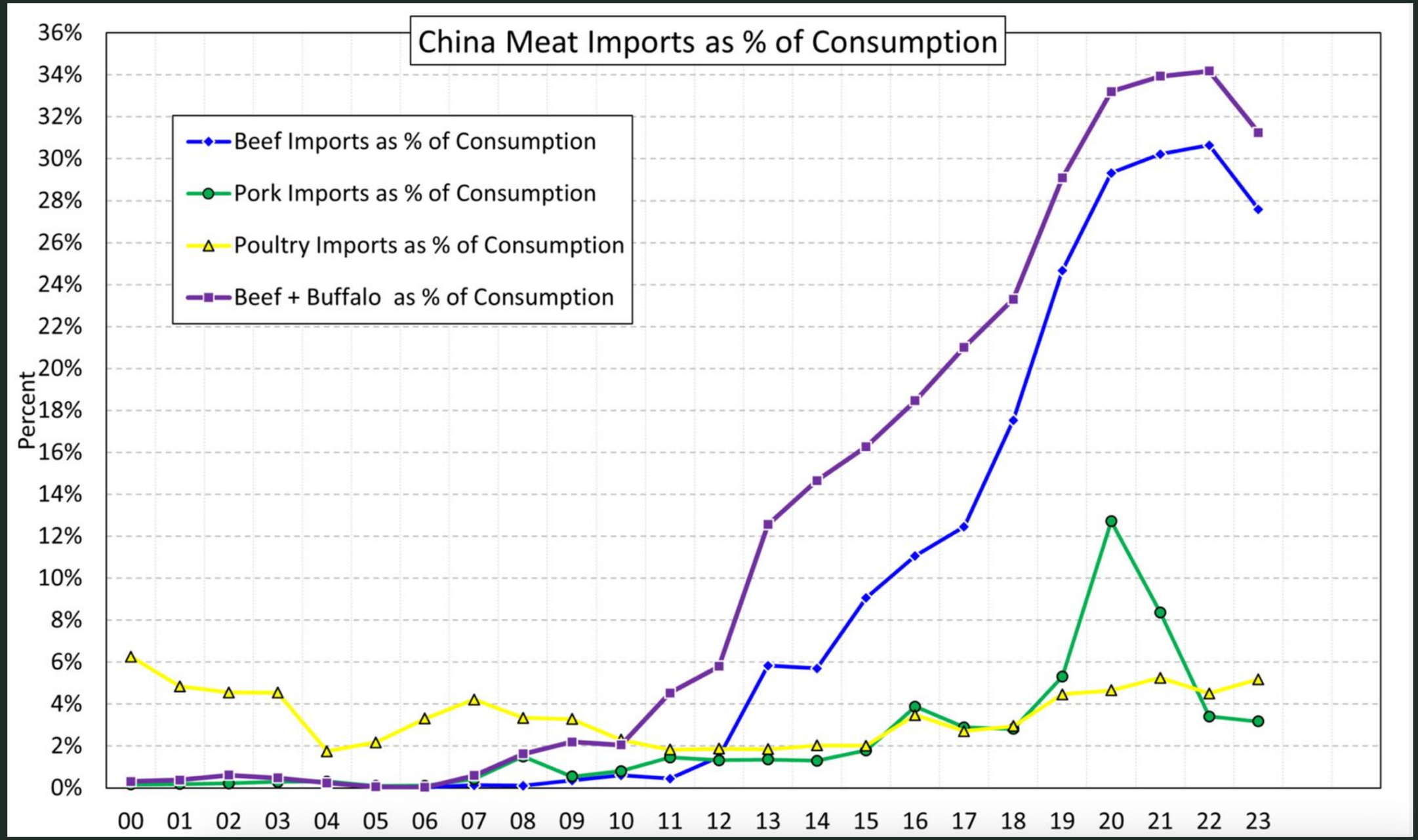
International Supply & Demand



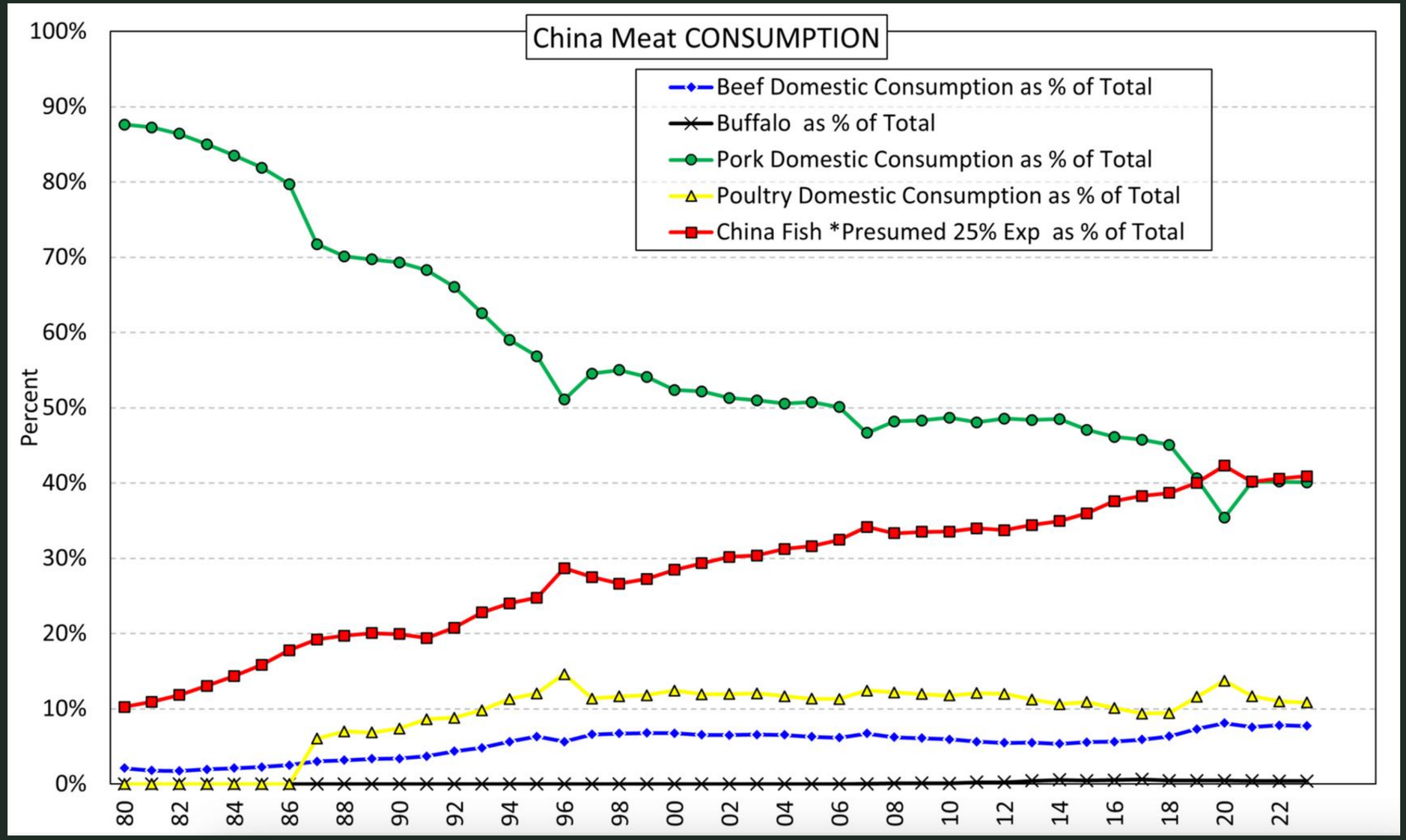
NOTEWORTHY:

Chinese fish production is larger than all US beef, pork, and poultry production.

International Supply & Demand



International Supply & Demand

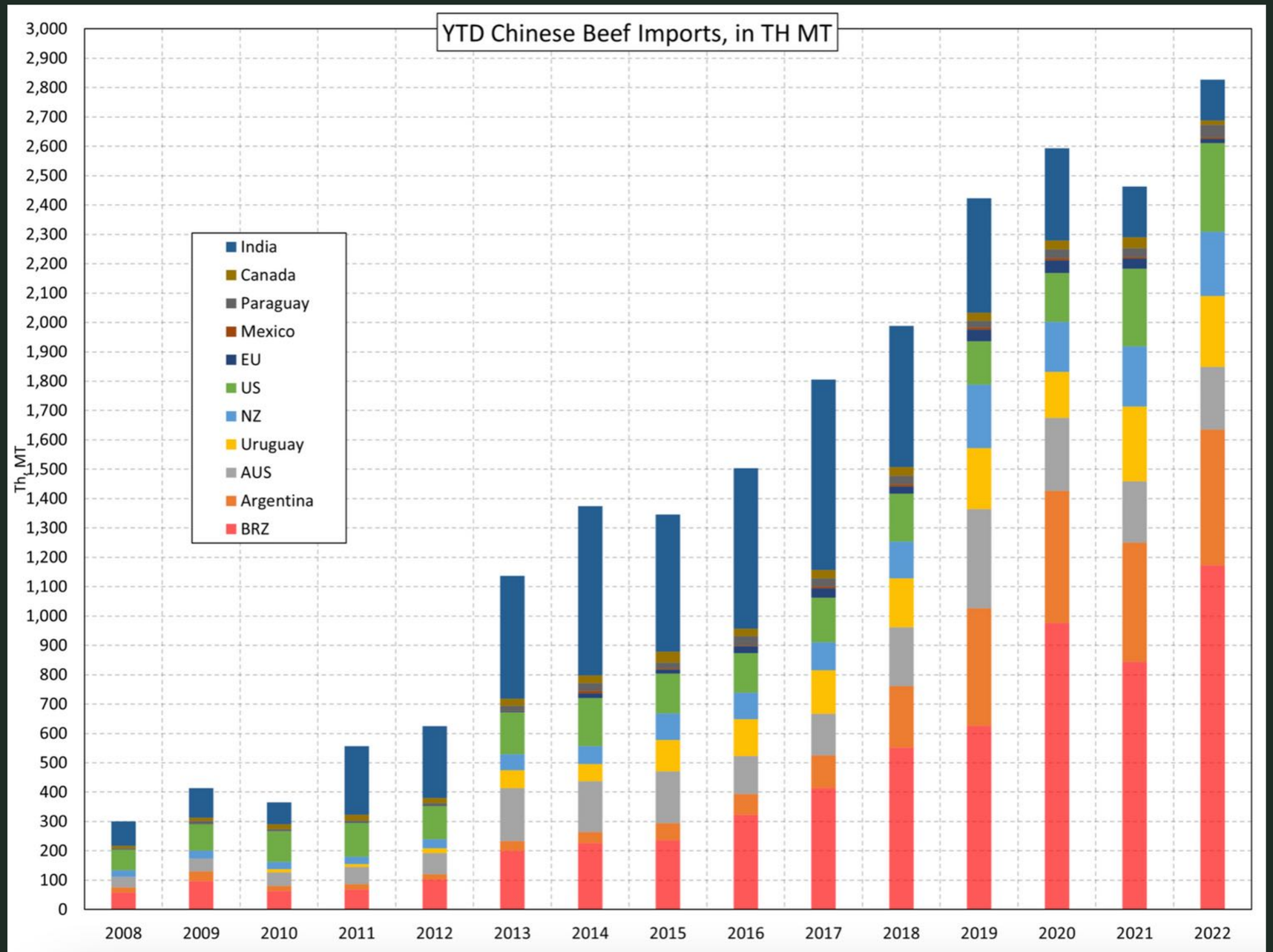


NOTEWORTHY:

As goes production, so goes consumption, with fish and pork accounting for more than 80% of total meat consumption. Beef is around 8%

In 1980, pork accounted for about 88% of consumption but is 40% today. Fish has gone from 10% to just over 40%.

International Supply & Demand

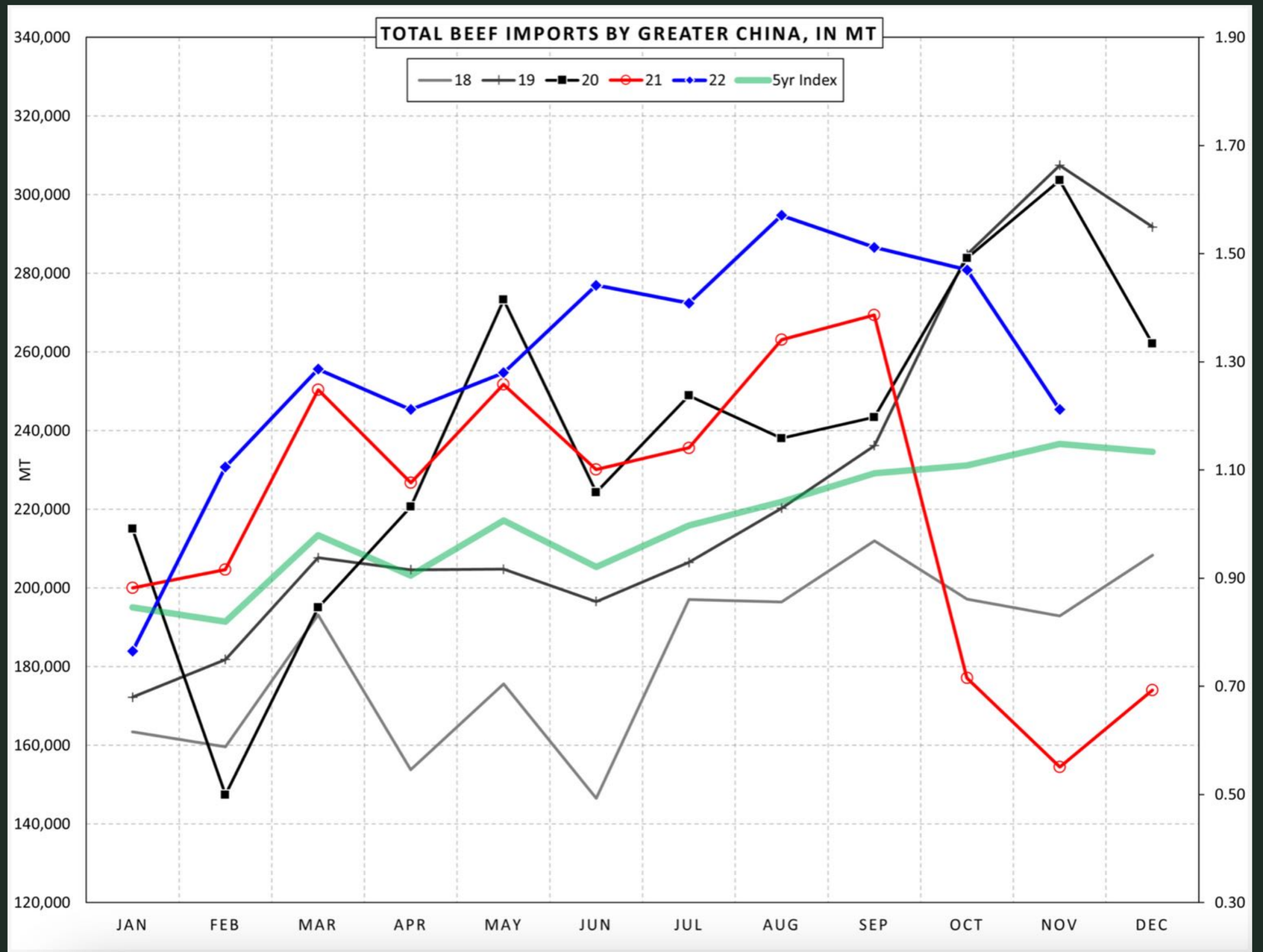


NOTEWORTHY:

Chinese beef imports have grown more than 6%/yr, on average, since 2008.

The US has moved into the 3rd spot, behind Brazil and Argentina.

International Supply & Demand



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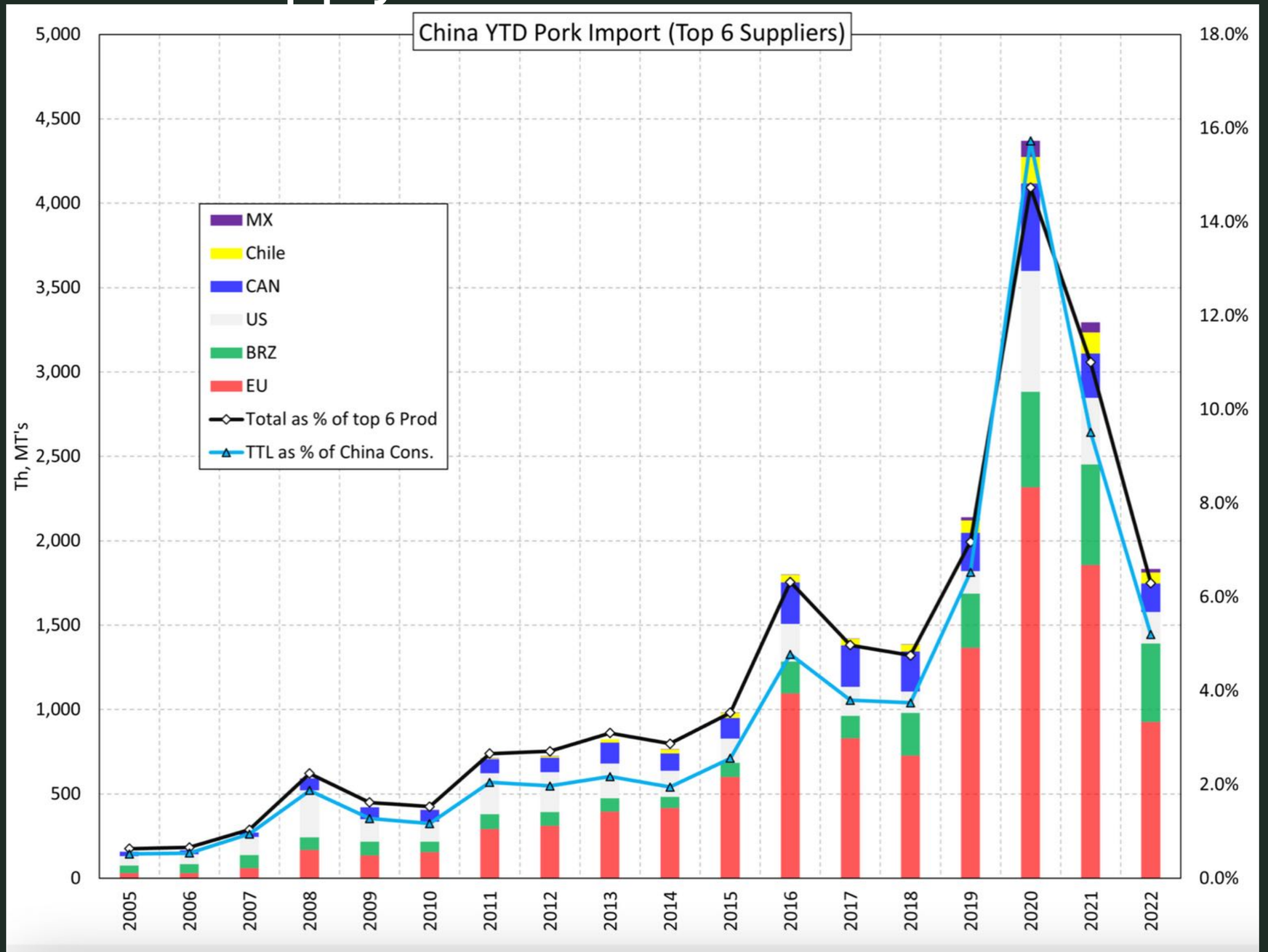

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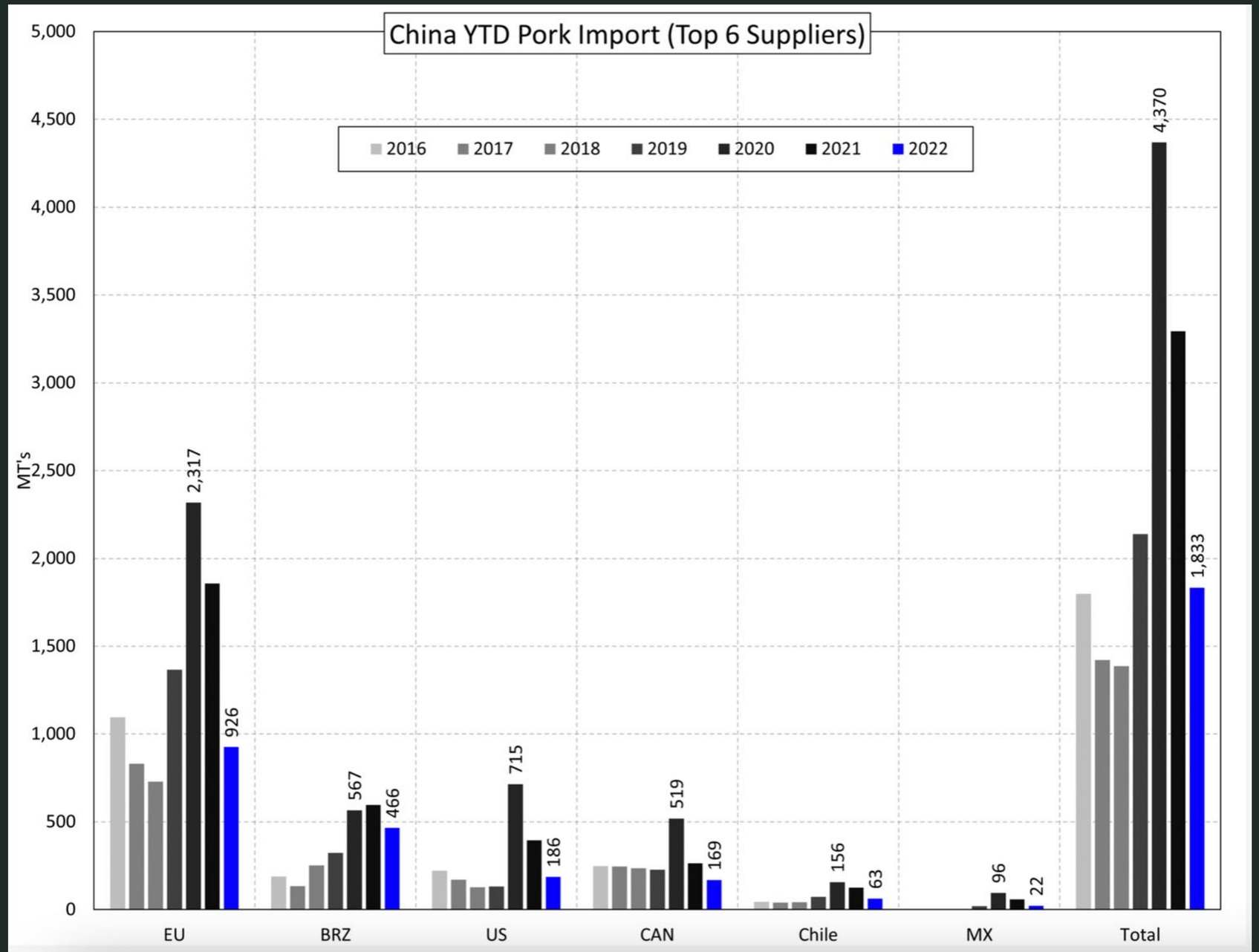
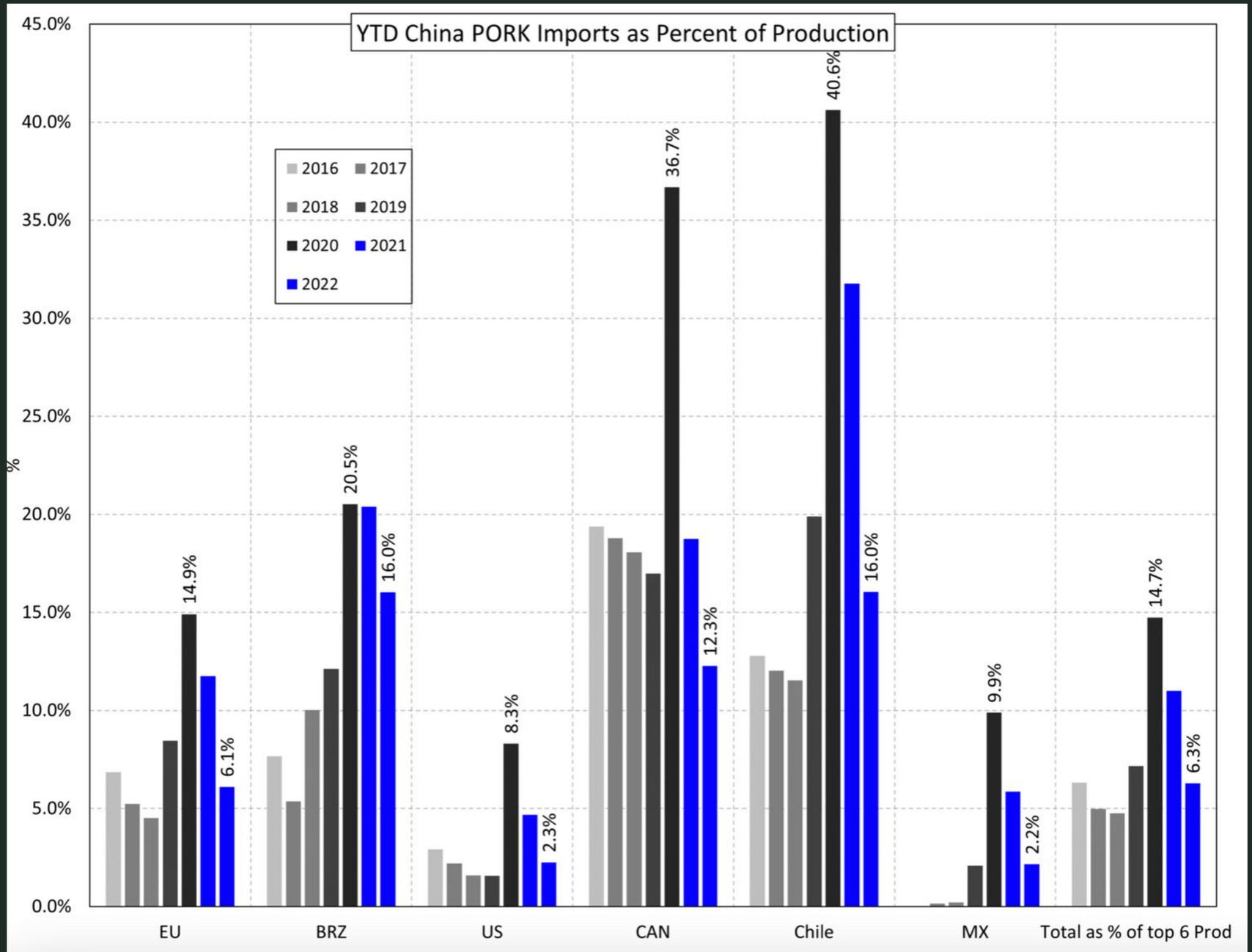
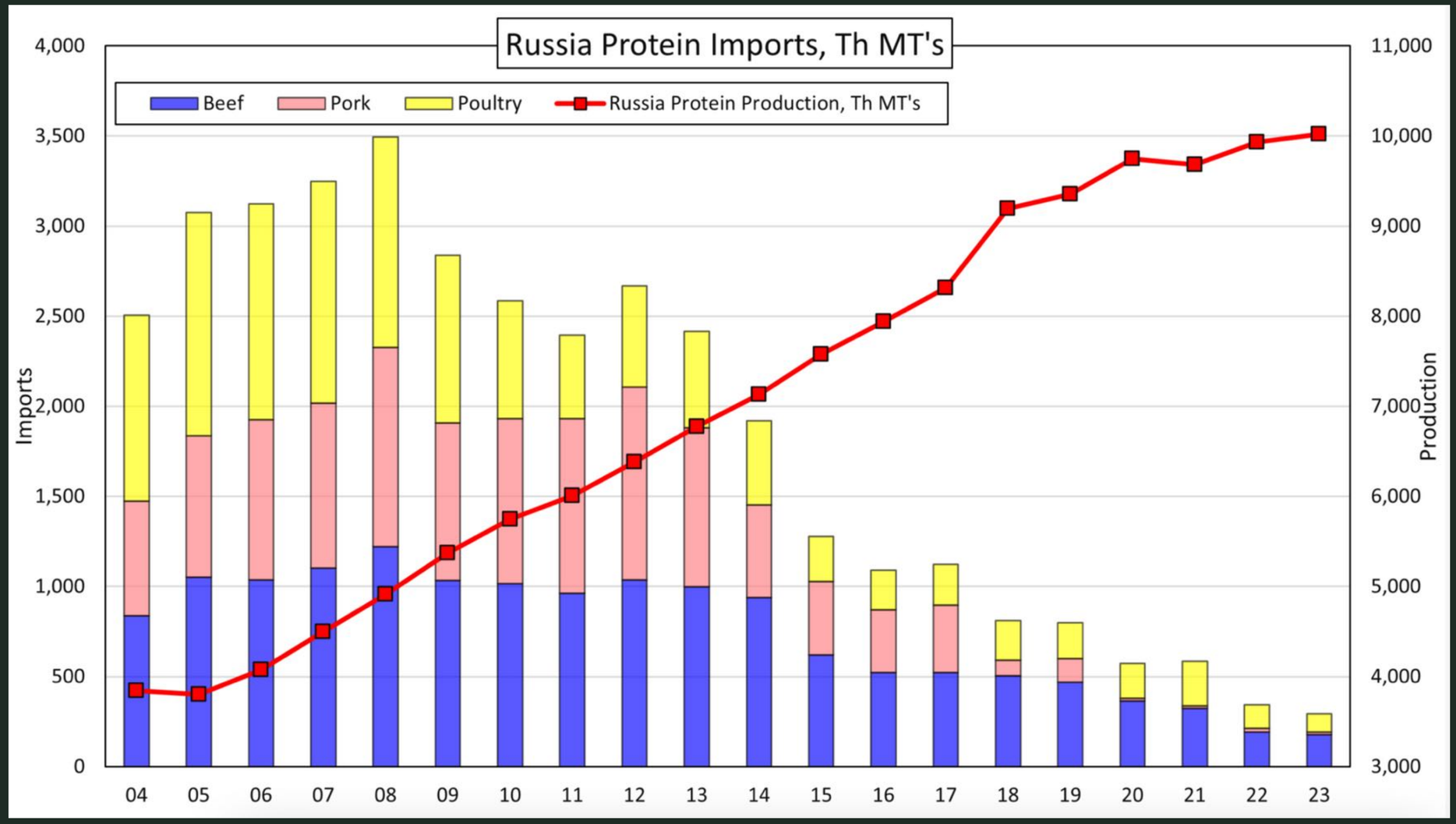


NOTEWORTHY:

International Supply & Demand



International Supply & Demand



NOTEWORTHY:

Russia's protein production has grown steadily since 2005, and their imports, particularly of pork, have been declining since that time.

International Supply & Demand

	GLOBAL Total Production (Beef+ Pork + Poultry)			
Country	10	23	MT's	%
US	38,783	45,590	6,807	18%
EU	41,313	45,200	3,887	9%
BRZ	24,622	29,720	5,098	21%
RUS	4,291	8,650	4,359	102%
China	70,225	73,800	3,575	5%

NOTEWORTHY:

US and EU essentially par in comparison.

US production has grown ~1.3%/yr while Brazil is growing at a 1.6%/yr clip.

Conversely, China only growing ~0.3%/yr over 10 years.

International Supply & Demand

Brazil Protein Production, Th MT's

	13	14	15	16	17	18	19	20	21	22	23	YOY %	YOY MT	10 Yr %	10 Yr Δ MT	Global Rank
Beef	9,675	9,723	9,425	9,284	9,550	9,900	10,200	10,100	9,325	10,350	10,450	1.0%	100	8.0%	775	#2
Pork	3,335	3,400	3,519	3,700	3,725	3,763	3,975	4,125	4,365	4,350	4,420	1.6%	70	32.5%	1,085	#4
Poultry	12,308	12,692	13,146	12,910	13,150	13,355	13,635	13,975	14,500	14,400	14,850	3.1%	450	20.7%	2,542	#2
Total	25,318	25,815	26,090	25,894	26,425	27,018	27,810	28,200	28,190	29,100	29,720	2.1%	620	17.4%	4,402	#3

Brazil Protein EXPORTS, Th MT's

	13	14	15	16	17	18	19	20	21	22	23	YOY %	YOY MT	10 Yr %	10 Yr Δ MT	Global Rank
Beef	1,798	1,850	1,659	1,652	1,803	2,021	2,314	2,539	2,320	2,950	2,975	0.8%	25	65%	1,177	#1
Pork	585	556	627	832	786	730	875	1,178	1,321	1,300	1,335	2.7%	35	128%	750	#3
Poultry	3,482	3,558	3,841	3,889	3,847	3,687	3,850	4,040	4,225	4,625	4,800	3.8%	175	38%	1,318	#1
Total	5,865	5,964	6,127	6,373	6,436	6,438	7,039	7,757	7,866	8,875	9,110	2.6%	235	55%	3,245	#1

Brazil Exports as Percent of Production

	13	14	15	16	17	18	19	20	21	22	23	YOY %	10 Yr %	Global Rank
Beef	18.6%	19.0%	17.6%	17.8%	18.9%	20.4%	22.7%	25.1%	24.9%	28.5%	28.5%	0.0%	9.9%	#3
Pork	17.5%	16.4%	17.8%	22.5%	21.1%	19.4%	22.0%	28.6%	30.3%	29.9%	30.2%	0.3%	12.7%	#2
Poultry	28.3%	28.0%	29.2%	30.1%	29.3%	27.6%	28.2%	28.9%	29.1%	32.1%	32.3%	0.2%	4.0%	#1
Total	23.2%	23.1%	23.5%	24.6%	24.4%	23.8%	25.3%	27.5%	27.9%	30.5%	30.7%	0.2%	7.5%	

NOTEWORTHY:

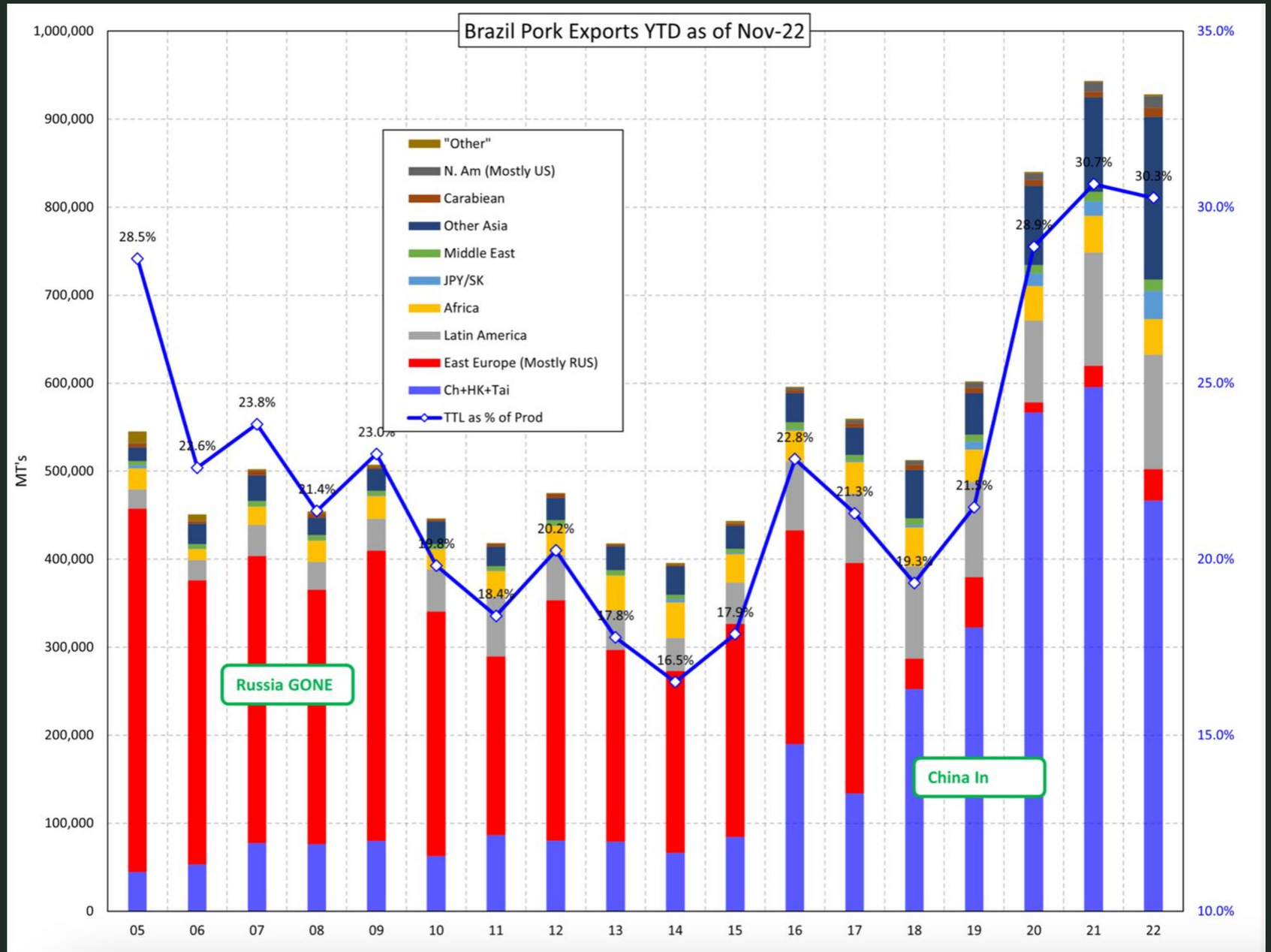
International Supply & Demand

Brazil Beef Exports YTD as of Nov-22										
	17	18	19	20	21	22	YOY	YOY%	% of TTL	% of Prod
TOTAL	1,183,879	1,323,038	1,513,900	1,682,441	1,535,398	1,938,789	403,390	26.3%		26.6%
Ch+HK+Viet+Tai	417,206	555,202	626,650	977,063	843,414	1,173,551	330,136	39.1%	60.5%	16.1%
Middle East	365,841	379,545	422,913	277,555	220,361	258,903	38,541	17.5%	13.4%	3.5%
East Europe (Mostly Russia)	138,909	12,695	74,558	59,722	30,525	48,088	17,563	57.5%	2.5%	0.7%
Latin America (Mostly Chili)	63,539	143,846	144,173	121,937	127,398	103,049	-24,350	-19.1%	5.3%	1.4%
EU	88,122	98,537	90,305	82,256	78,575	87,573	8,998	11.5%	4.5%	1.2%
Other Asia	30,941	44,725	60,979	69,082	89,319	110,353	21,035	23.5%	5.7%	1.5%
United States	35,723	28,963	35,218	53,977	106,469	119,884	13,416	12.6%	6.2%	1.6%
China	187,556	294,124	414,147	780,105	716,394	1,139,060	422,665	59.0%	58.8%	15.6%
Hong Kong	225,652	259,269	209,789	196,401	126,643	33,660	-92,983	-73.4%	1.7%	0.5%
"Other"	43,598	59,526	59,105	40,848	39,338	37,388	-1,949	-5.0%	1.9%	0.5%

NOTEWORTHY:

It's not hard to see the trends and growth into China.

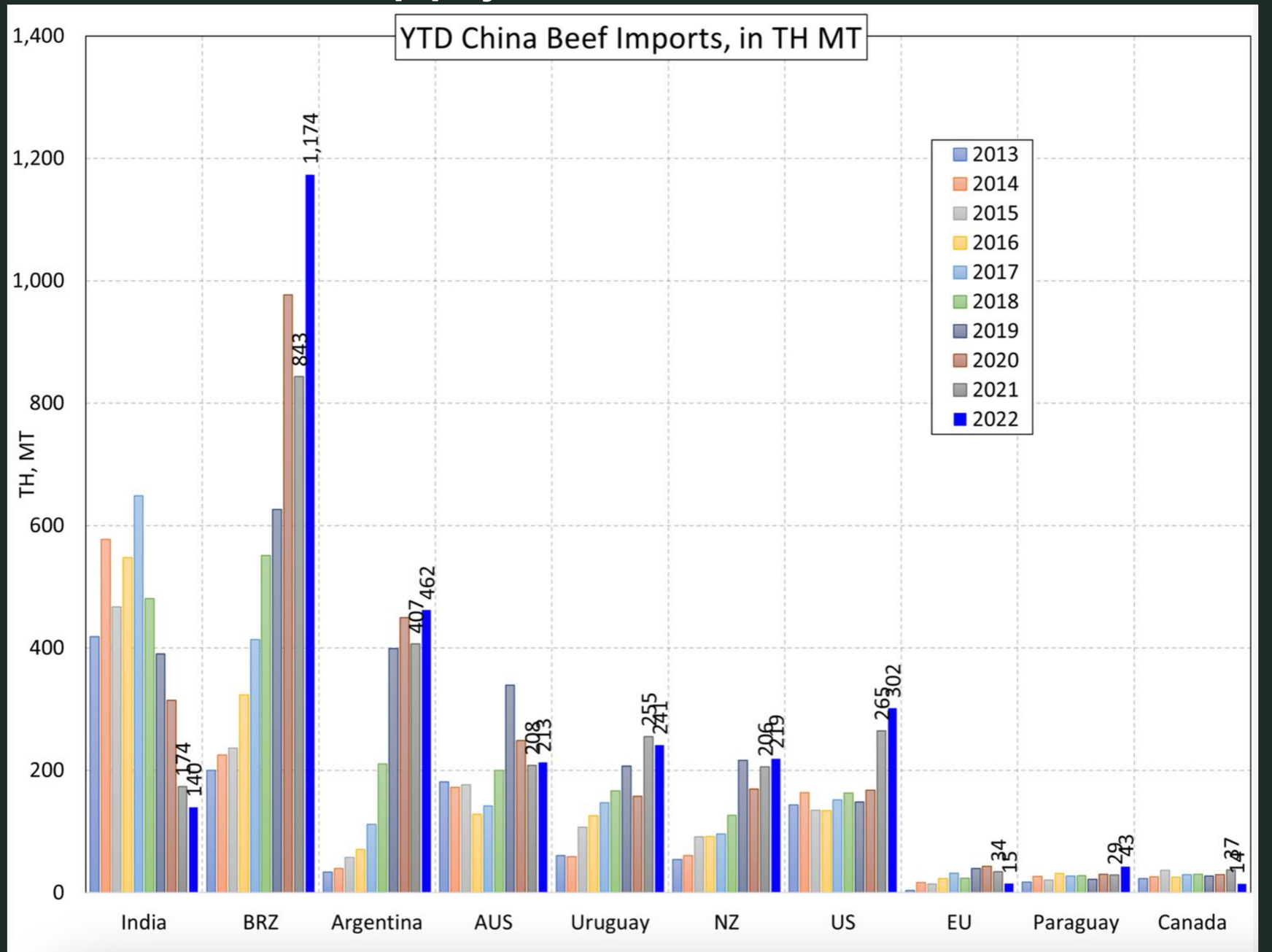
International Supply & Demand



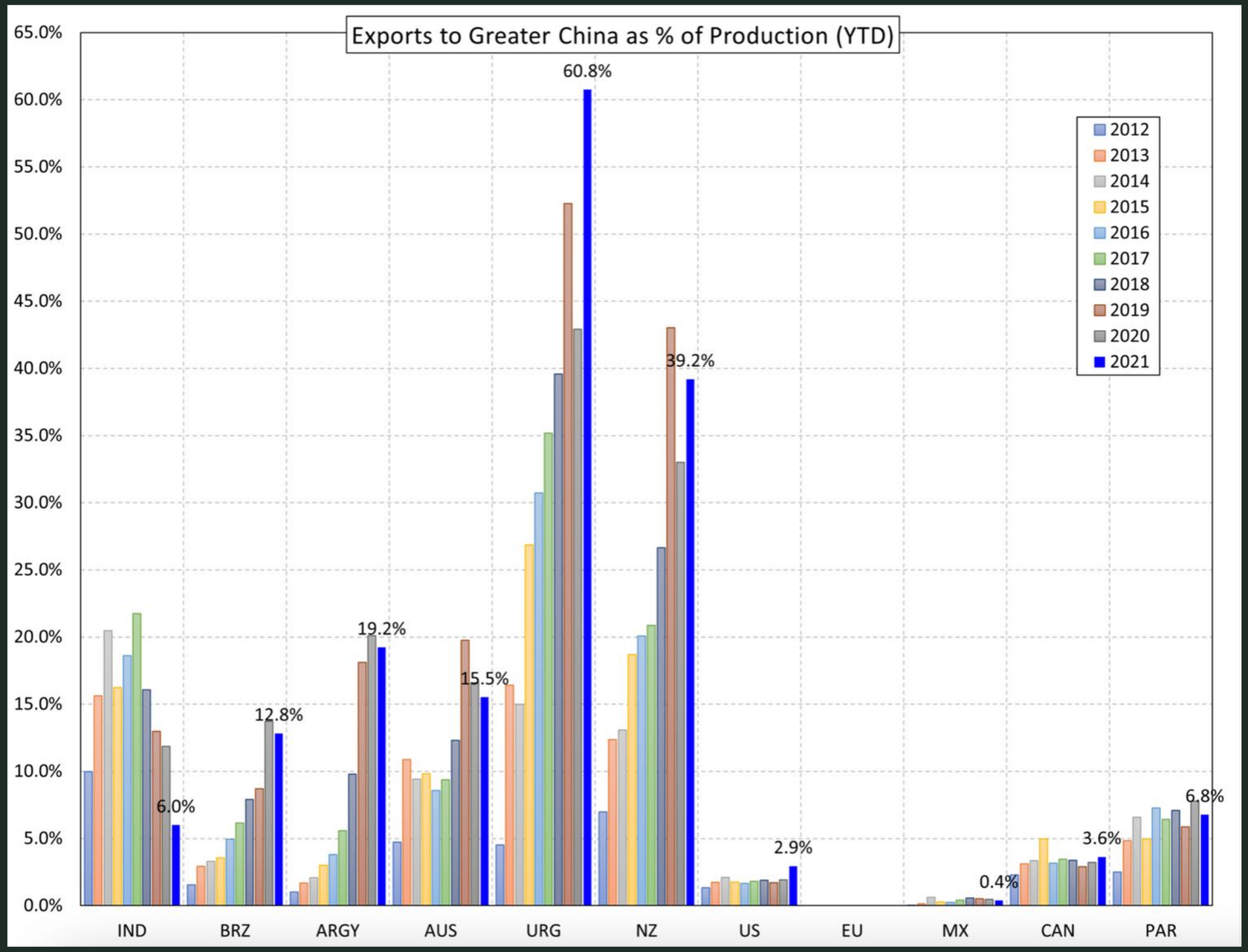
NOTEWORTHY:

Brazil has seen a pullback in pork shipments to China as well.

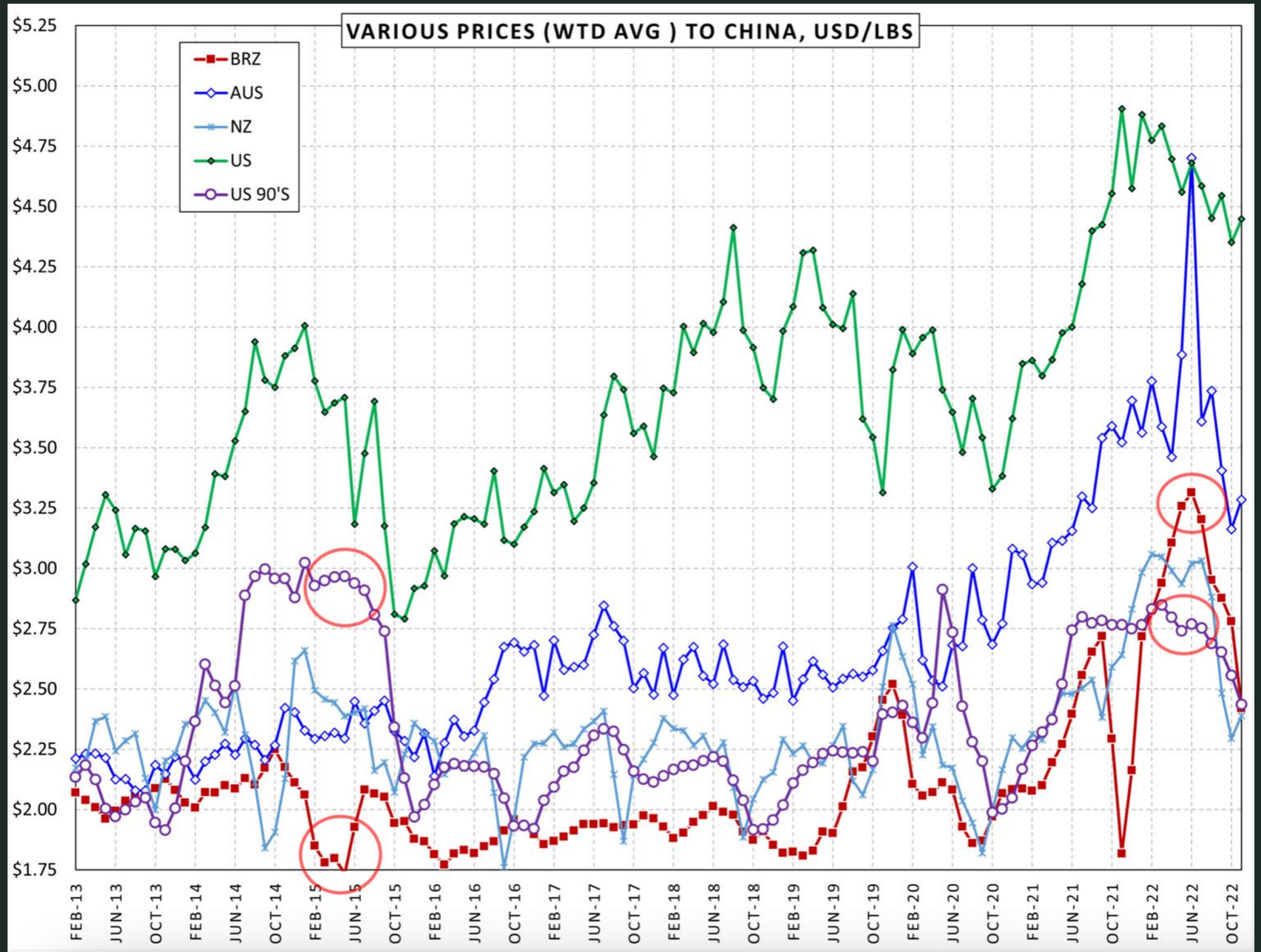
International Supply & Demand



International Supply & Demand



International Supply & Demand

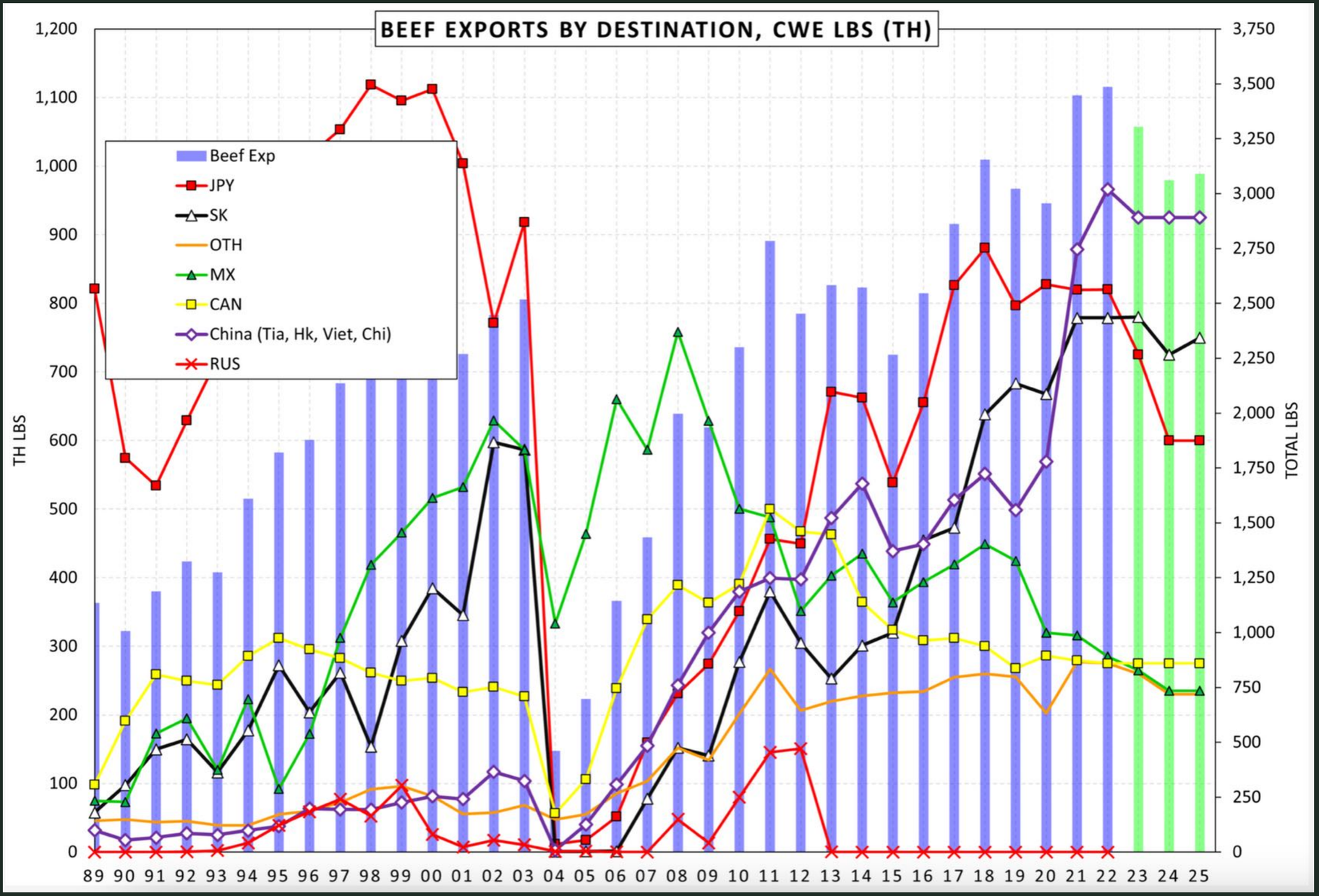


NOTEWORTHY:

China has not, and is not, importing all "cheap" items from the US, with current prices almost $4.50/lb, the 2nd highest of any destination (EU NHTC #1).

If we compare Brazilian product to US 90's, we are competitively priced.

International Supply & Demand

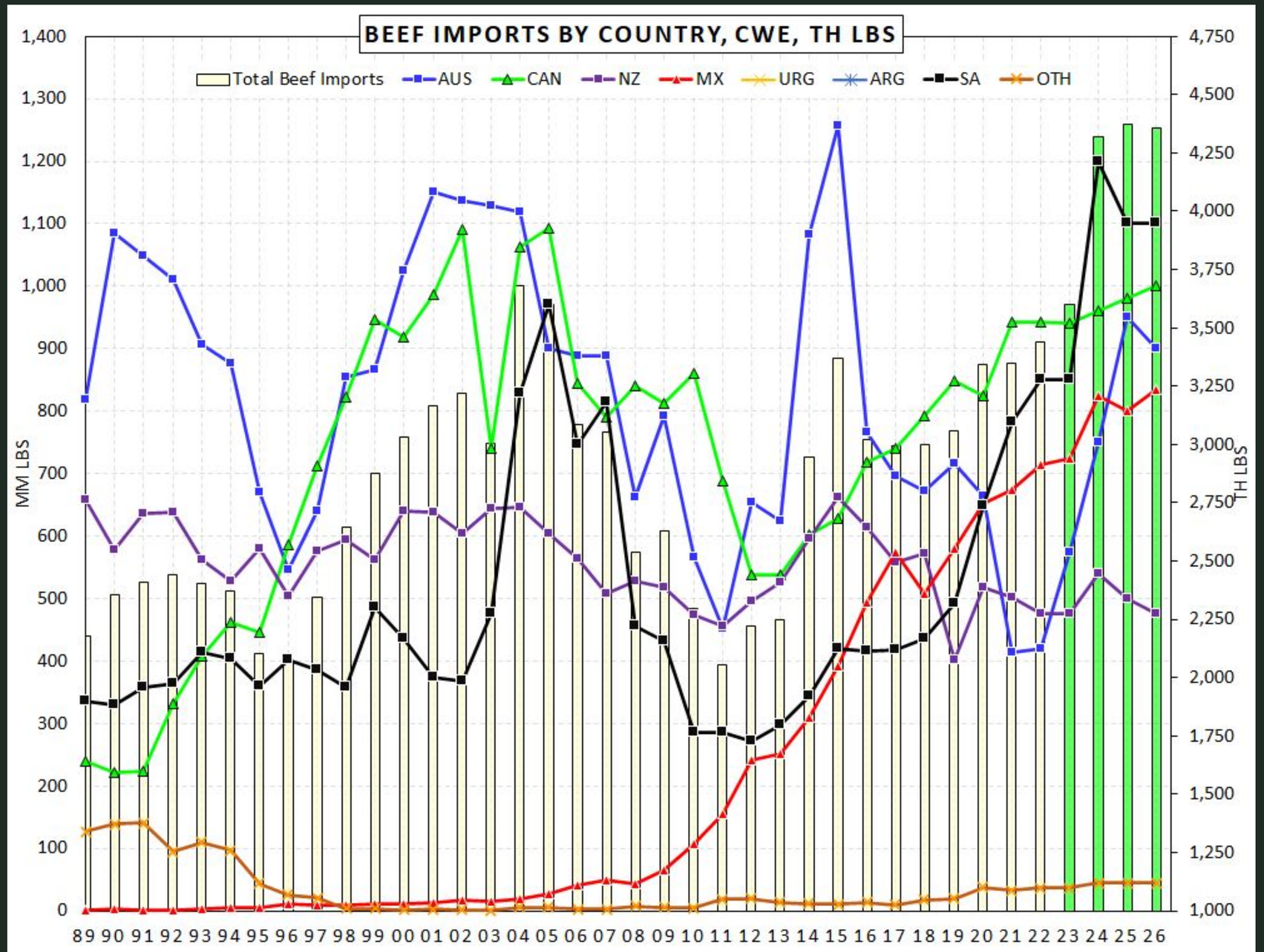


NOTEWORTHY:

JPY is expected to give up and move towards AUS as their supply grows. We also should be seeing lighter supply from the US making it less attractive here.

China is the only wild card and really the only bright spot. SK has been decent but we will have more competition with AUS and our prices are likely too high.

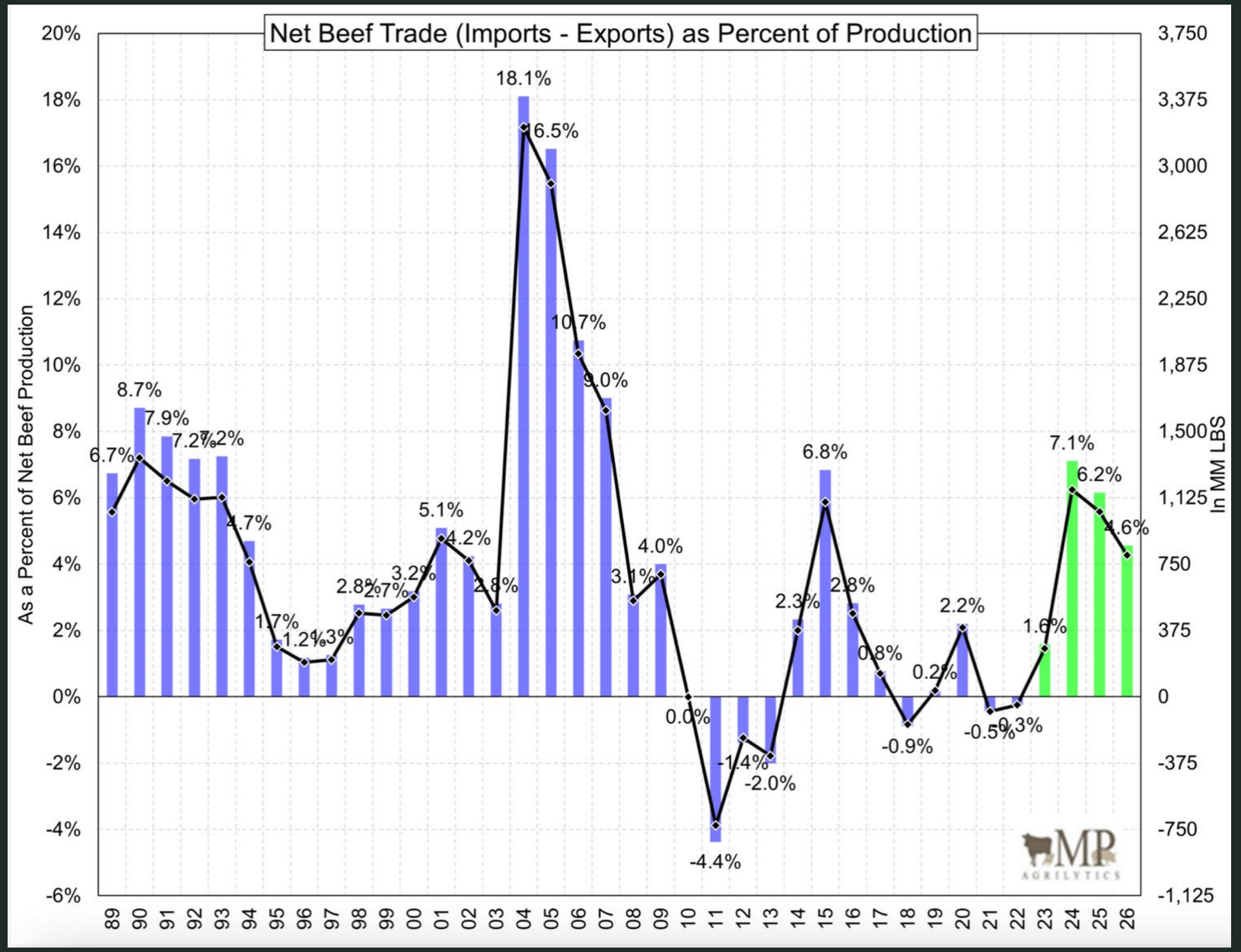
International Supply & Demand



NOTEWORTHY:

We are likely to see big numbers with AUS coming online again.
South America continues to grow like weeds with allowing for fresh product from BRZ.
NAFTA continues to be quite the loss for US beef and massive gain for Chicken/Pork.

International Supply & Demand



01. We are still a net importer by a long ways. US is still the 2nd largest demand base for imports behind China.

Domestic Demand

01. How do we measure it?

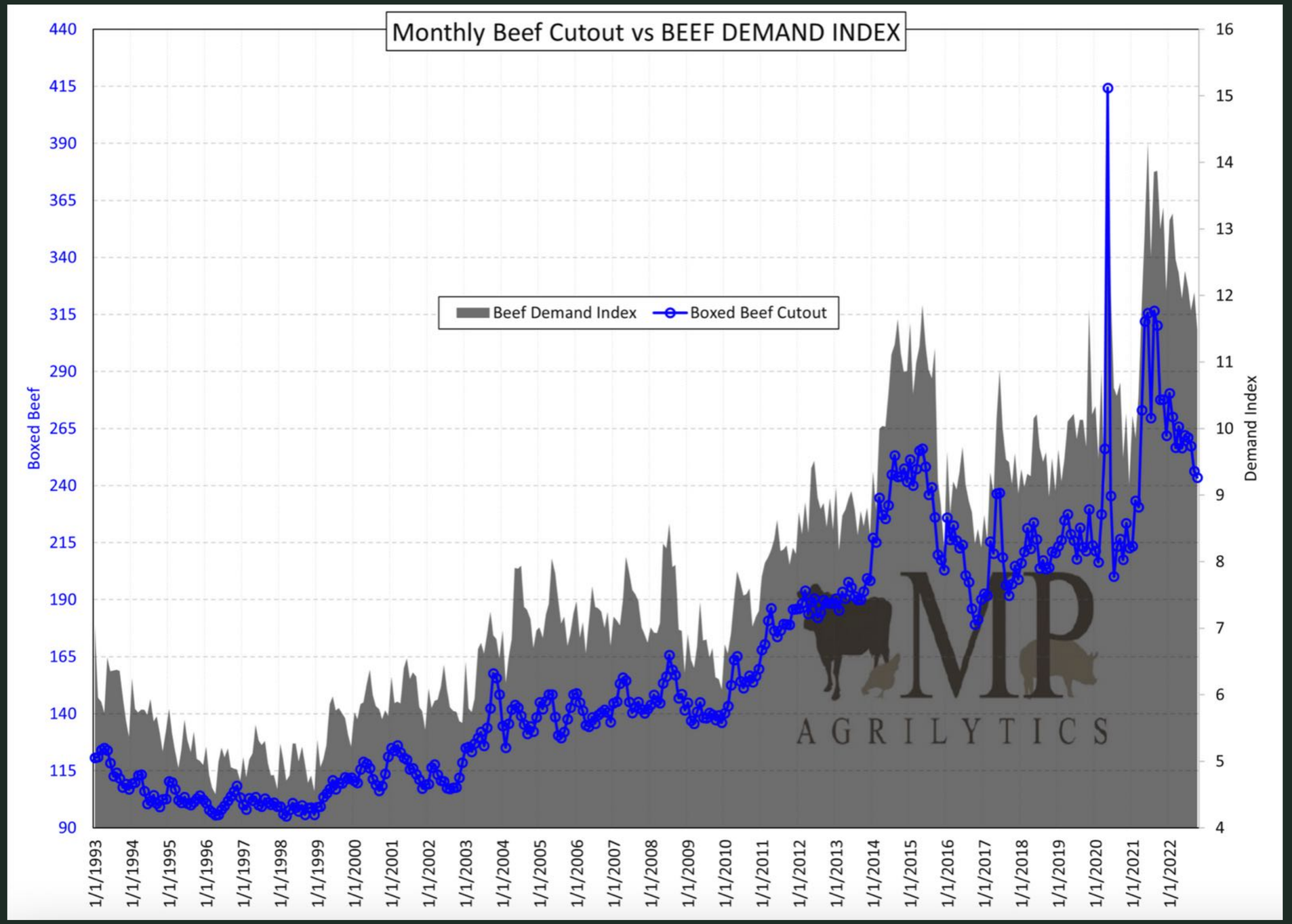
- Price X Quantity Supplied (dollars/capita)
- We find K State similar, but charts take 18 months to receive.

02. Pre- 2020 Factors

- Income, population, RPI, Exports, Pork
- Prime and Choice

03. Post- 2020 Factors...

Domestic Demand

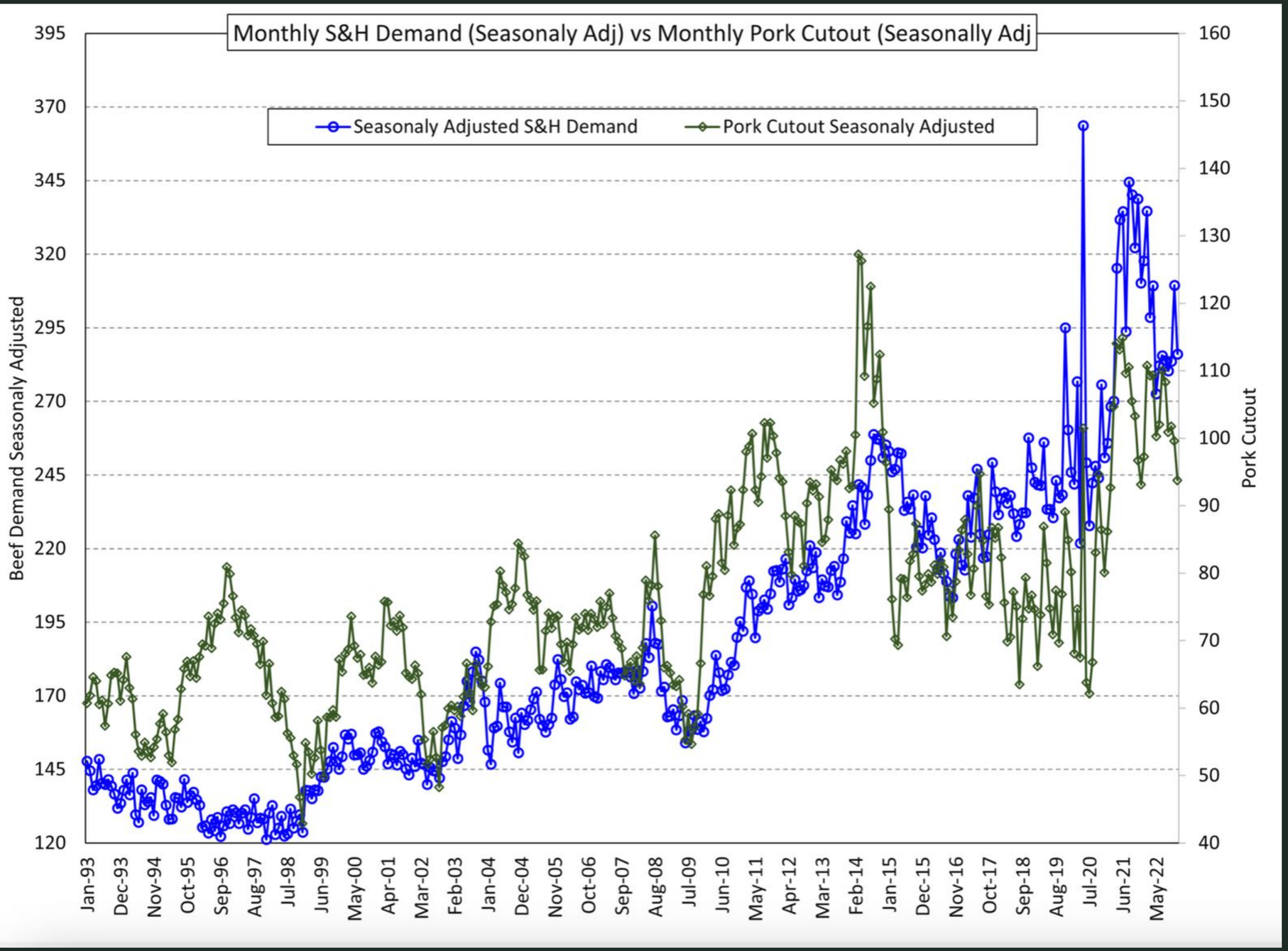


Domestic Demand

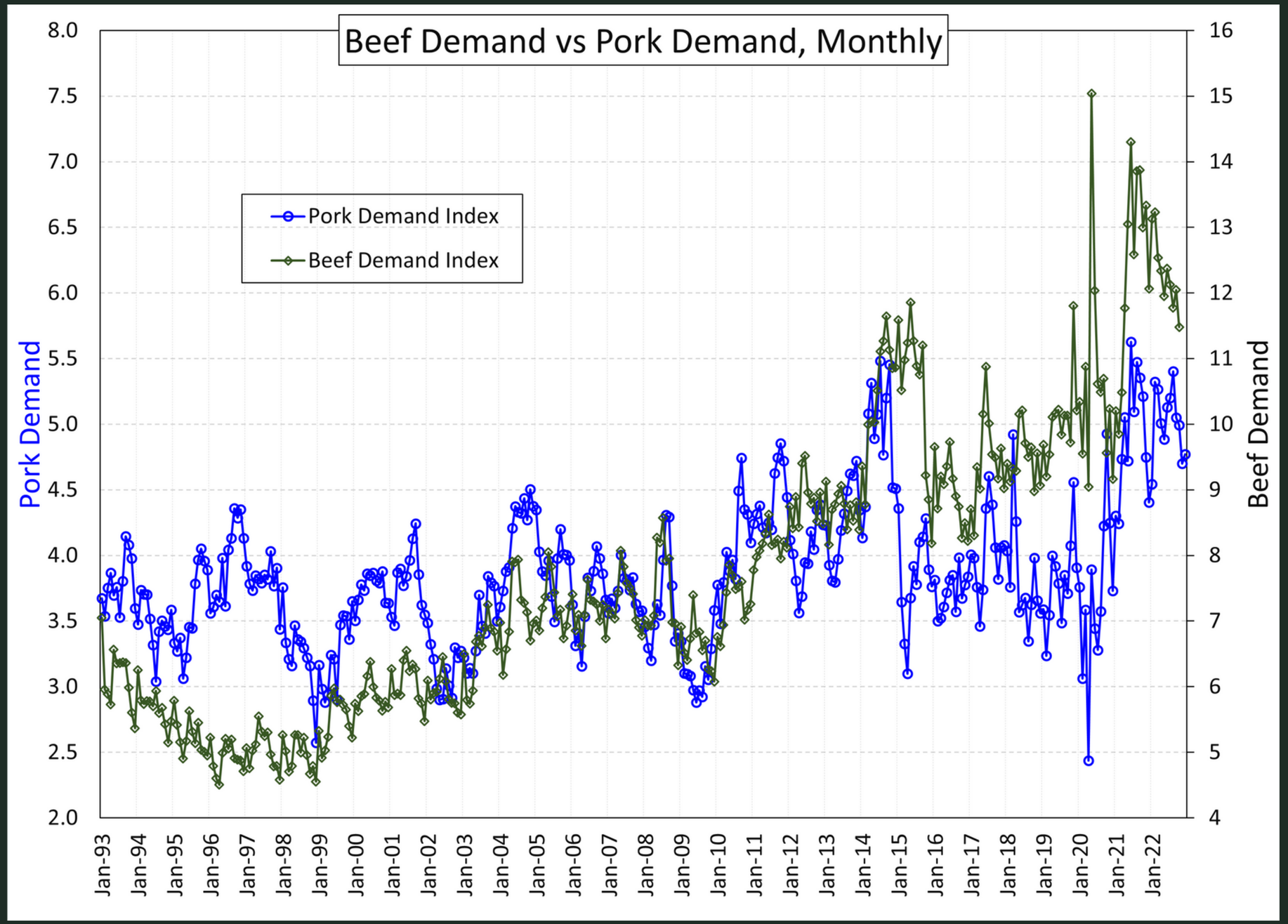
02. Pre- 2020 Factors

- Competing meats, population, RPI, income, and exports.
- Big changes to prime/choice starting 2017.

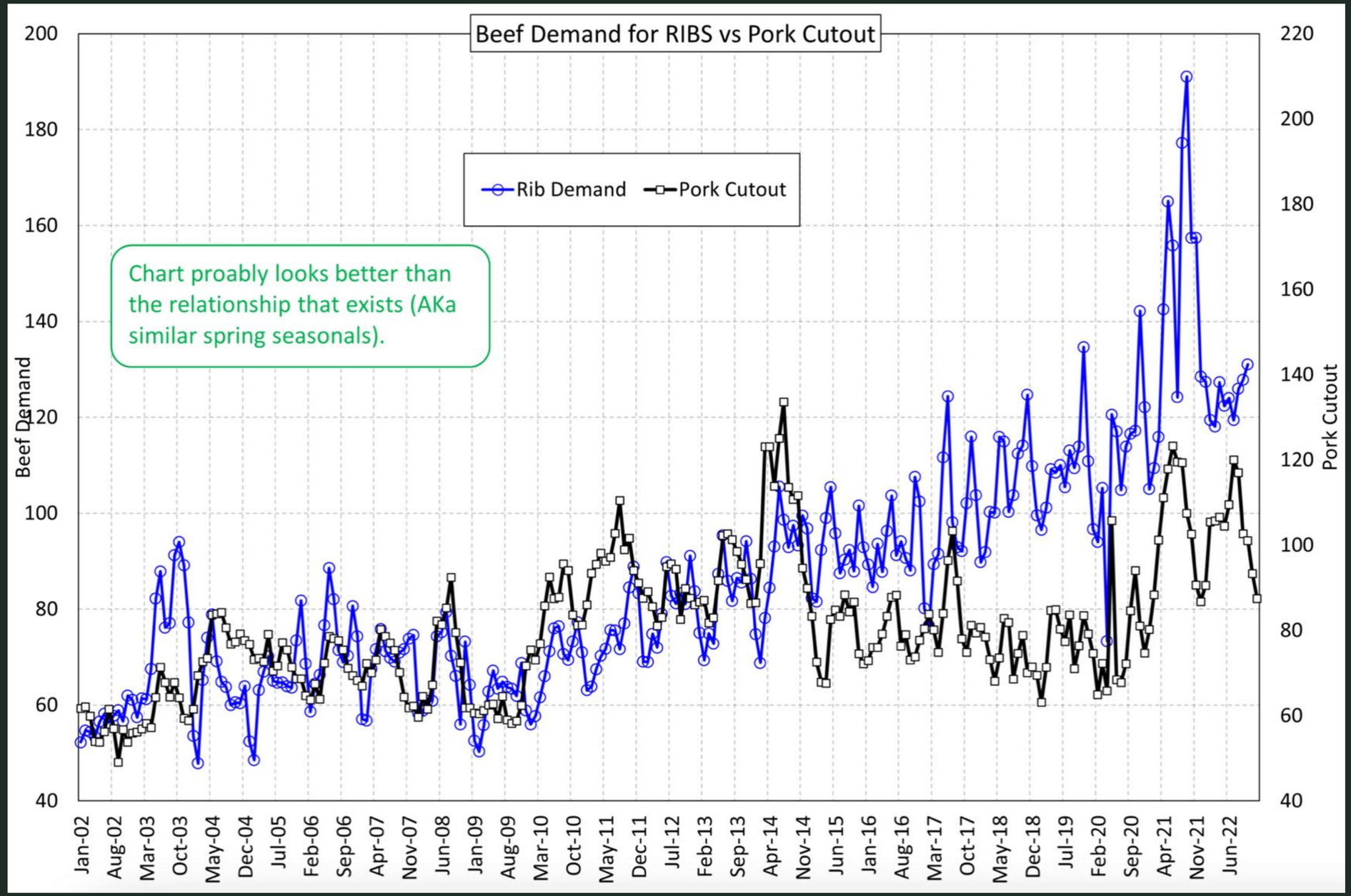
Domestic Demand



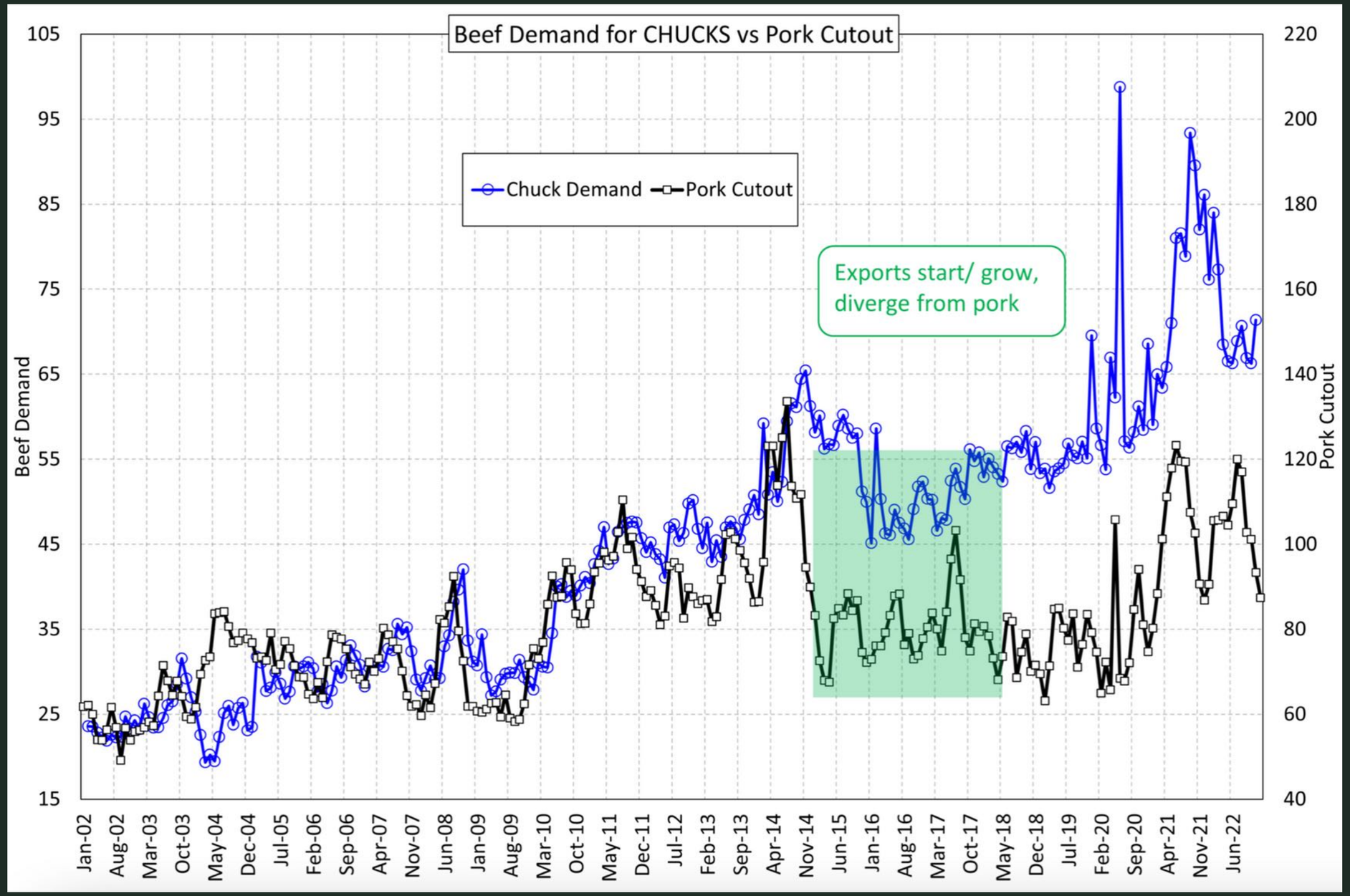
Domestic Demand



Domestic Demand

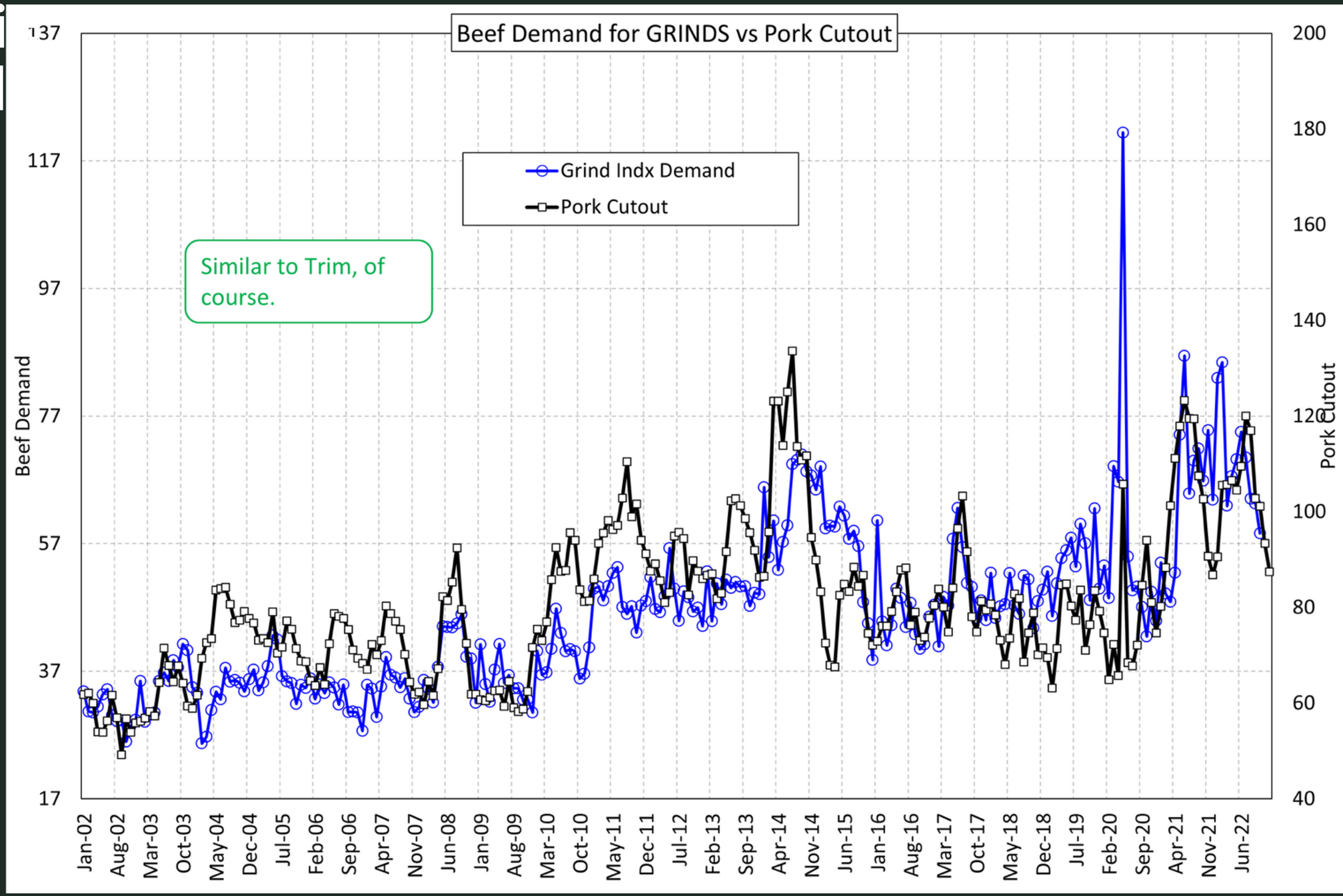


Domestic Demand

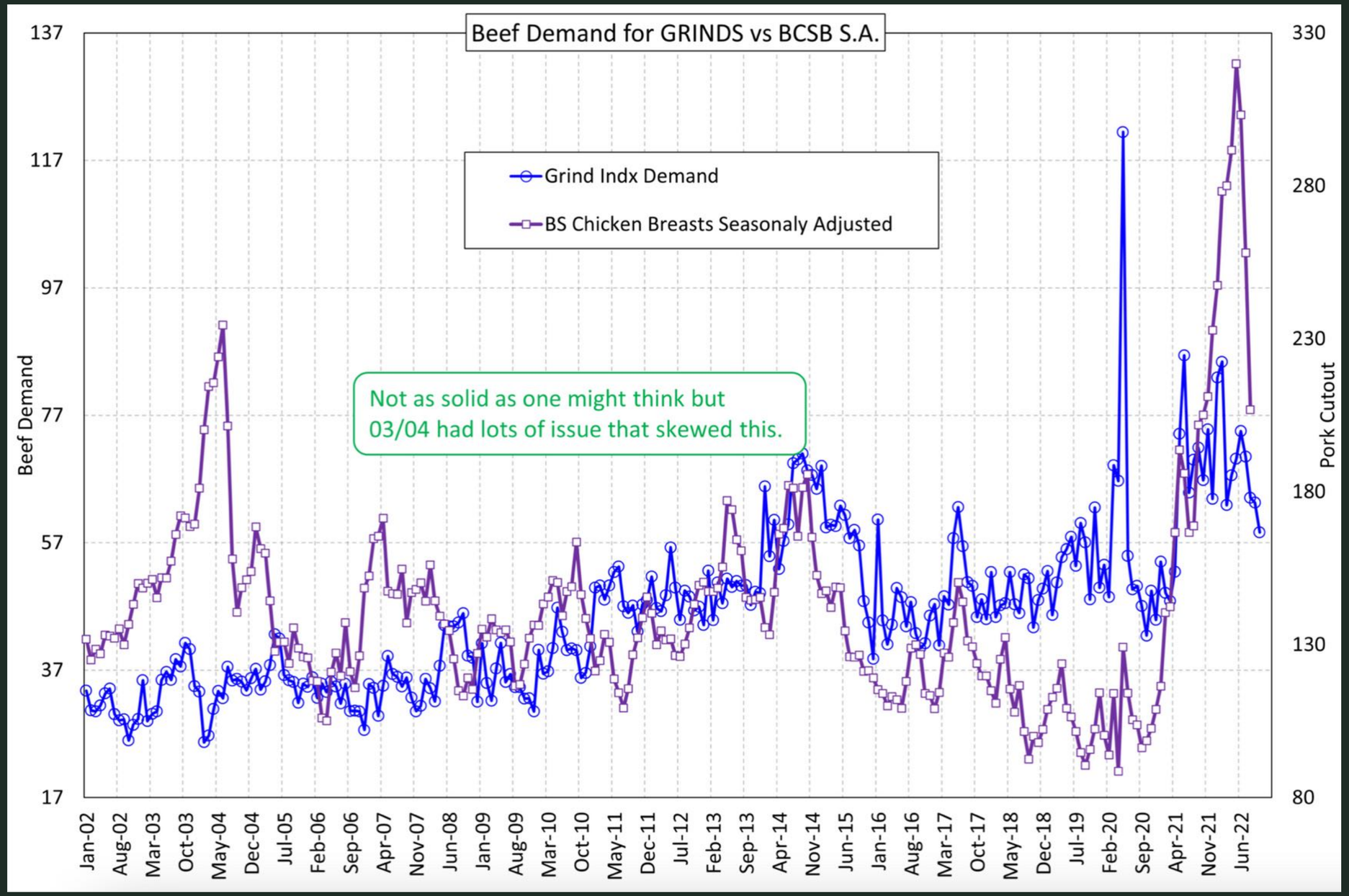


Domesti Demand

NOTEWORTHY:



Domestic Demand

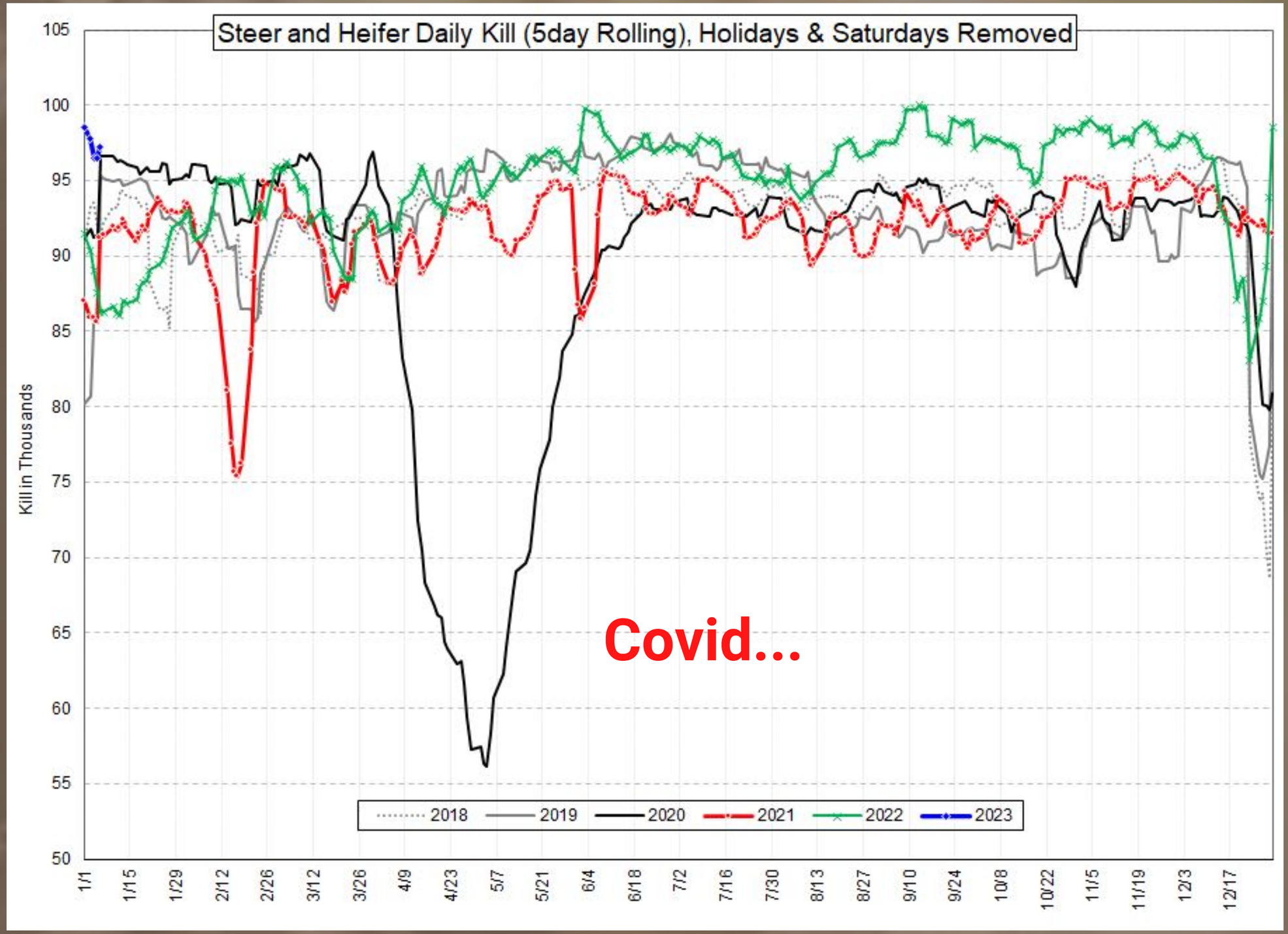


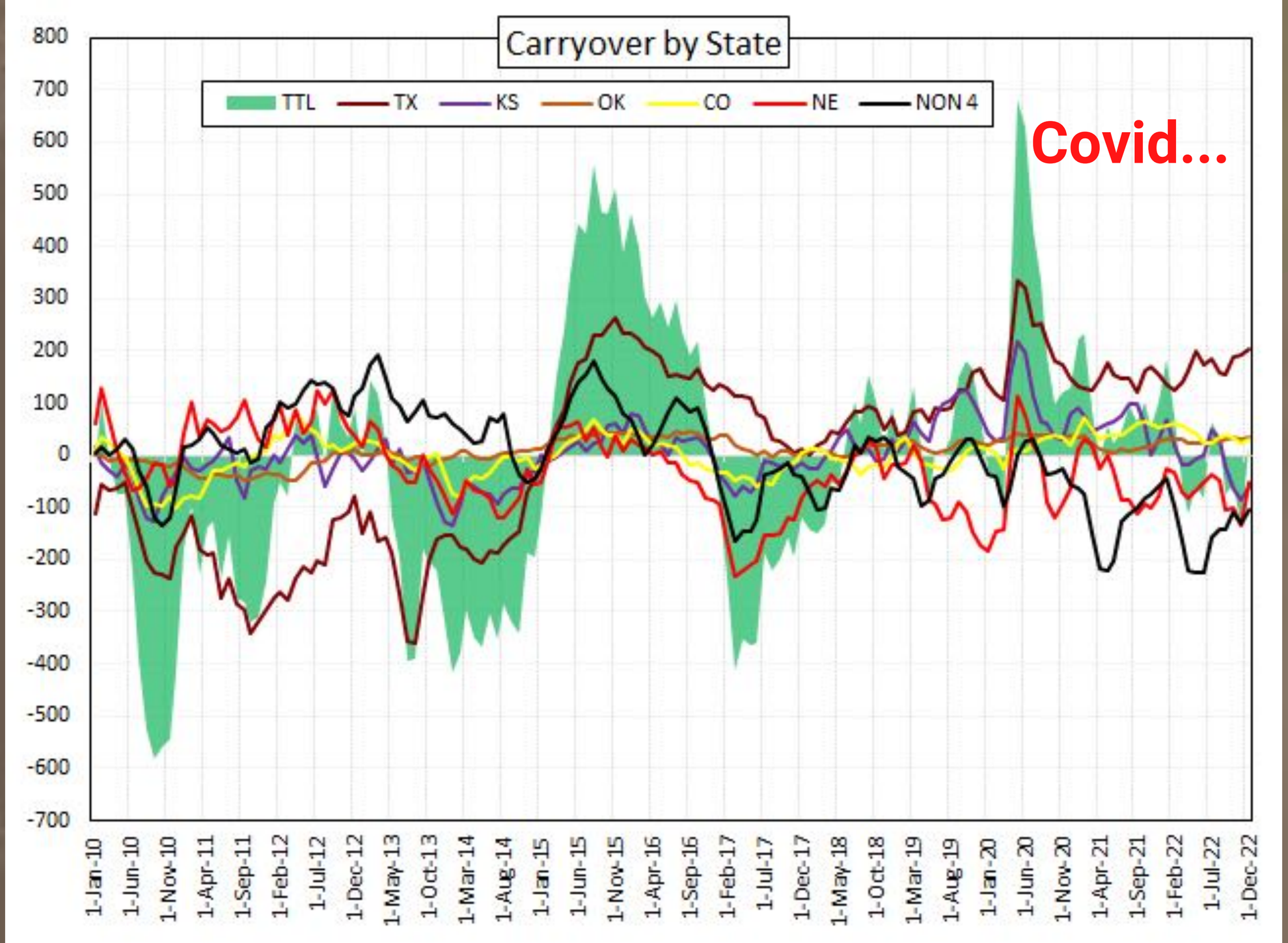
Domestic Demand

03. Post- 2020 Factors

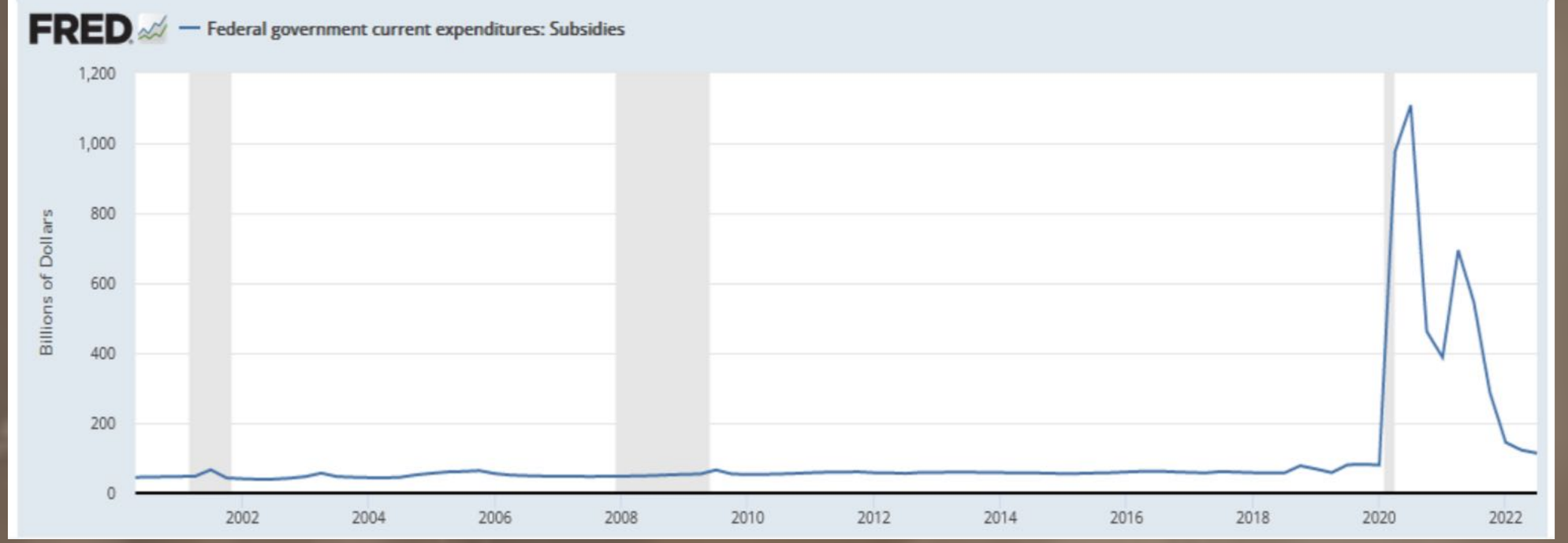
- We forced prices to new levels – unprecedented.
- Slaughter off 30% for 3 months (supply shortage)
- Labor never fully came back for ~18 months
- Consumer hoarding
- Food service shut down
- Stemi… snap
- Food service ramps back up (need to refill pipeline too)
- How much did consumer/restaurants end up throwing away?
- Prices had to ration retail demand to fill food service & cold storage
- Surprisingly, prices have stayed at these levels

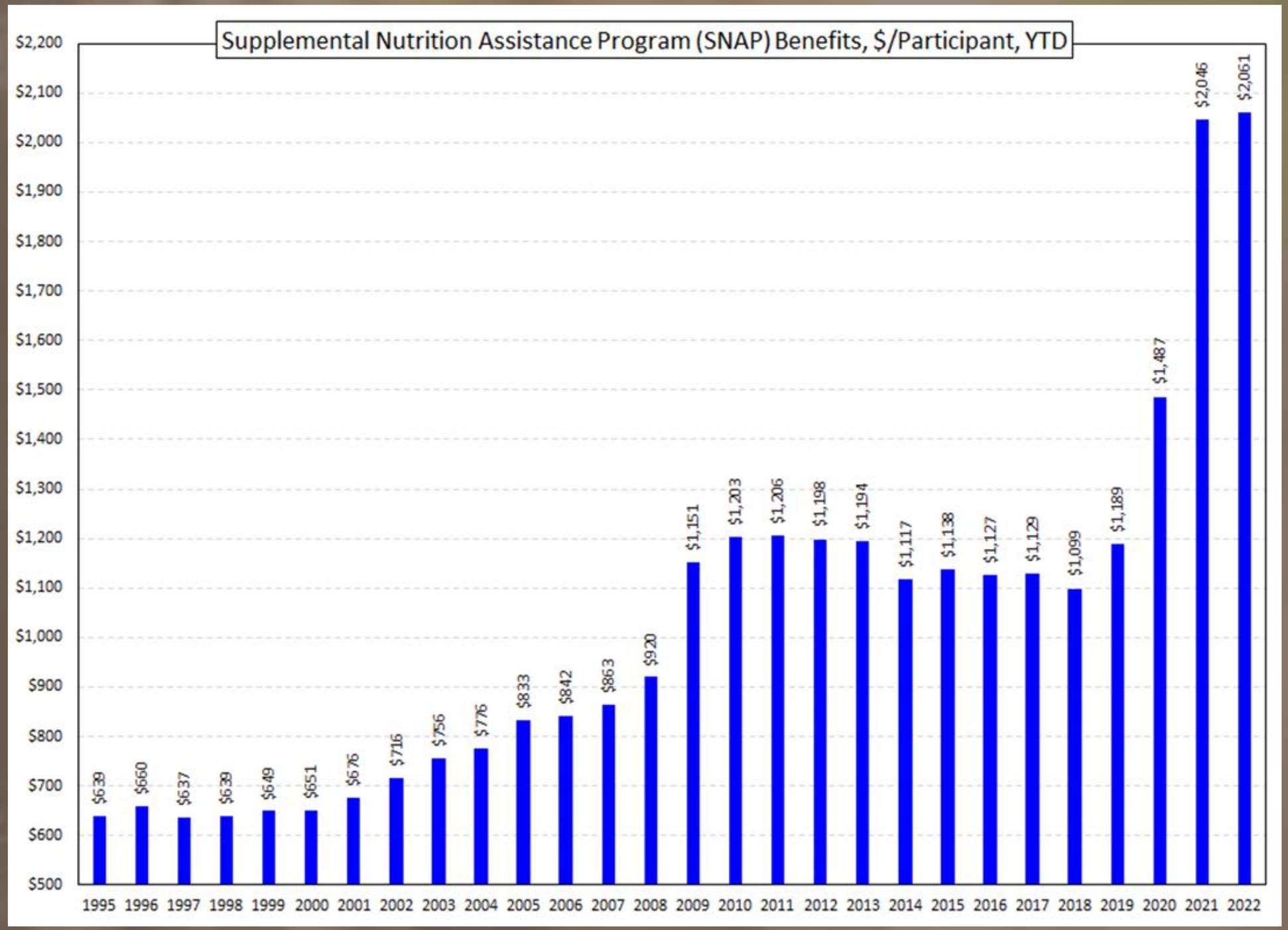
MP AGRILYTICS

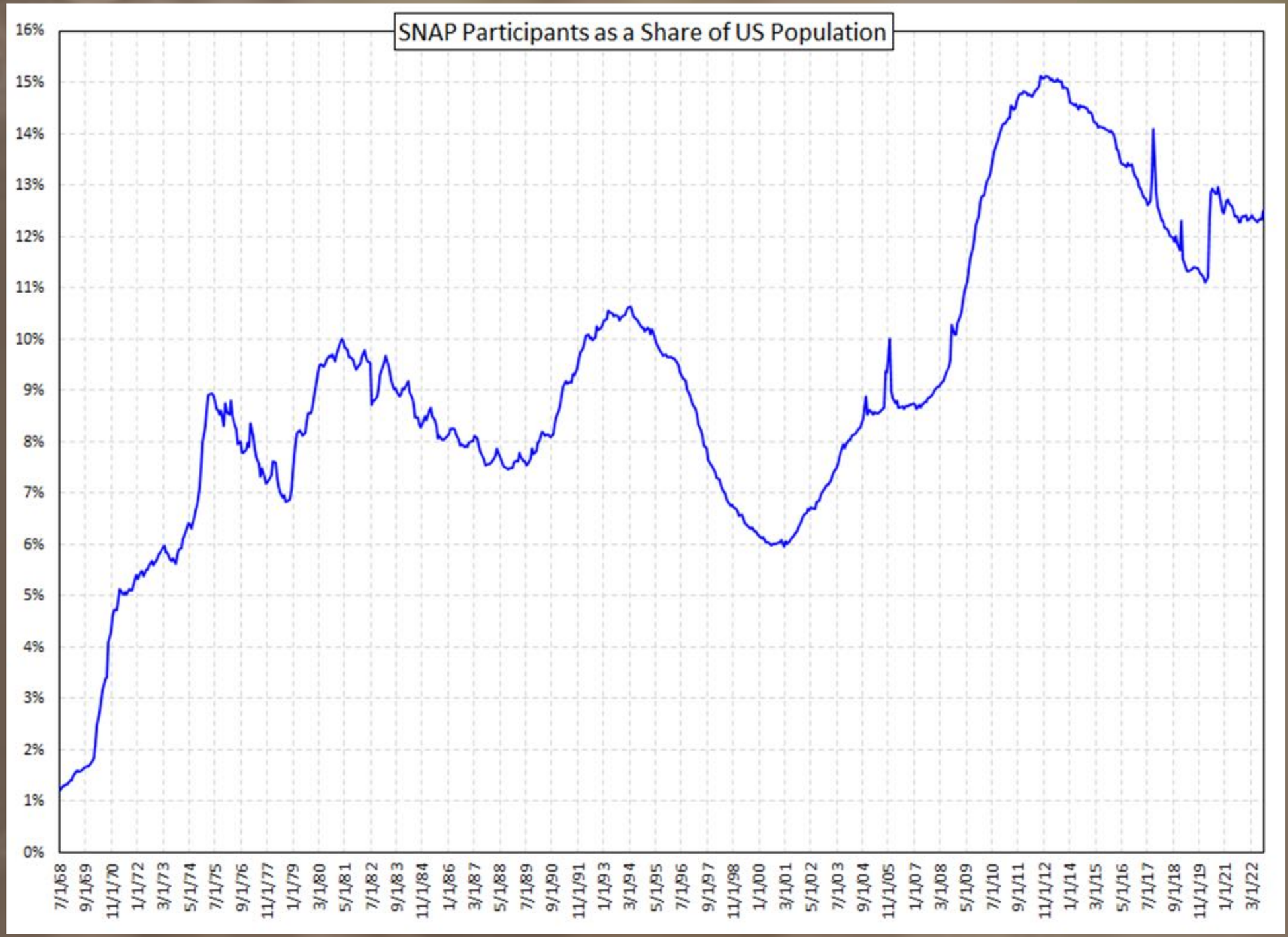



Carryover by State
TTL
TX
KS
OK
CO
NE
NON 4
Covid...
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
-500
-600
-700
1-Jan-10
1-Jun-10
1-Nov-10
1-Apr-11
1-Sep-11
1-Feb-12
1-Jul-12
1-Dec-12
1-May-13
1-Oct-13
1-Mar-14
1-Aug-14
1-Jan-15
1-Jun-15
1-Nov-15
1-Apr-16
1-Sep-16
1-Feb-17
1-Jul-17
1-Dec-17
1-May-18
1-Oct-18
1-Mar-19
1-Aug-19
1-Jan-20
1-Jun-20
1-Nov-20
1-Apr-21
1-Sep-21
1-Feb-22
1-Jul-22
1-Dec-22

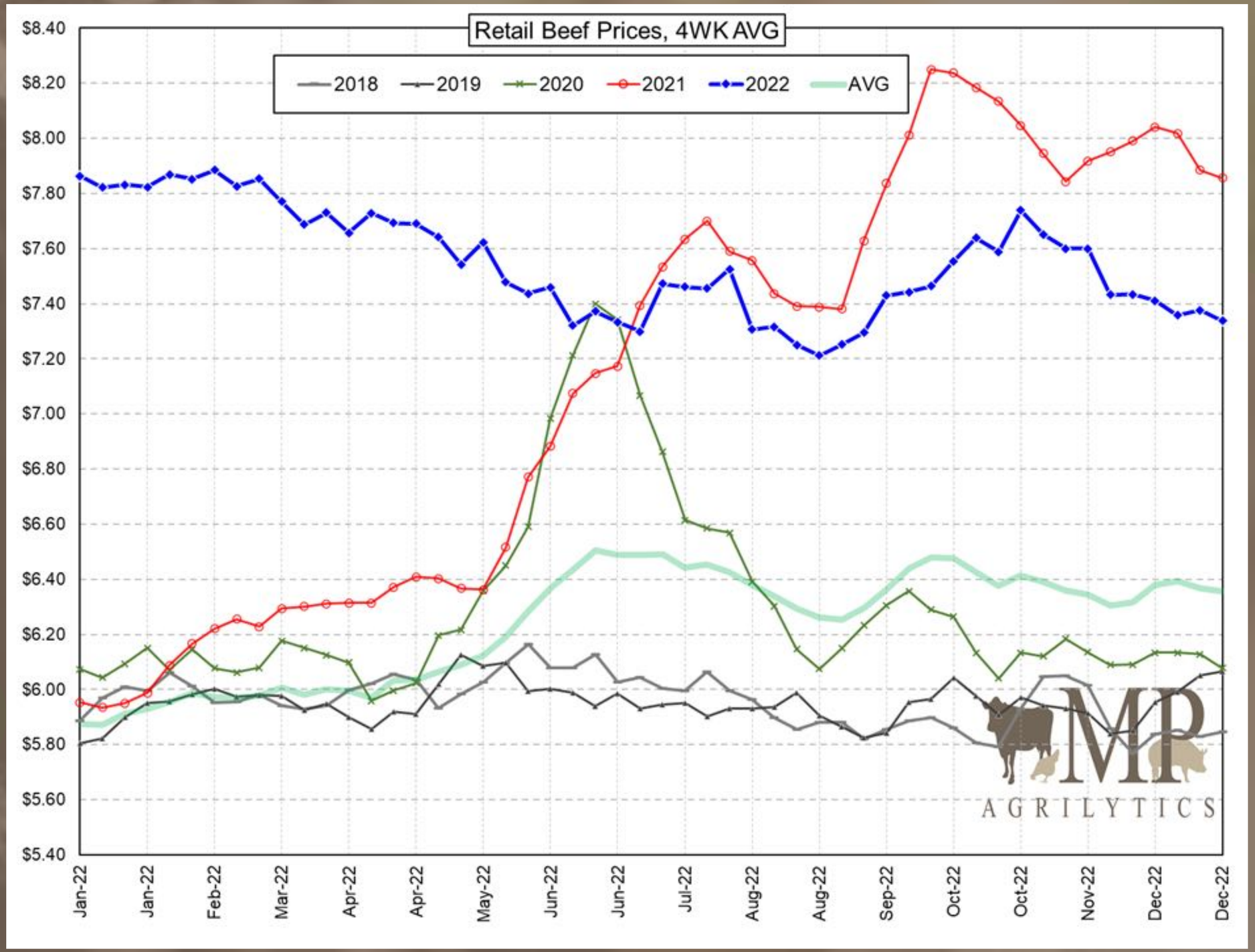
FRED
Real Disposable Personal Income: Per Capita
Chained 2012 Dollars
60,000
56,000
52,000
48,000
44,000
40,000
36,000
32,000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022

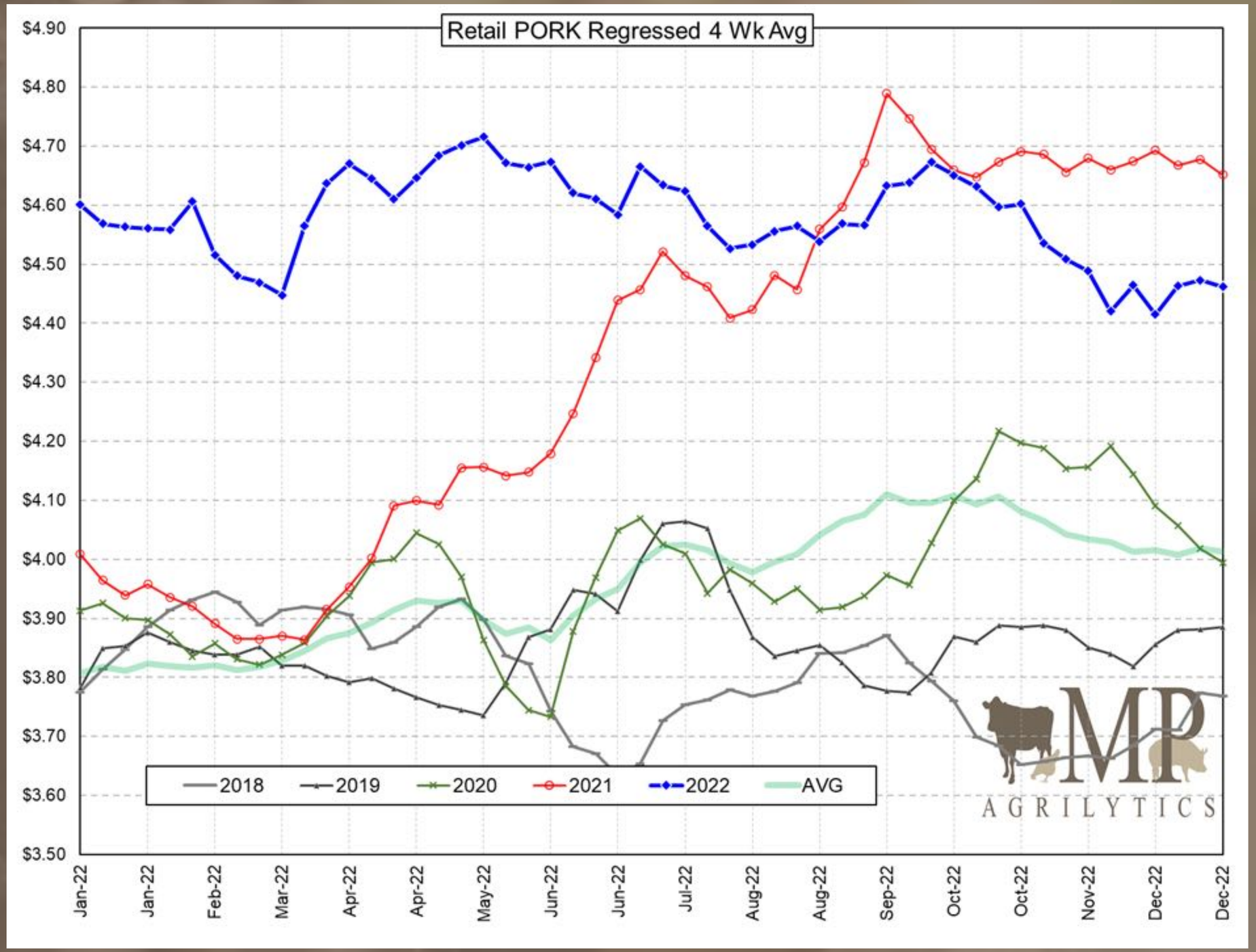

FRED
Federal government current expenditures: Subsidies
Billions of Dollars
1,200
1,000
800
600
400
200
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022


Supplemental Nutrition Assistance Program (SNAP) Benefits, $/Participant, YTD
$2,200
$2,100
$2,000
$1,900
$1,800
$1,700
$1,600
$1,500
$1,400
$1,300
$1,200
$1,100
$1,000
$900
$800
$700
$600
$500
$639
$660
$637
$639
$649
$651
$676
$716
$756
$776
$833
$842
$863
$920
$1,151
$1,203
$1,206
$1,198
$1,194
$1,117
$1,138
$1,127
$1,129
$1,099
$1,189
$1,487
$2,046
$2,061
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

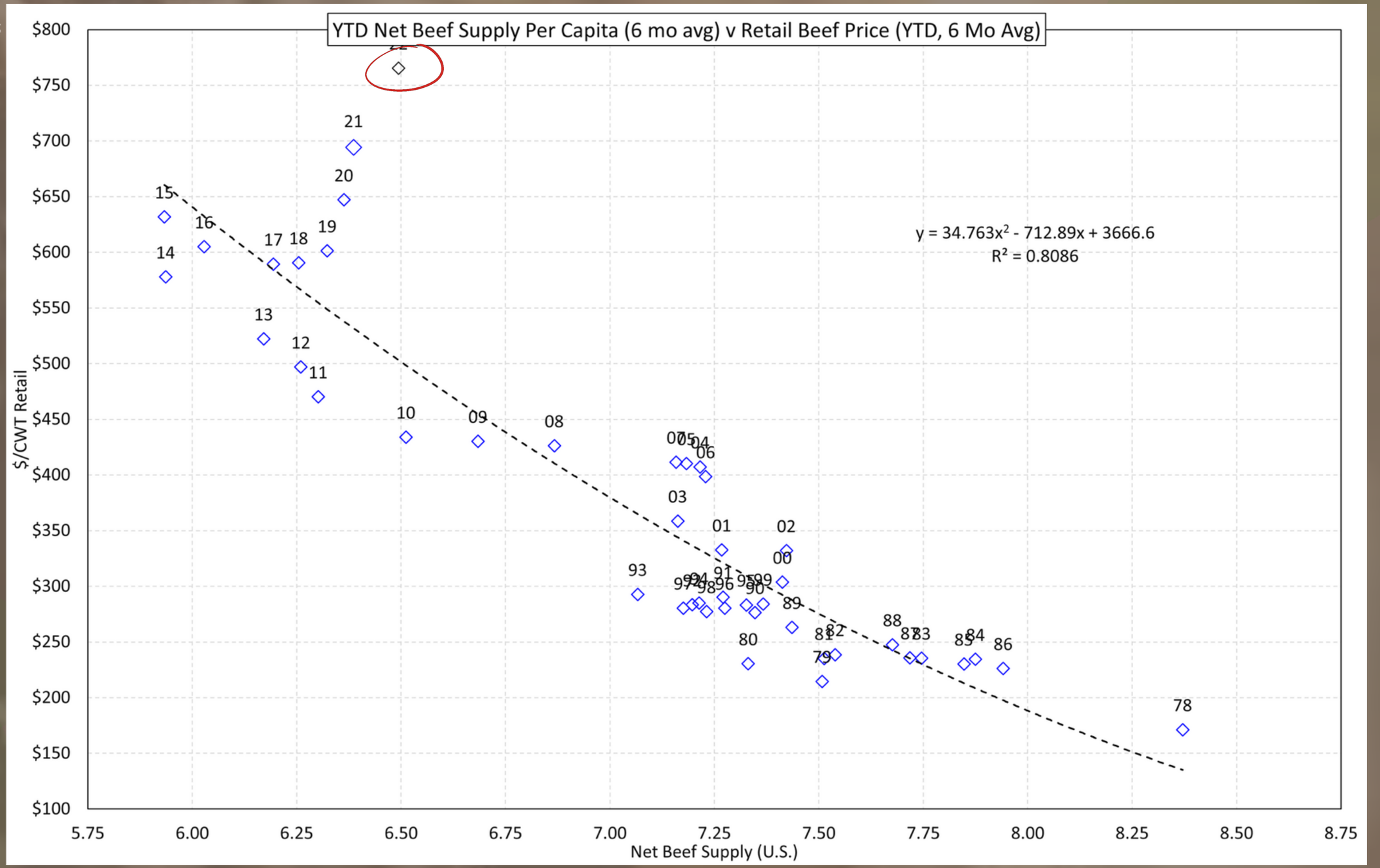

SNAP Participants as a Share of US Population
16%
15%
14%
13%
12%
11%
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
7/1/68
9/1/69
11/1/70
1/1/72
3/1/73
5/1/74
7/1/75
9/1/76
11/1/77
1/1/79
3/1/80
5/1/81
7/1/82
9/1/83
11/1/84
1/1/86
3/1/87
5/1/88
7/1/89
9/1/90
11/1/91
1/1/93
3/1/94
5/1/95
7/1/96
9/1/97
11/1/98
1/1/00
3/1/01
5/1/02
7/1/03
9/1/04
11/1/05
1/1/07
3/1/08
5/1/09
7/1/10
9/1/11
11/1/12
1/1/14
3/1/15
5/1/16
7/1/17
9/1/18
11/1/19
1/1/21
3/1/22

MP AGRILYTICS




Retail PORK Regressed 4 Wk Avg
$4.90
$4.80
$4.70
$4.60
$4.50
$4.40
$4.30
$4.20
$4.10
$4.00
$3.90
$3.80
$3.70
$3.60
$3.50
2018
2019
2020
2021
2022
AVG
Jan-22
Jan-22
Feb-22
Mar-22
Apr-22
Apr-22
May-22
Jun-22
Jun-22
Jul-22
Aug-22
Aug-22
Sep-22
Oct-22
Oct-22
Nov-22
Dec-22
Dec-22
MP
AGRILYTICS

MP AGRILYTICS



Retail Price	$725	$715	$705	$695	$685	$675	$665	$655	$645
Retail Cost	$275	$275	$275	$275	$275	$275	$275	$275	$275
Retail Margin	$125	$125	$125	$125	$125	$125	$125	$125	$125
Implied Wholesale	$325	$315	$305	$295	$285	$275	$265	$255	$245
Packing Margin	$0	$0	$0	$0	$0	$0	$0	$0	$0
Implied Cash	$204	$198	$191	$185	$179	$172	$166	$160	$153
Retail Price	$725	$715	$705	$695	$685	$675	$665	$655	$645
Retail Cost	$275	$275	$275	$275	$275	$275	$275	$275	$275
Retail Margin	$100	$100	$100	$100	$100	$100	$100	$100	$100
Implied Wholesale	$350	$340	$330	$320	$310	$300	$290	$280	$270
Packing Margin	$0	$0	$0	$0	$0	$0	$0	$0	$0
Implied Cash	$220	$214	$207	$201	$195	$188	$182	$176	$169
Retail Price	$725	$715	$705	$695	$685	$675	$665	$655	$645
Retail Cost	$275	$275	$275	$275	$275	$275	$275	$275	$275
Retail Margin	$75	$75	$75	$75	$75	$75	$75	$75	$75
Implied Wholesale	$375	$365	$355	$345	$335	$325	$315	$305	$295
Packing Margin	$0	$0	$0	$0	$0	$0	$0	$0	$0
Implied Cash	$236	$229	$223	$217	$210	$204	$198	$191	$185

DEMAND SUMMARY

- **Prices**

  Very hard to know where prices will clear.

- **Silly Money**

  Appears to be over for the minute.

- **Consumer**

  Much different than last cycle with margins negative with consumers saying "no" for years

- **Consumers**

  Consumers have seen this pricing before.

- **Packer Margins**

  300-600/HD margins above at any given point in the day.

- **Supply**

  Will be smaller than last cycle with greater capacity.