2017 Census of Agriculture
Chesapeake Bay Watershed

Jeff Sweeney
Environmental Protection Agency
Chesapeake Bay Program Office
sweeney.jeff@epa.gov
410-267-9844

Agriculture Workgroup Meeting
October 17, 2019

2017 Census of Agriculture

Categories

- CBP Animal Types
- CBP Land use/Crop Types and Categories

2017 Census of Agriculture

Time Period for Trends

- 1987 through 2012, then
  1) Post-2012 with old forecast through 2025, the background conditions for the Phase III WIP scenarios.
  2) Post-2012 with new 2017 Ag Census data and new forecast through 2025

2017 Census of Agriculture

Time Period for Trends

- Forecasts use methods recommended by Ag Modeling for Phase 6 Watershed Model (CAST) and approved through Agriculture Workgroup, Water Quality GIT, etc.

2017 Census of Agriculture

When will the new data be used?

- According to decisions through the PSC, introduction of new data and methods (science) occurs at the beginning of new Milestone periods.
  - 2017 Ag Census data will be incorporated with the next version of CAST for the 2020-2021 Milestone period.
  - Current schedule calls for updated CAST to be finalized Nov. 1.

2017 Census of Agriculture

When will the new data be used?

- The new forecasts are used for background conditions for the annual model Progress assessments.
  - Starting point is 2nd 2019 progress scenario, then 2020 and 2021 Progress scenarios.
- The new forecasts do not change the background conditions for Phase III WIPs which were finalized August, 2019.
  - "The bar" has not changed

2017 Census of Agriculture

Animal Forecast Methods

- Detailed documentation of the methods and data used for calculating manure nutrient inputs to the land – including data from the Census of Agriculture – are part of the Phase 6 Watershed Model documentation https://cast.chesapeakebay.net/Documentation/ModelDocumentation
  - Section 3, Terrestrial Inputs

2017 Census of Agriculture

Animal Forecast Methods

- Checks on the office's analyses have been done in-house and well as some stakeholders who specifically asked for detailed information.
  - Data is available by request during this draft period.
  - Please be specific as to what you're interested in – animals, crops, spatial scale, time period, etc.
  - It is imperative that users understand methods used by the CBP from the raw data in Census of Agriculture – as documented on the Program's site.
  - There have been corrections to the forecasts since originally presented to the Ag Workgroup 7/18/19

2017 Census of Agriculture

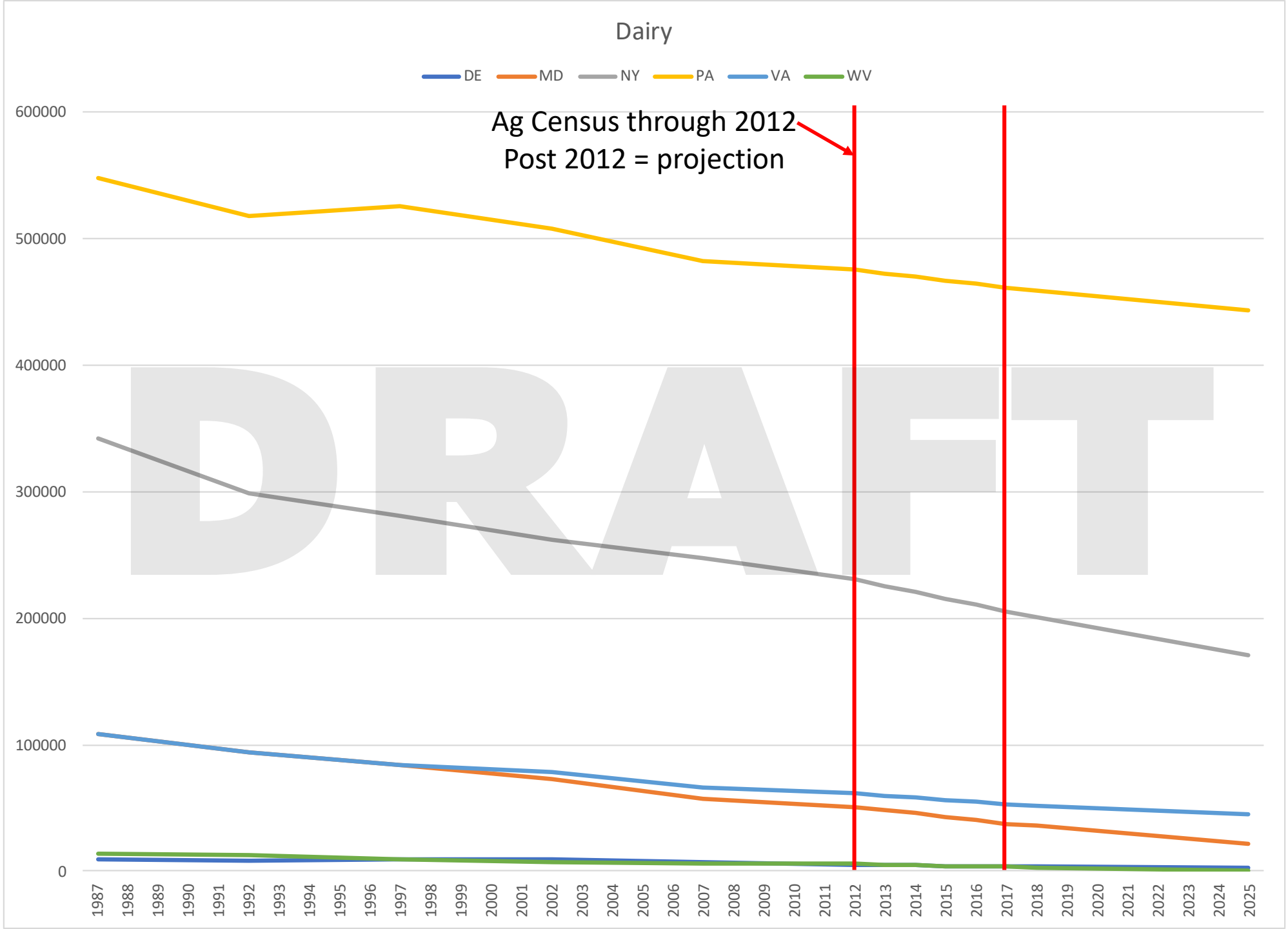
Animal Forecast Methods

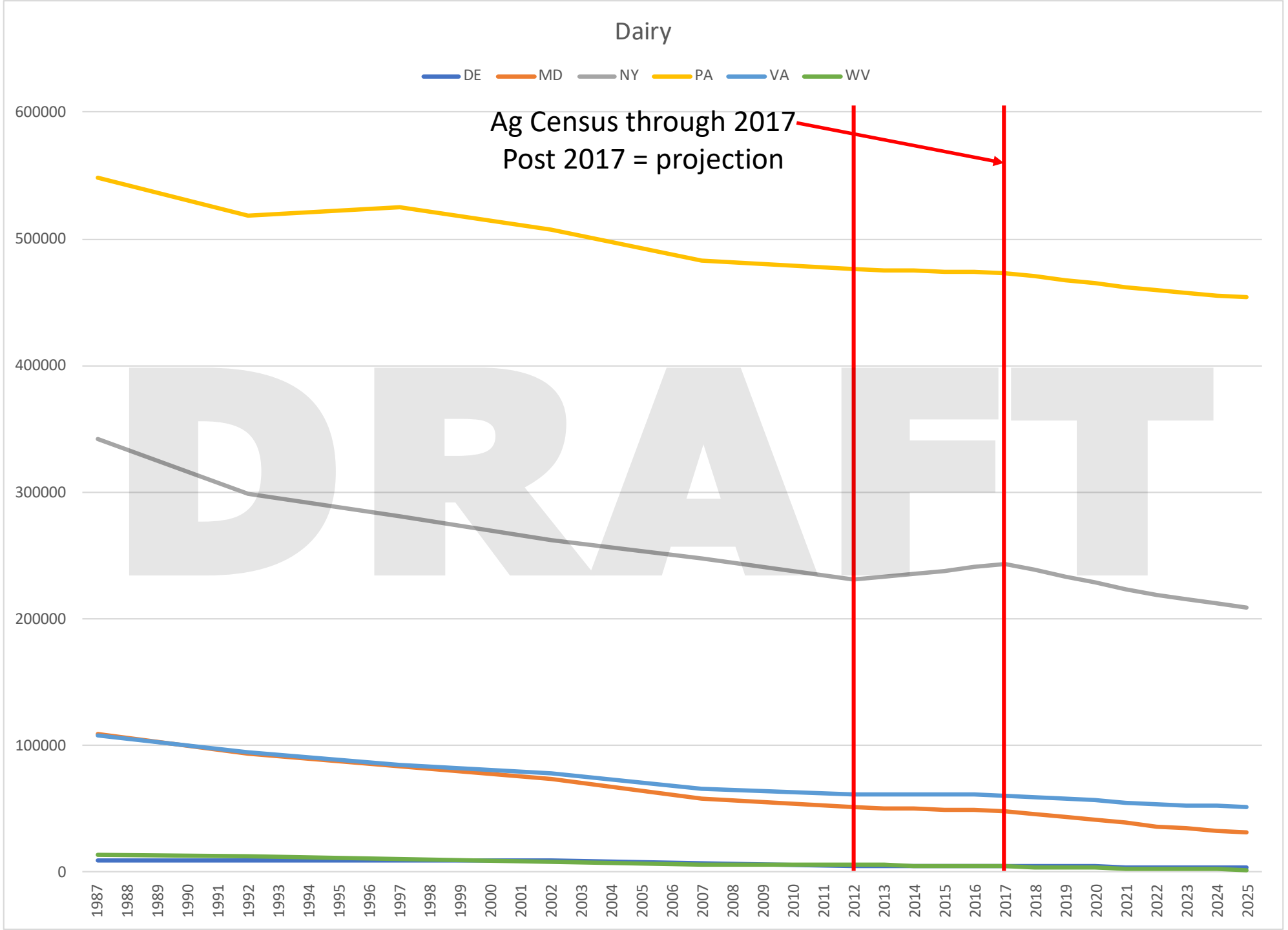
- For animals, forecasts are at the state scale
- State numbers are then proportioned to individual counties according to latest Census of Agriculture
- For broilers, turkeys, pullets, and hogs, use annual Census production numbers by state
- For all other animals, use 5-year Census inventory numbers by state
- For forecasts, greater weight is given to more recent short-term trends than long-term trends

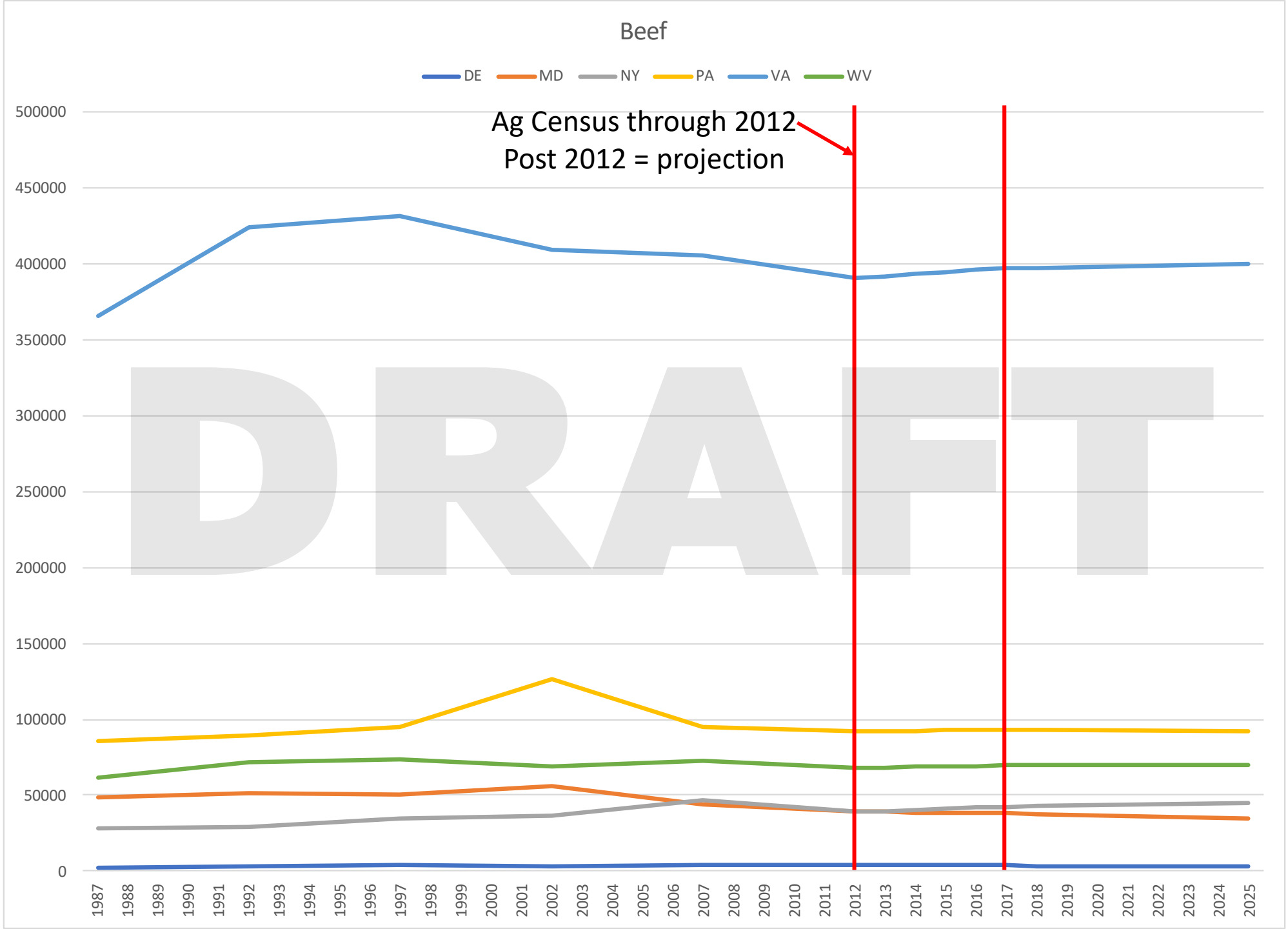
2017 Census of Agriculture

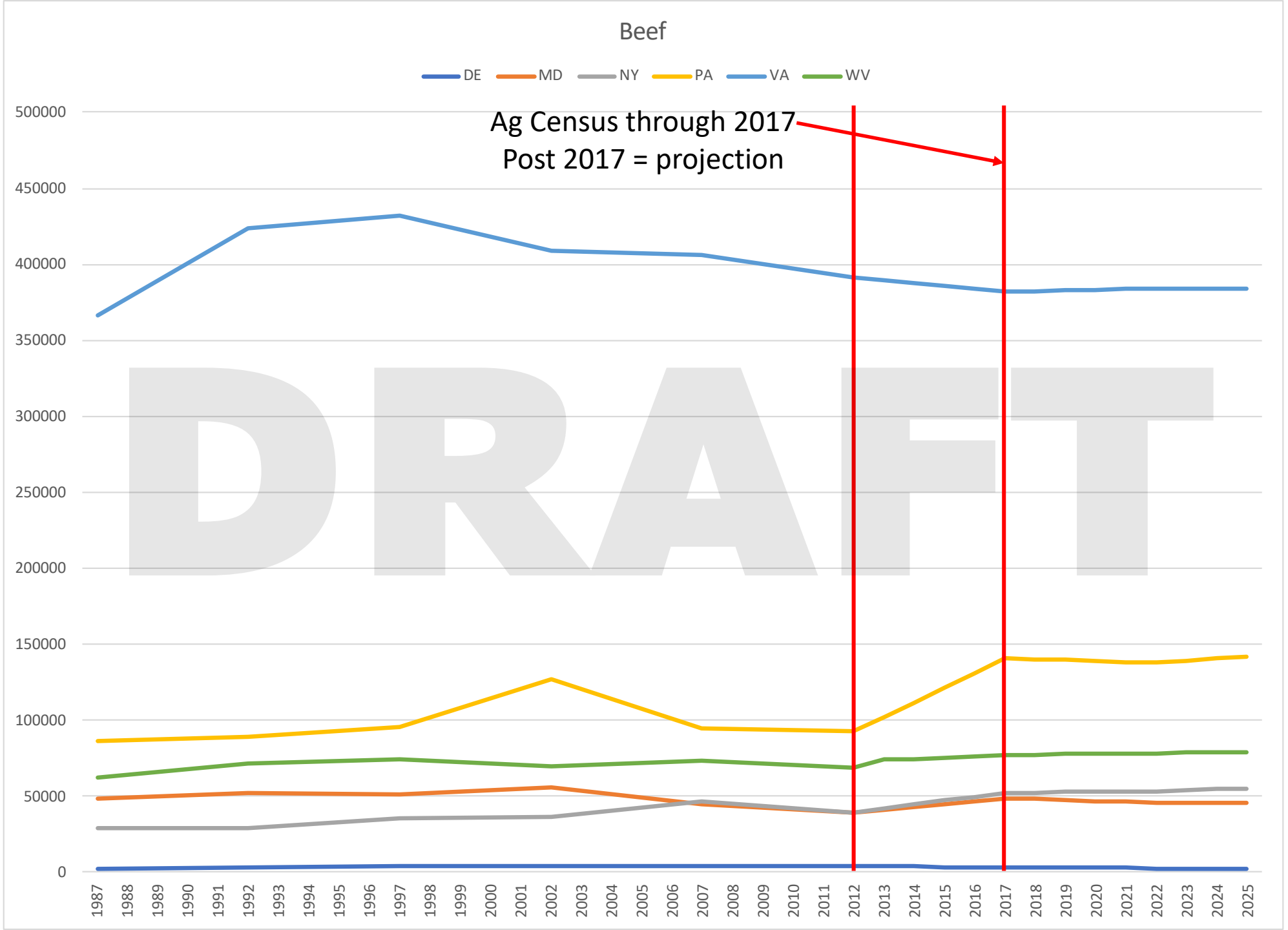
Animals and Crops

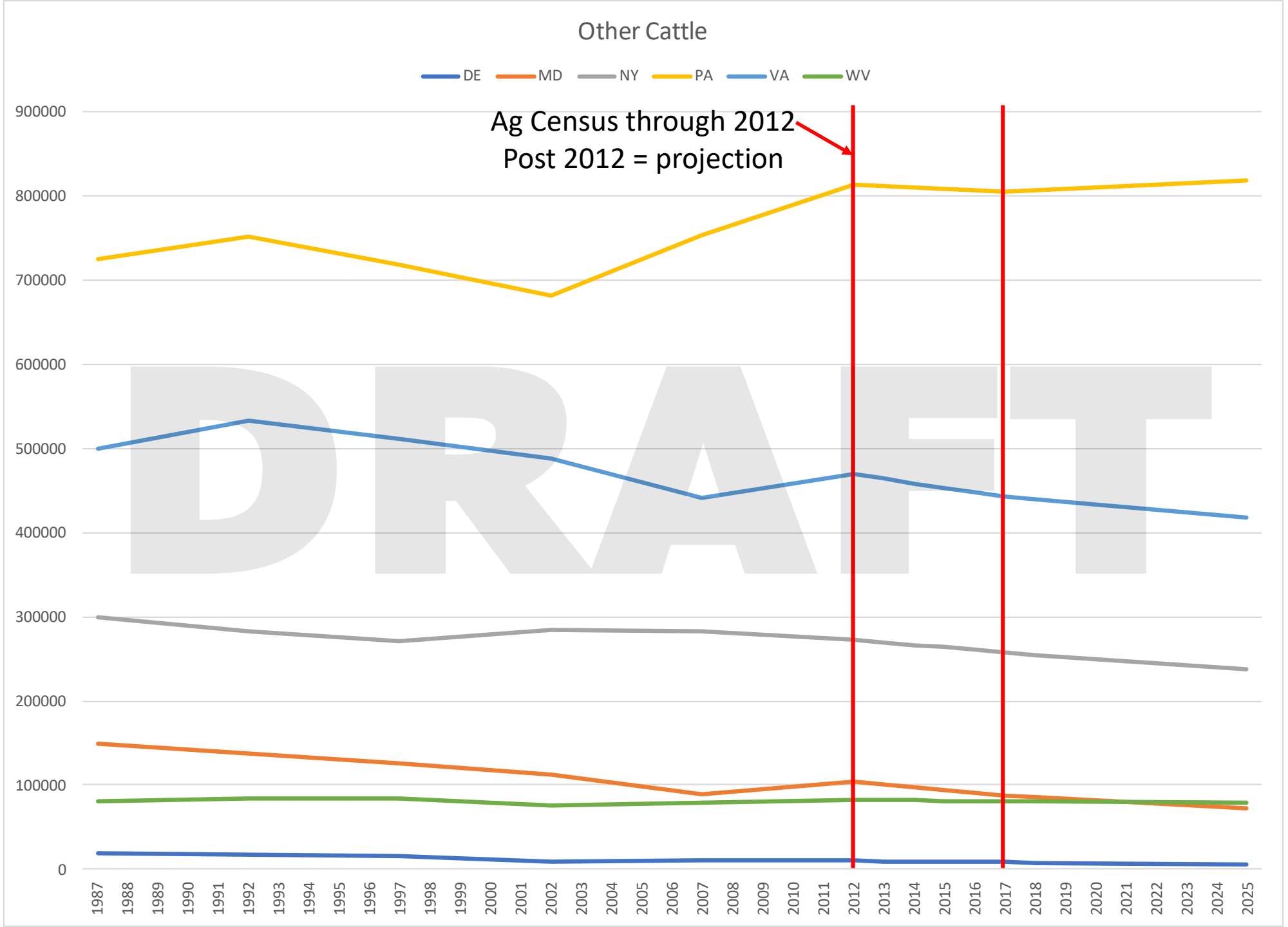
- Decreases in animal manure nutrients, generally, reduce loads.
- Increases in animal manure nutrients can be offset.
  - BMPs
  - Changes in crop types the manure is applied to
  - Less chemical fertilizer use
- It is unknown at this point the effects of the changes in animals on changes in loads to the CB.

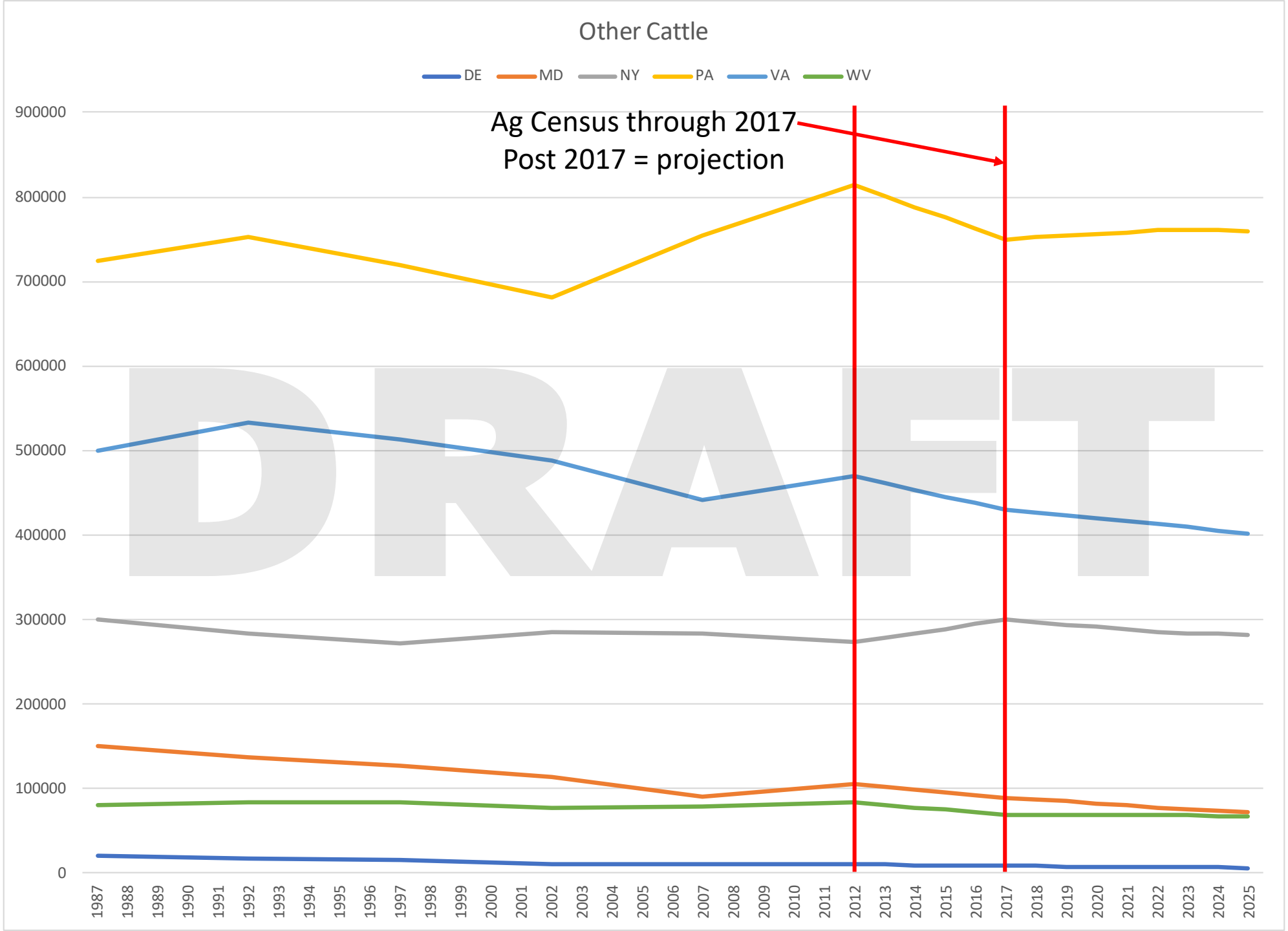

Dairy
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
600000
500000
400000
300000
200000
100000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

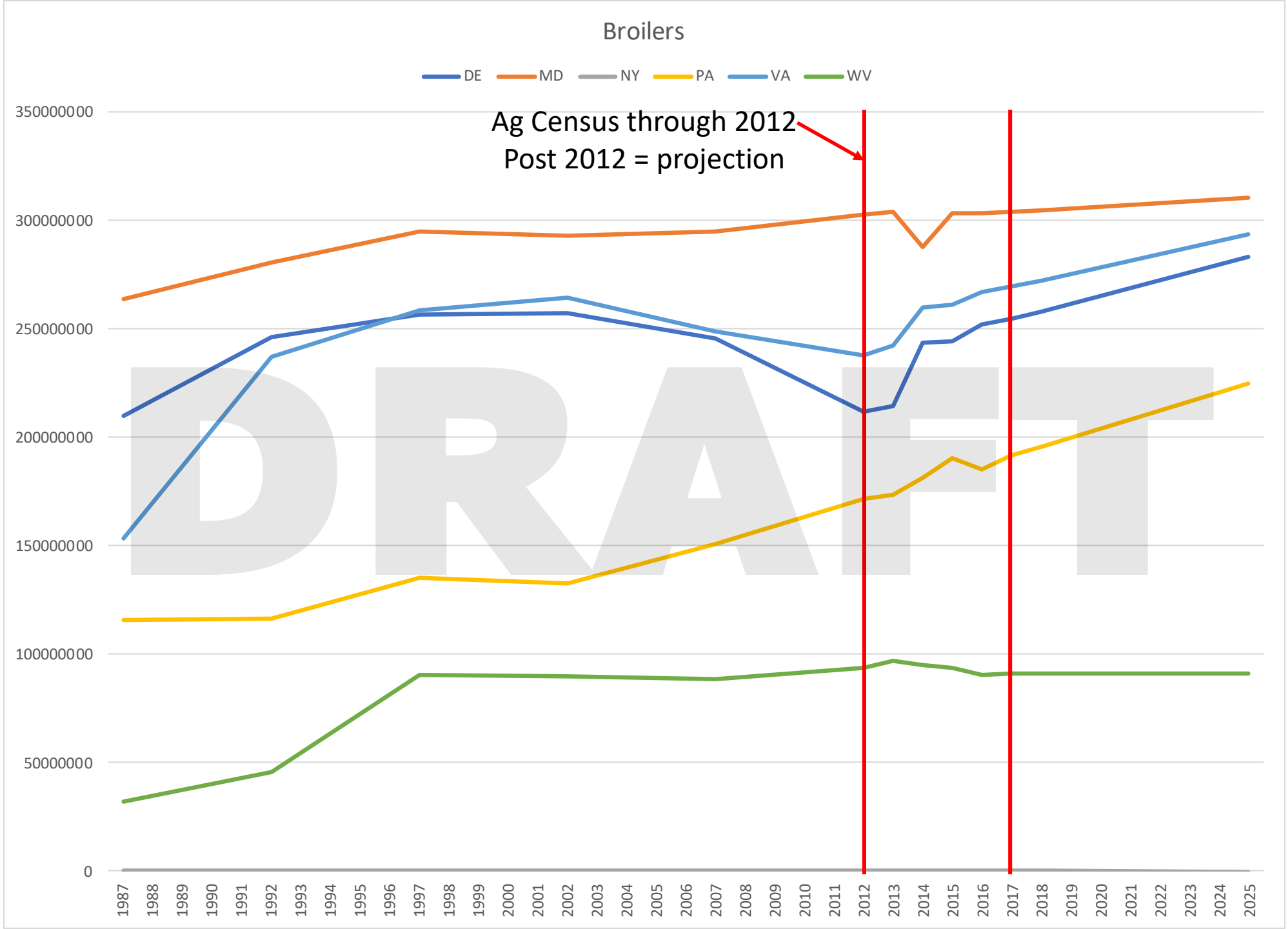

Dairy
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
600000
500000
400000
300000
200000
100000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

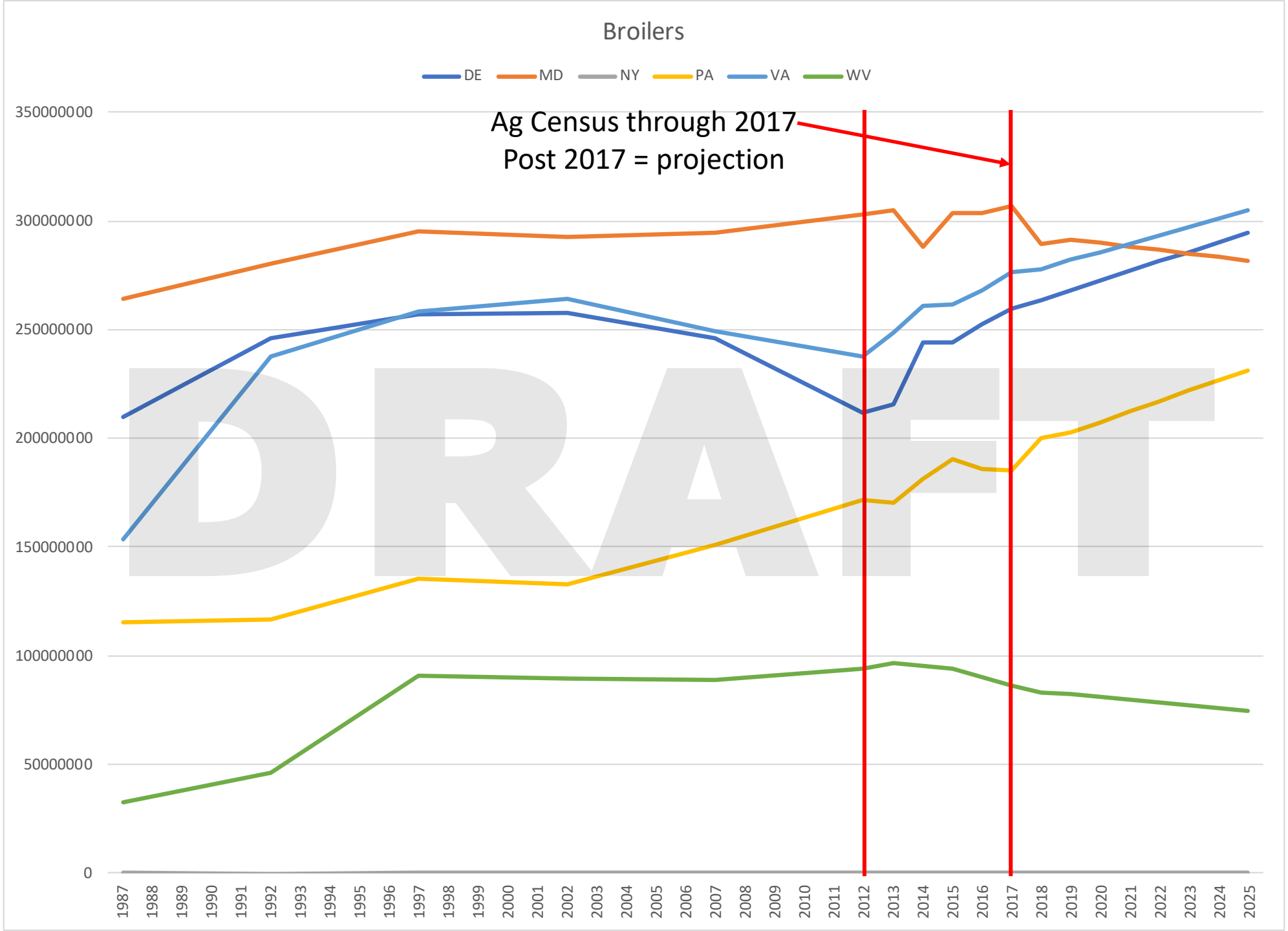

Beef
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

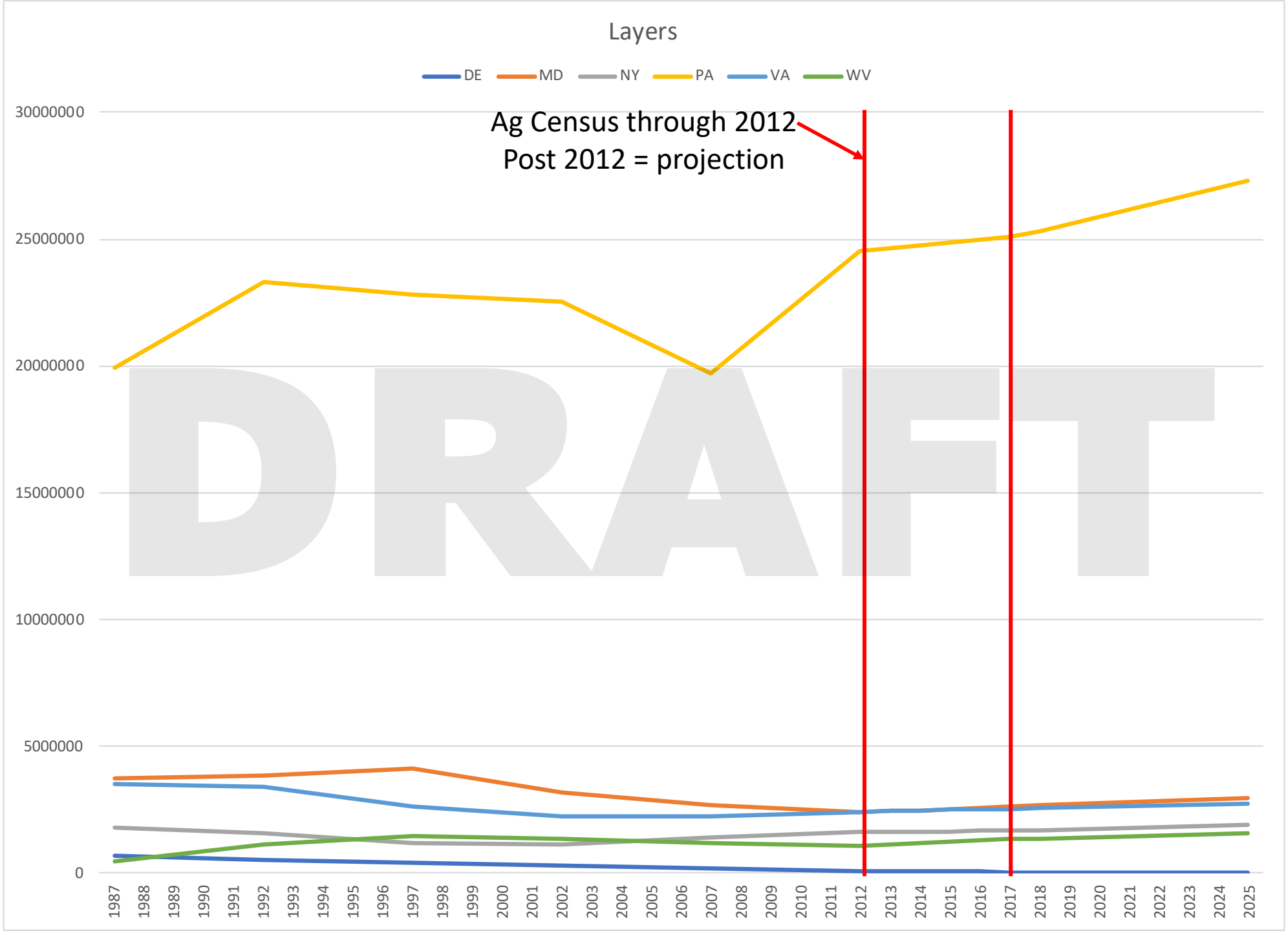

Beef
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
DRAFT
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

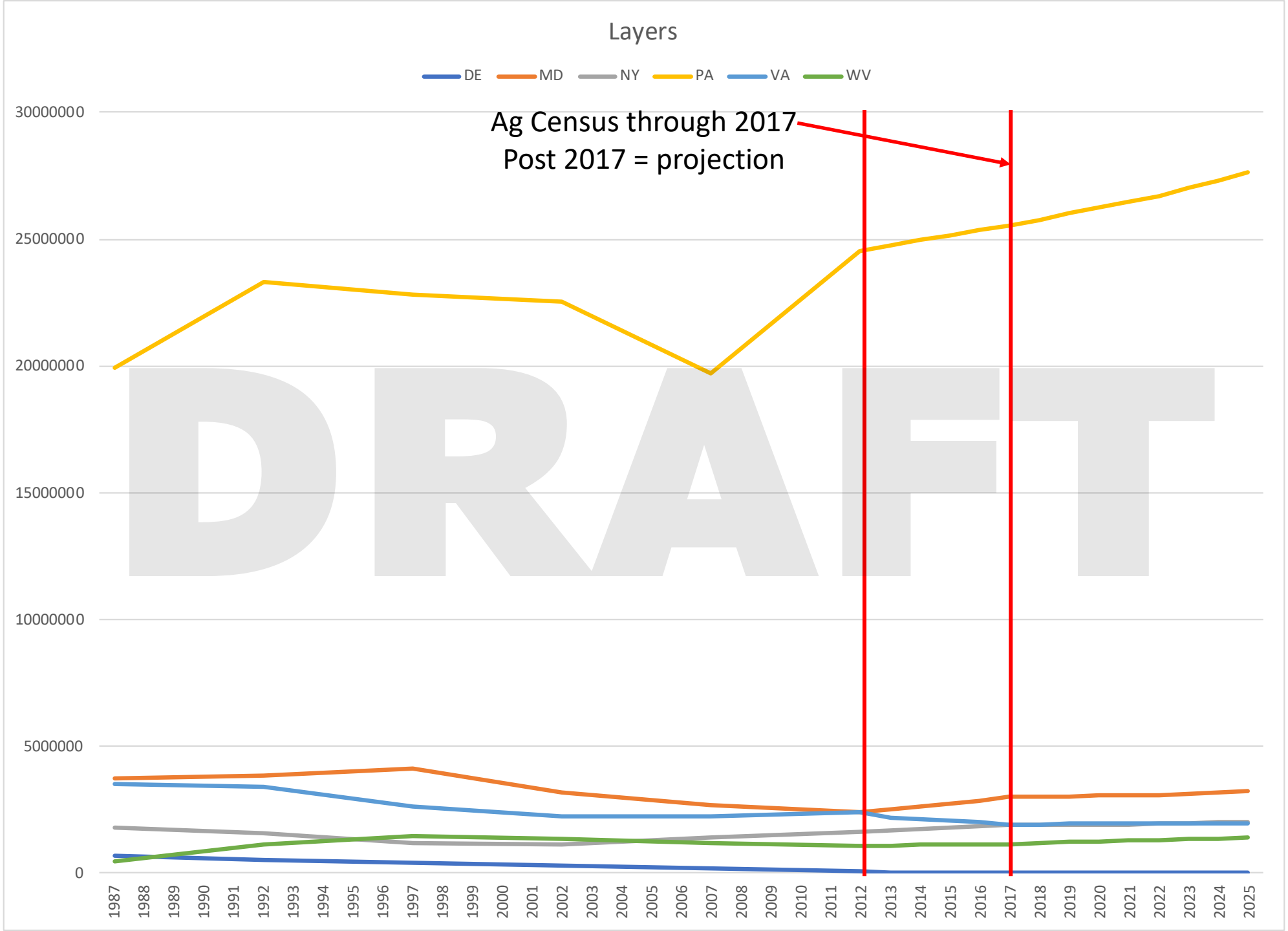

Other Cattle
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

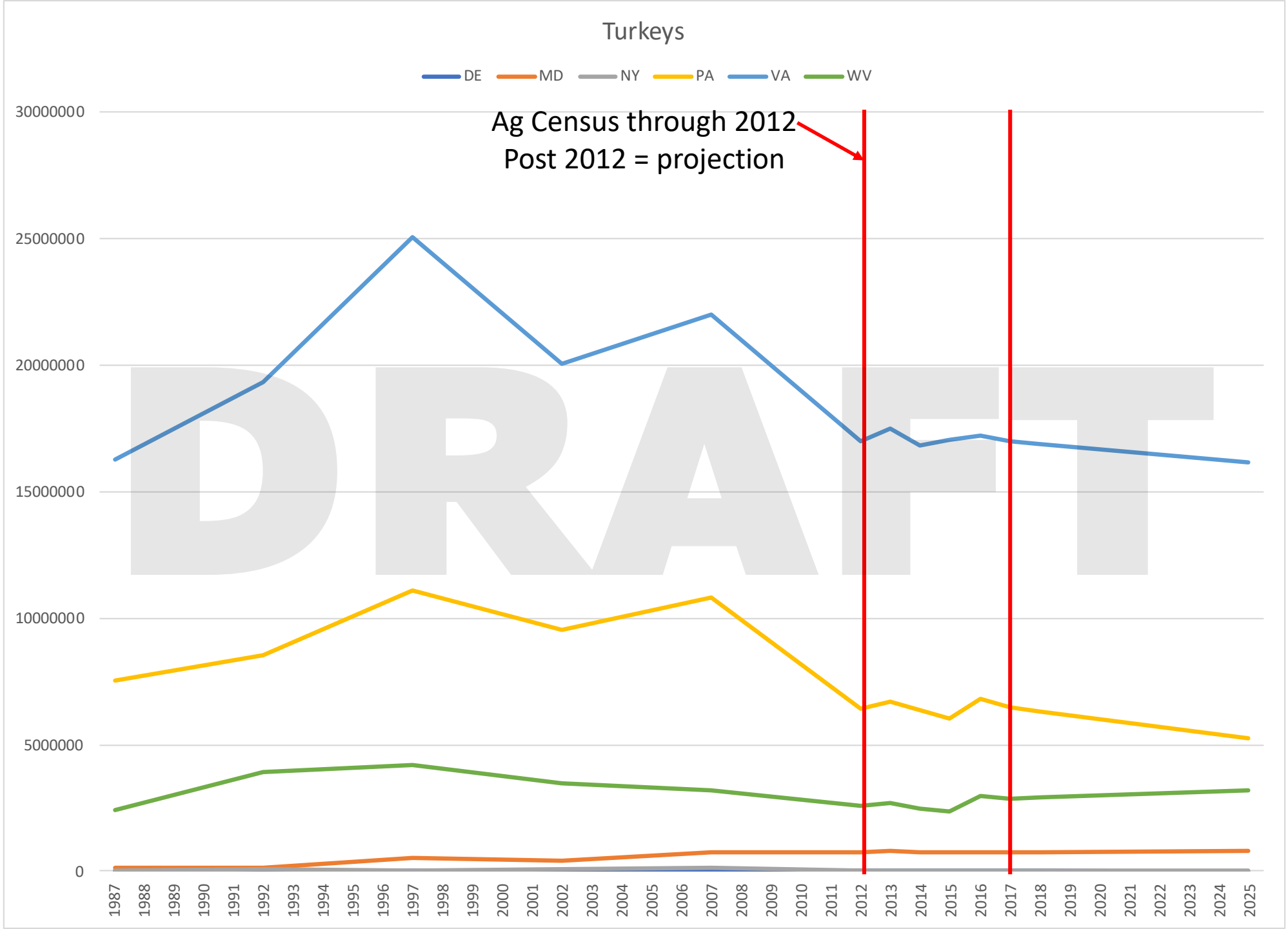

Other Cattle
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

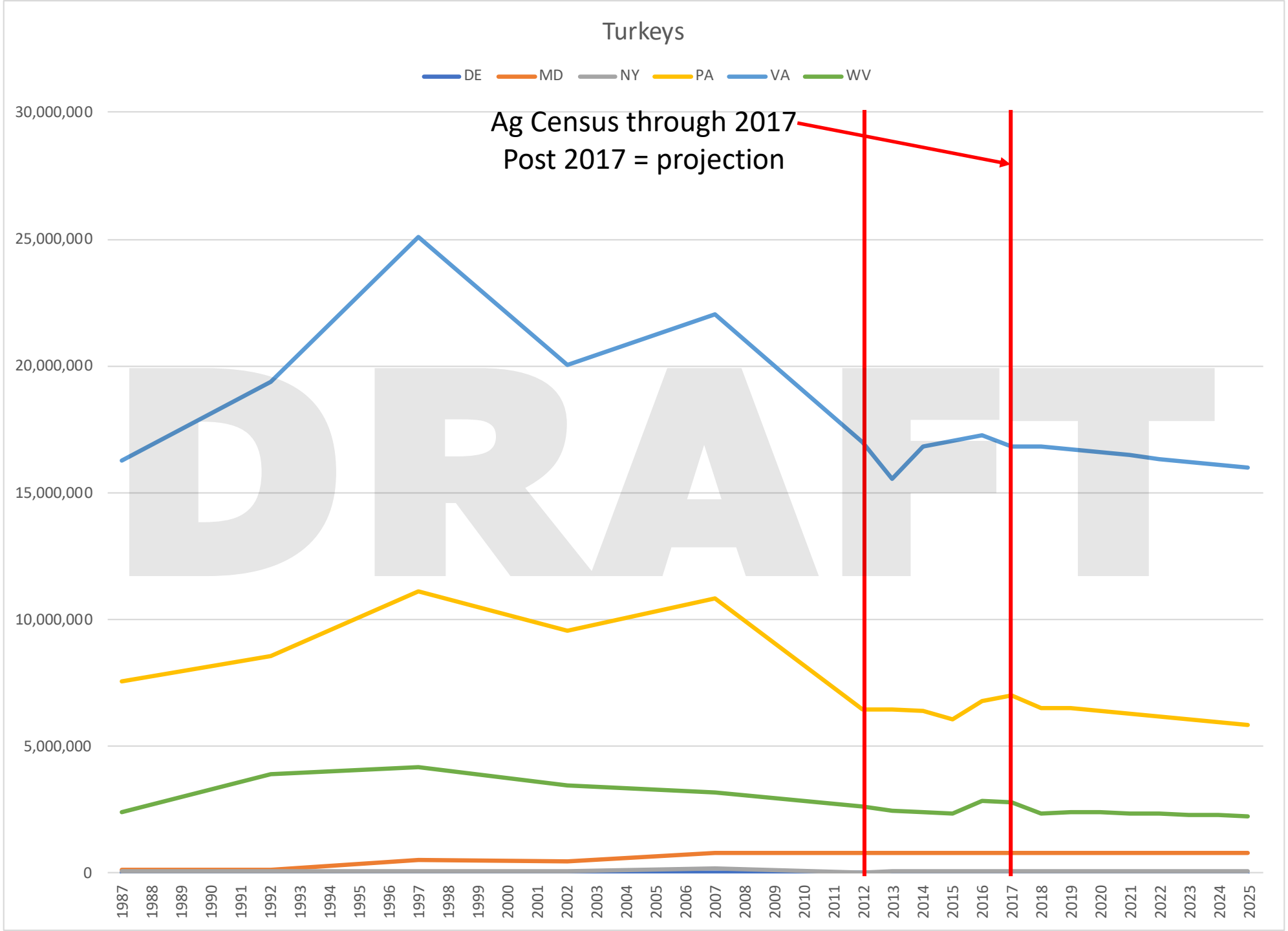

Broilers
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
350000000
300000000
250000000
200000000
150000000
100000000
50000000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025


Broilers
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
350000000
300000000
250000000
200000000
150000000
100000000
50000000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Layers
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
30000000
25000000
20000000
15000000
10000000
5000000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Layers
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
30000000
25000000
20000000
15000000
10000000
5000000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Turkeys
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
30000000
25000000
20000000
15000000
10000000
5000000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Turkeys
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025

2017 Census of Agriculture

Categories

- CBP Animal Types
- CBP Land use/Crop Types and Categories

2017 Census of Agriculture

Crop Forecast Methods

- Detailed documentation of the methods and data used for calculating land use and crop acres – including data from the Census of Agriculture – are part of the Phase 6 Watershed Model documentation https://cast.chesapeakebay.net/Documentation/ModelDocumentation
  - Section 5, Land Use

2017 Census of Agriculture

Crop Forecast Methods

- Forecasts use methods recommended by Ag Modeling for Phase 6 Watershed Model (CAST) and approved through Agriculture Workgroup, Water Quality GIT, etc.

2017 Census of Agriculture

Crop Forecast Methods

- For crops, forecasts are by crop categories at the county scale
- Categories are then proportioned to individual land use types according to latest Census of Agriculture
- For forecasts, greater weight is given to recent short-term trends than long-term trends

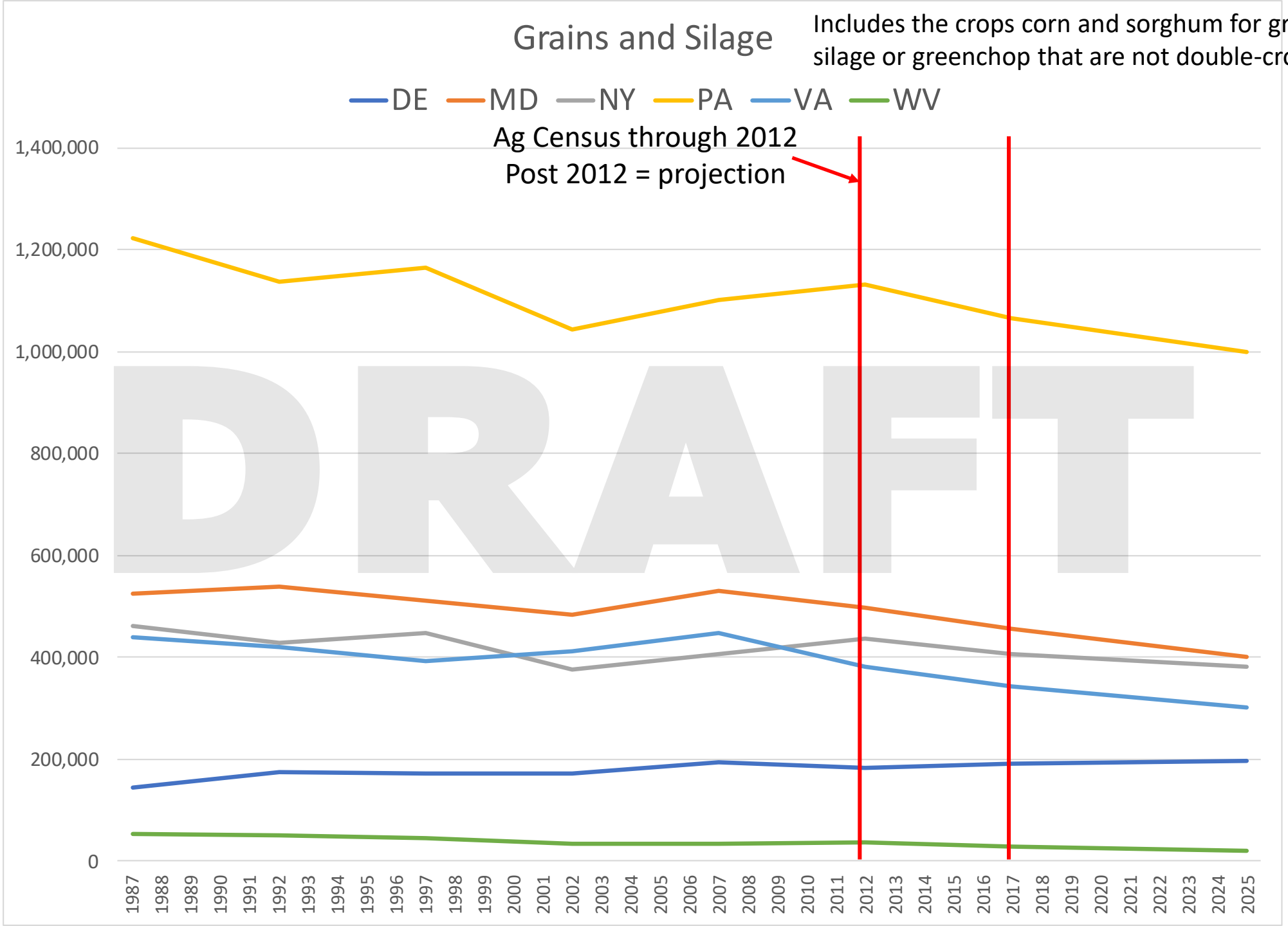
2017 Census of Agriculture

Animals and Crops

- Changes in crop types will increase or decrease nutrient (and sediment) loads – related to the degree of the change and, primarily, the crop nutrient needs.
- It is unknown at this point the effects of the changes in crops on changes in loads to the CB.

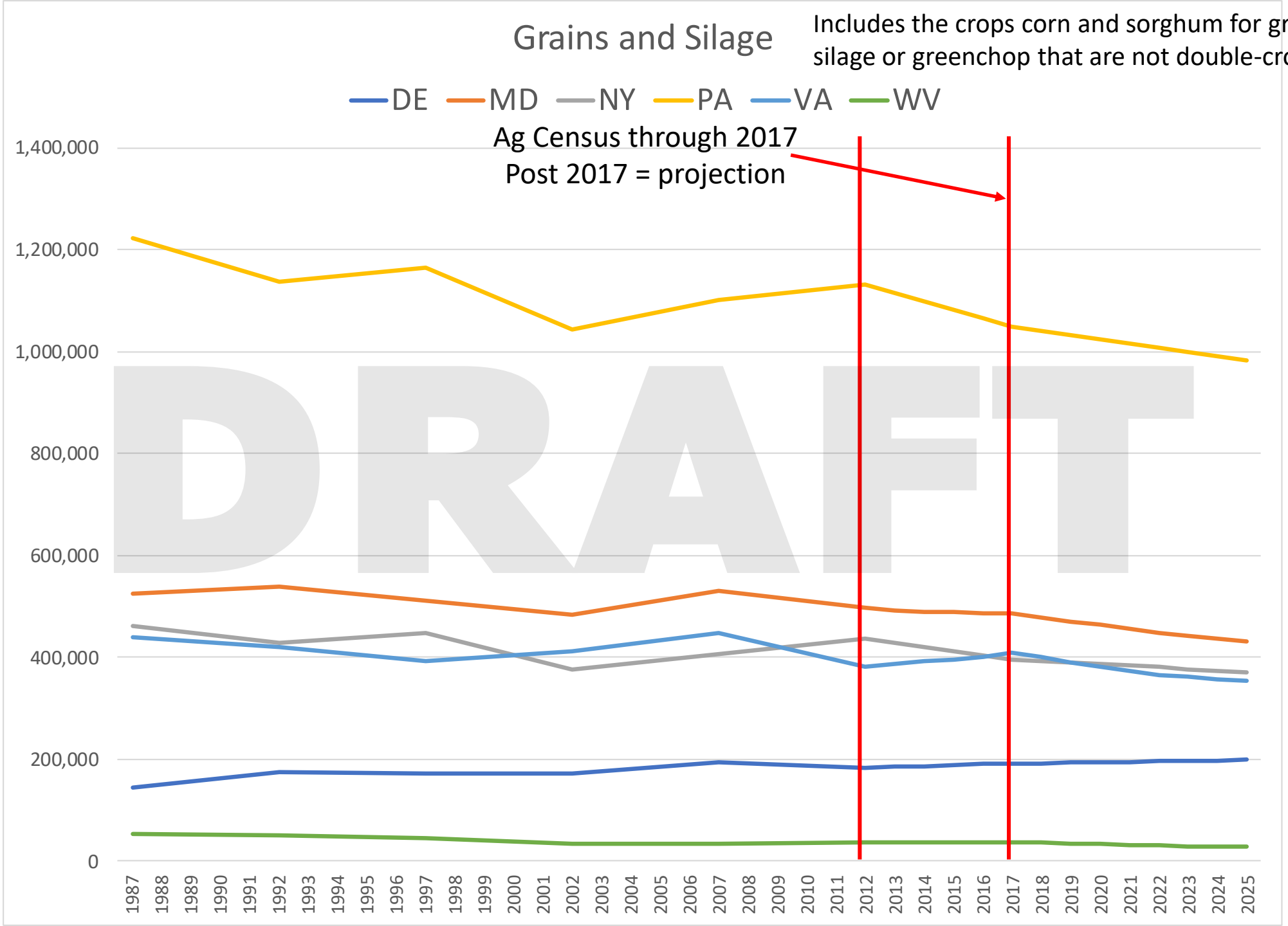
Grains and Silage

Includes the crops corn and sorghum for grain and for silage or greenchop that are not double-cropped



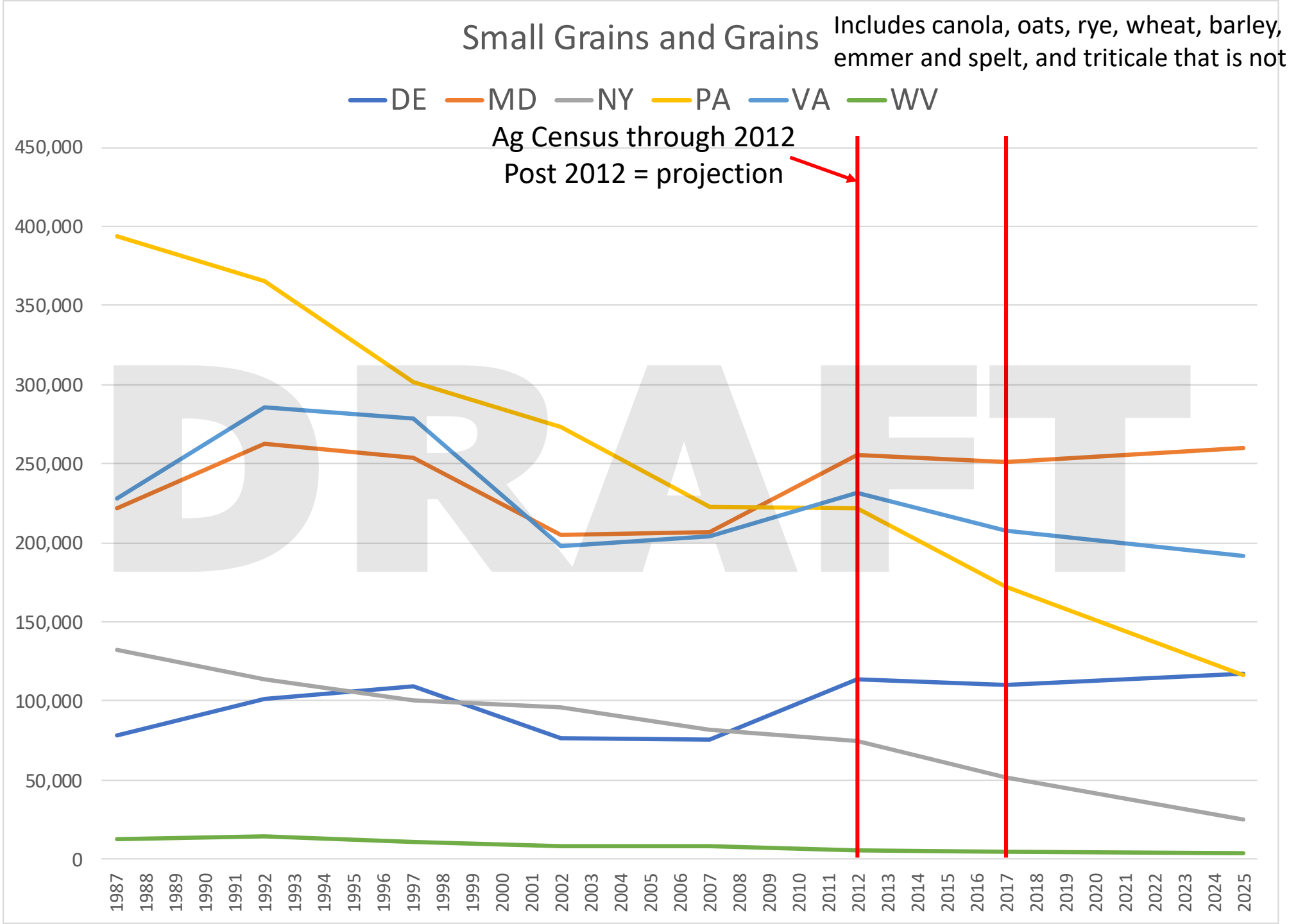
Grains and Silage

Includes the crops corn and sorghum for grain and for silage or greenchop that are not double-cropped



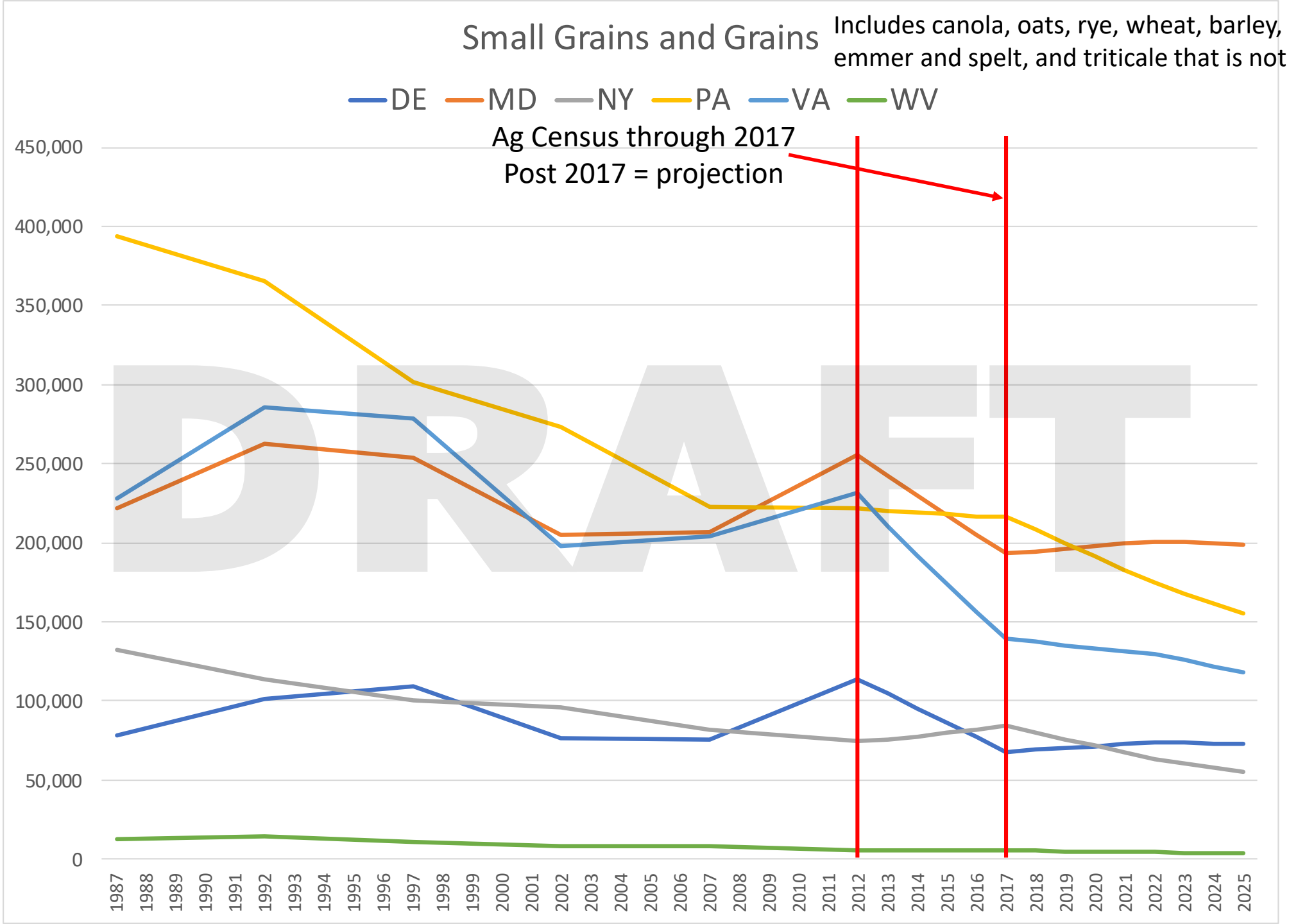
Small Grains and Grains

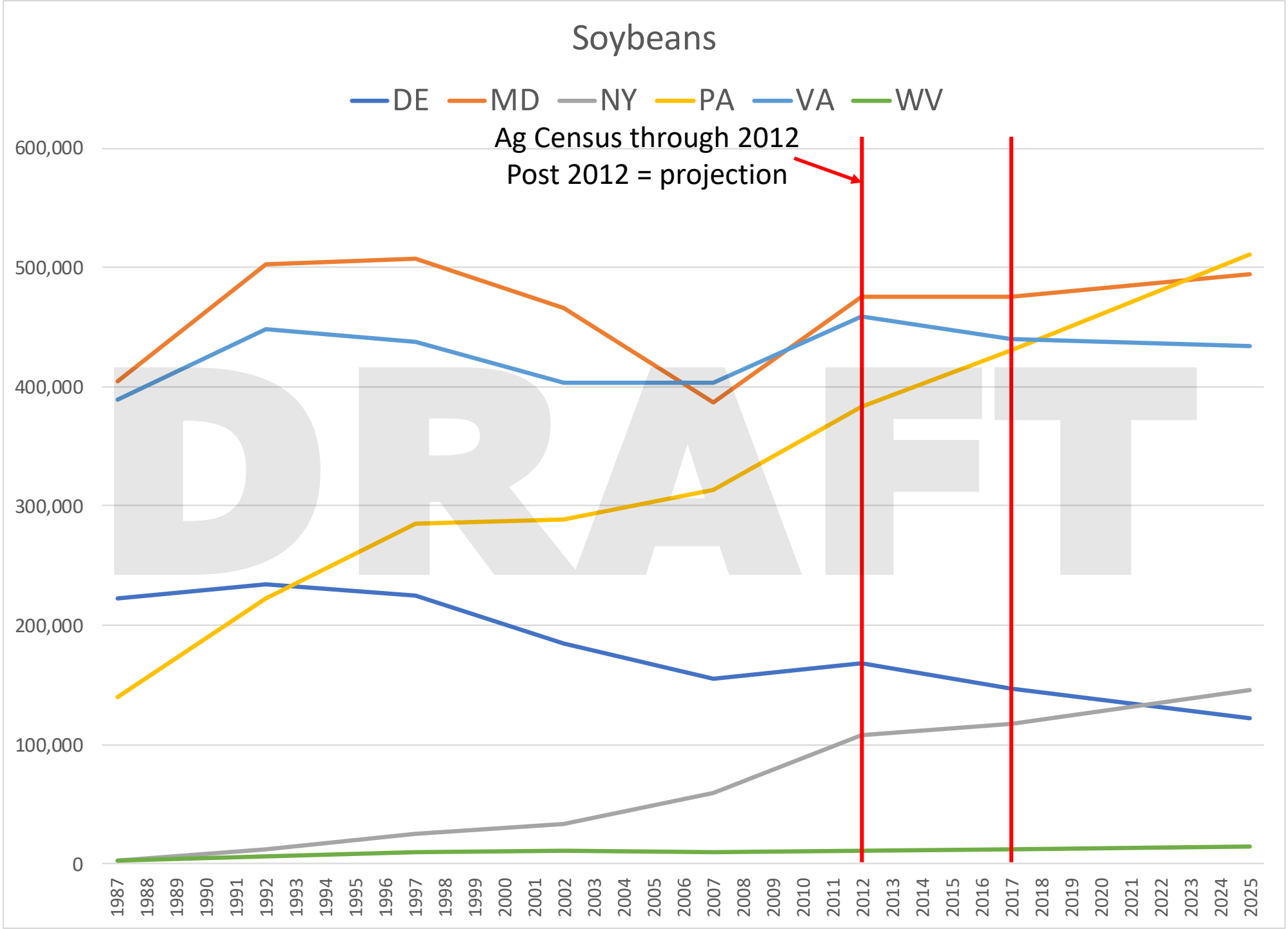
Includes canola, oats, rye, wheat, barley, buckwheat, emmer and spelt, and triticale that is not double-crop

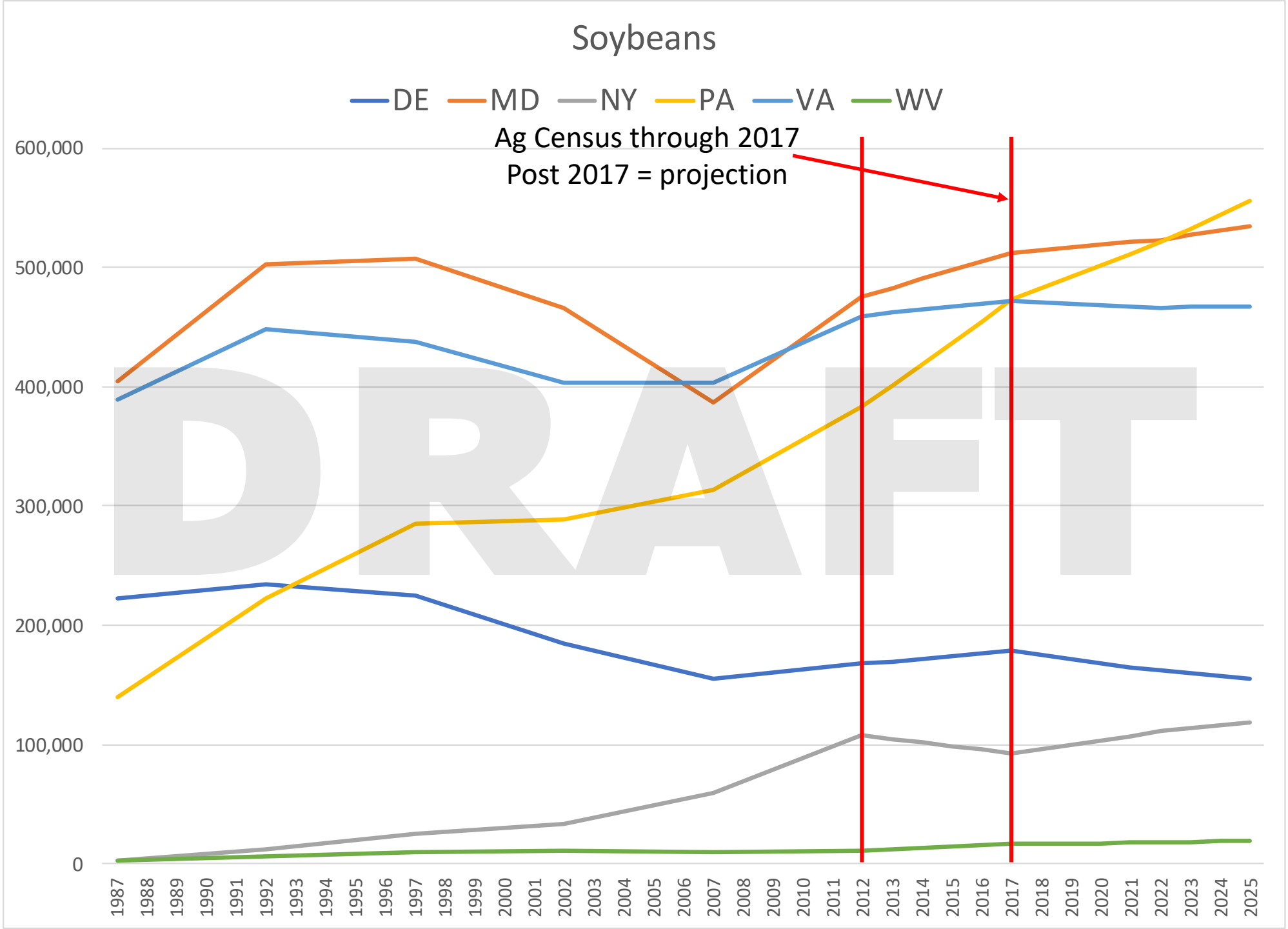


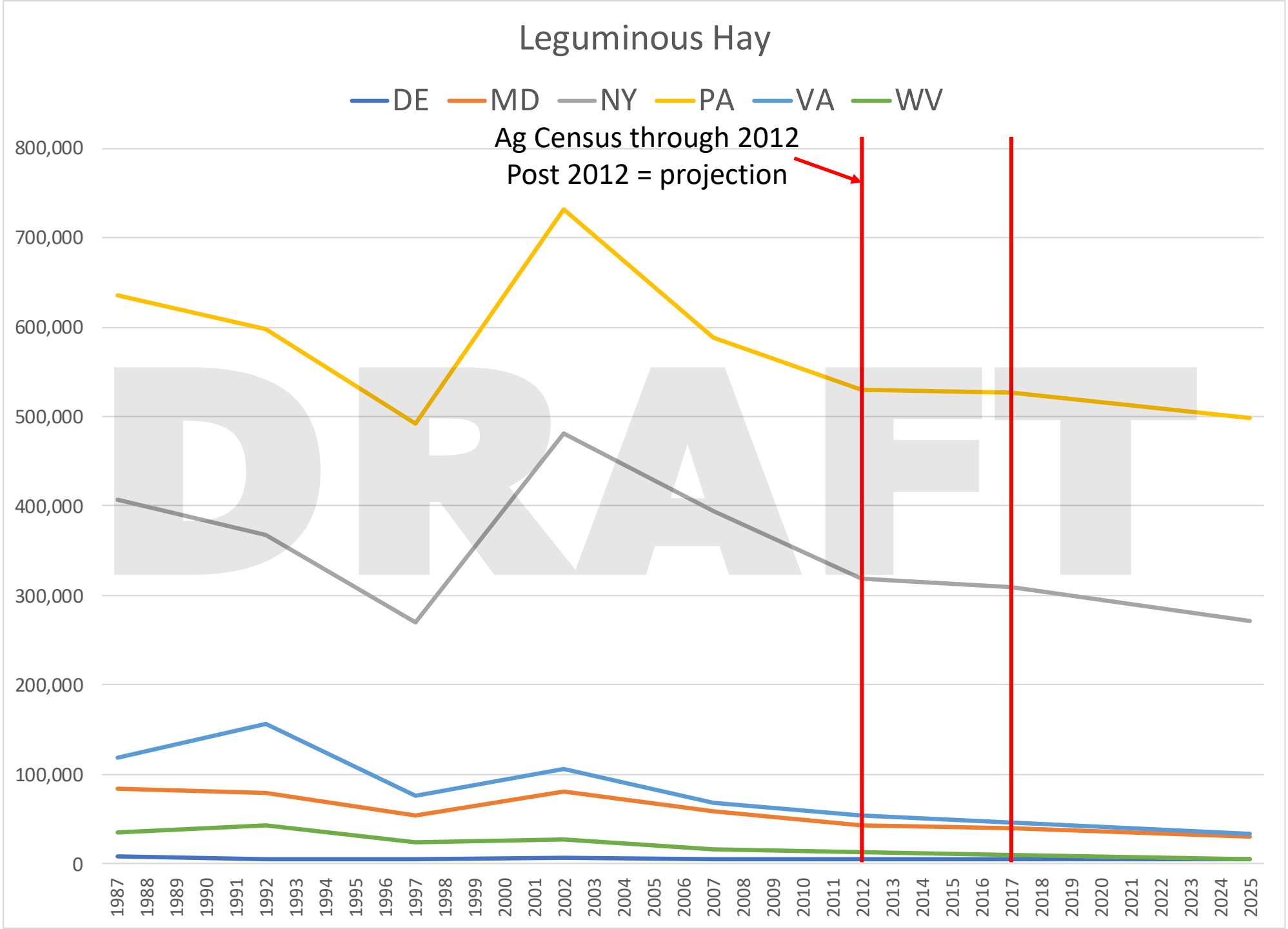
Small Grains and Grains

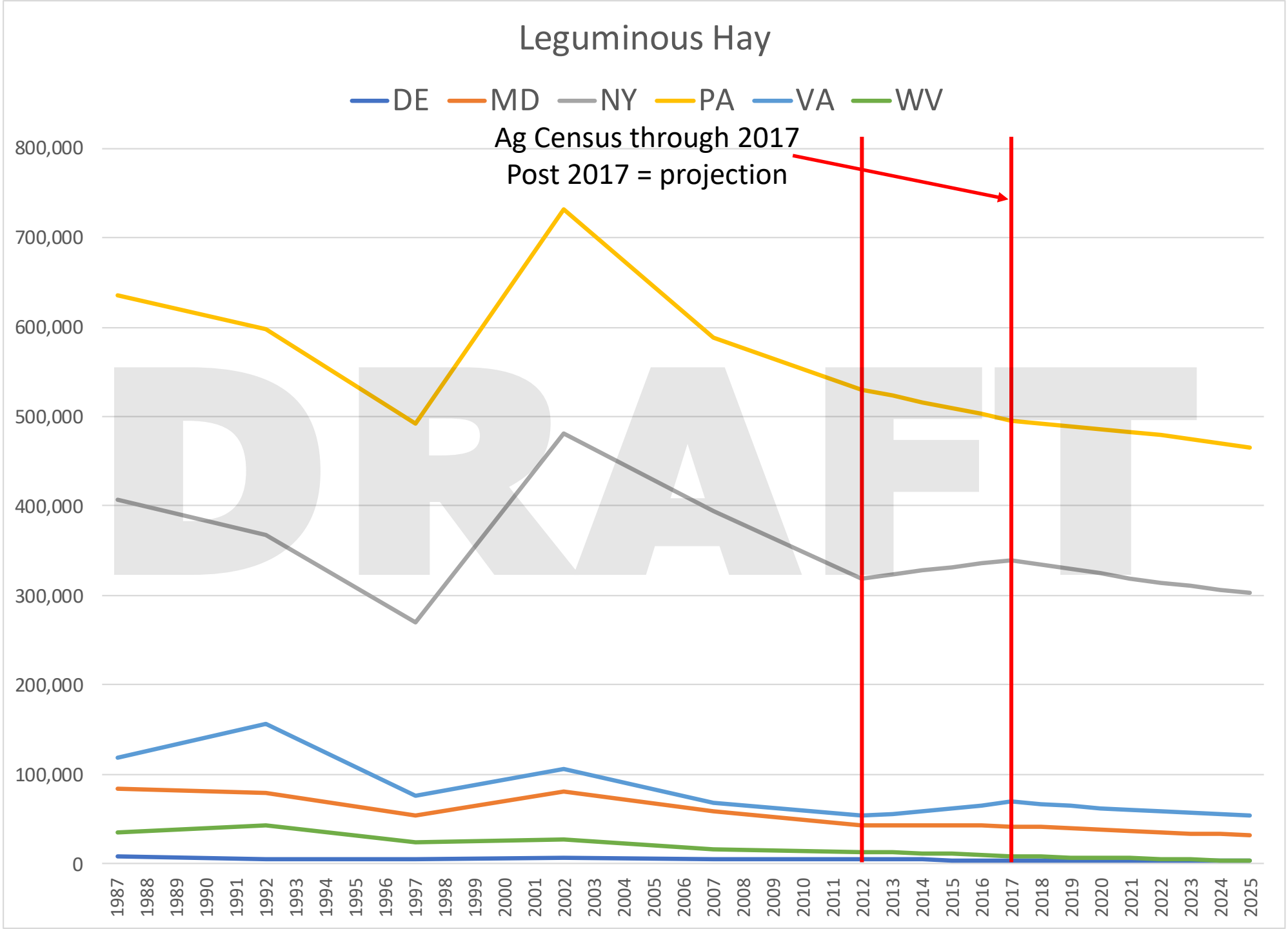
Includes canola, oats, rye, wheat, barley, buckwheat, emmer and spelt, and triticale that is not double-crop

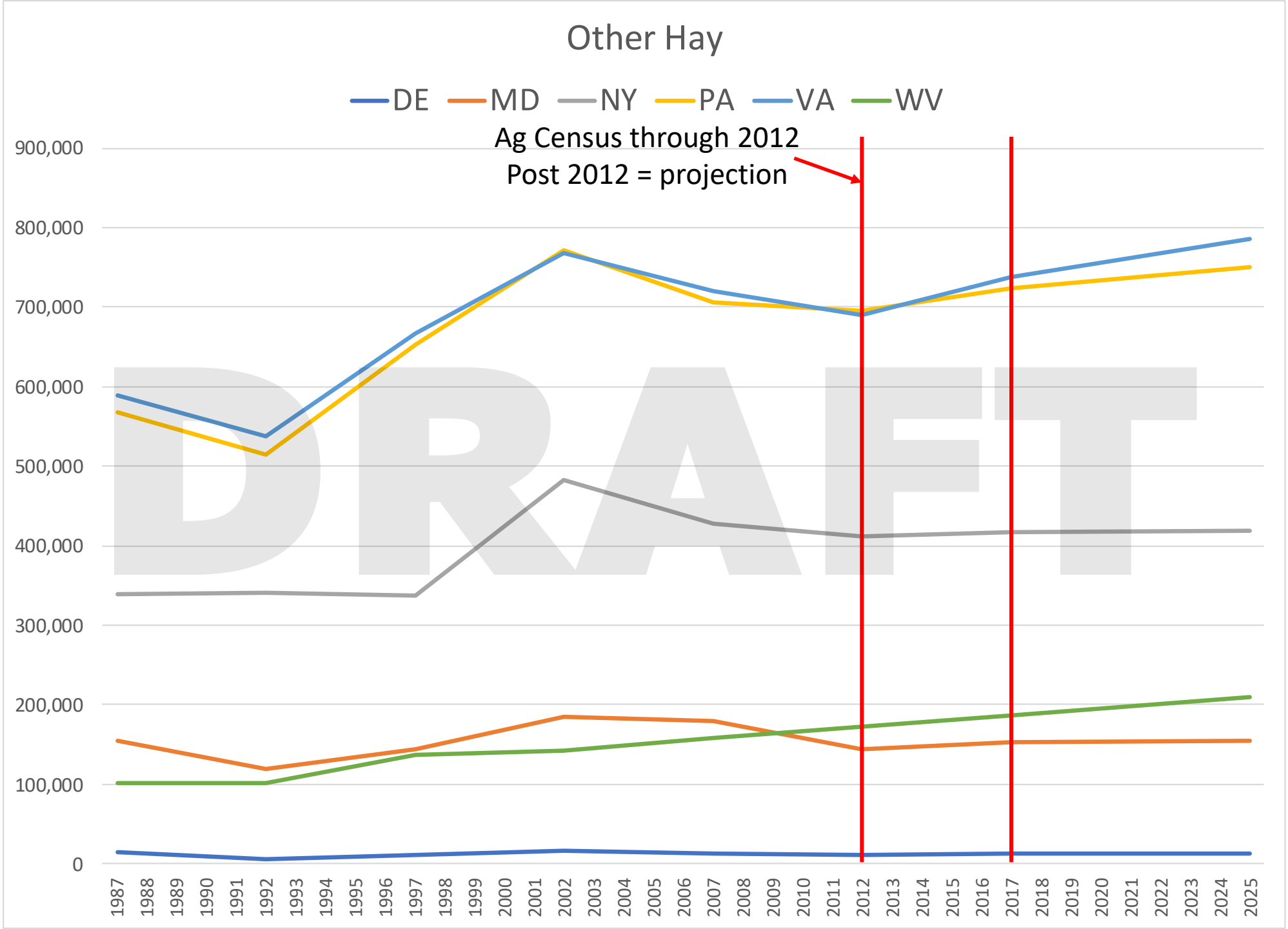


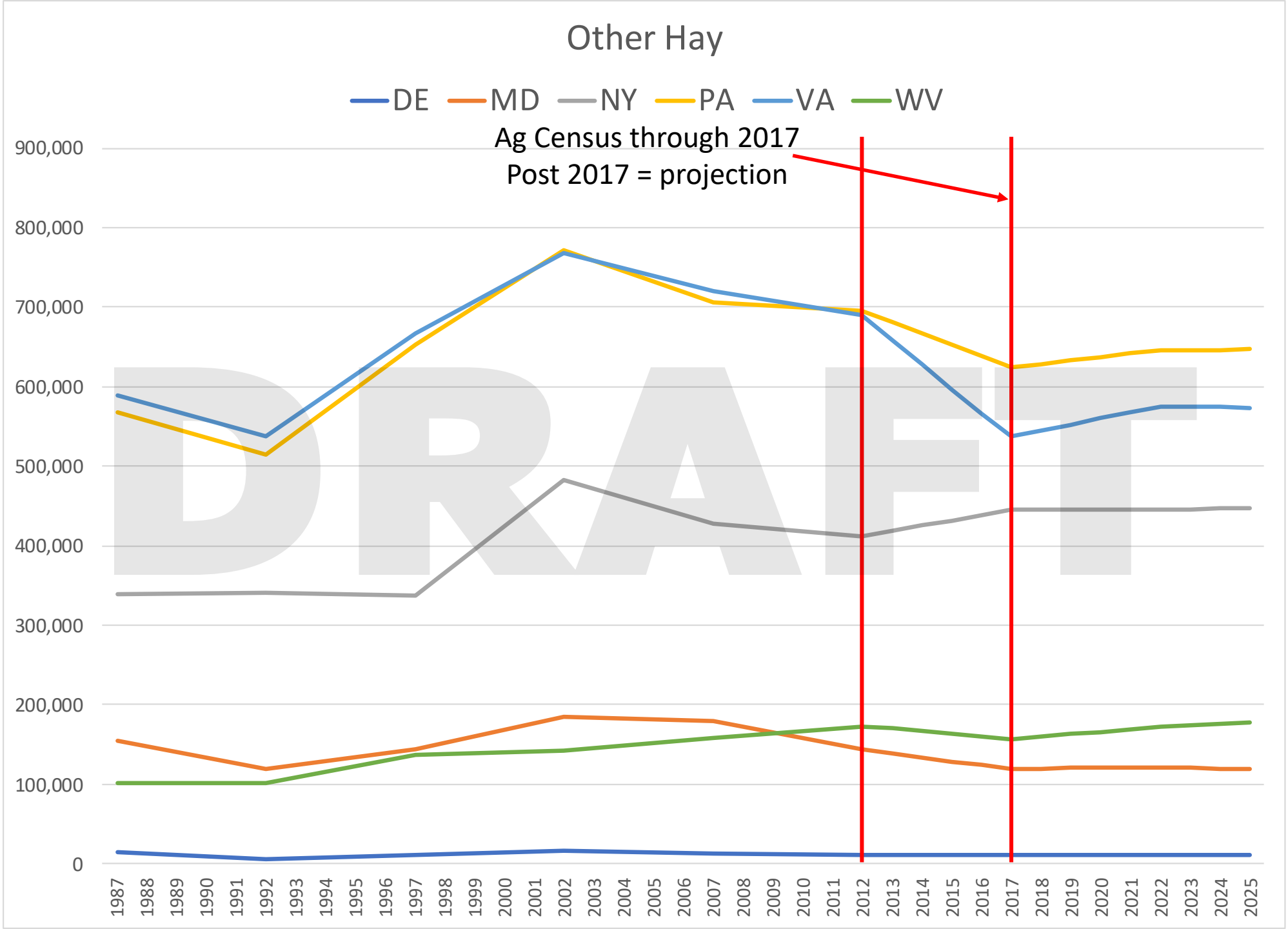

Soybeans
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

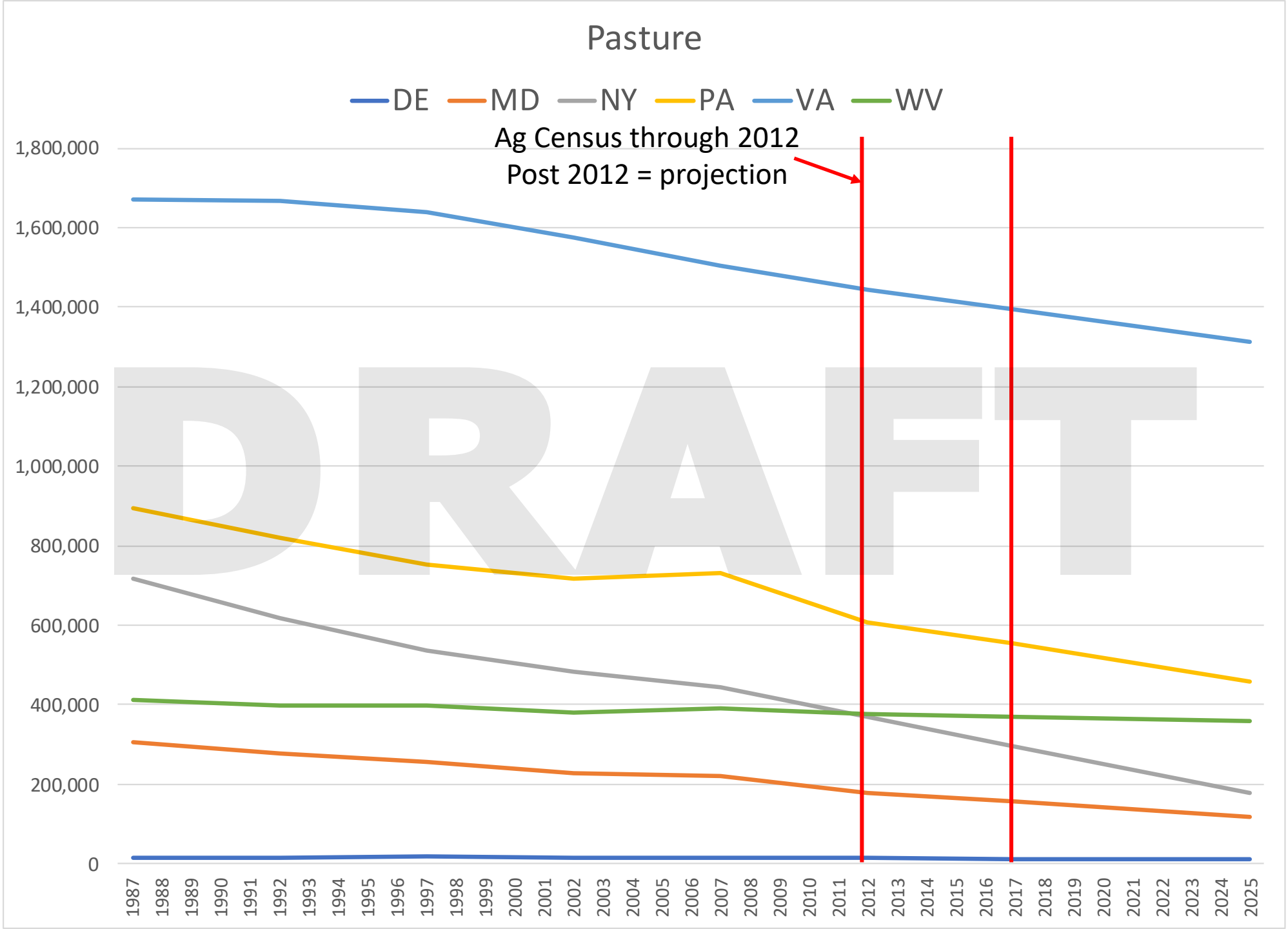

Soybeans
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025

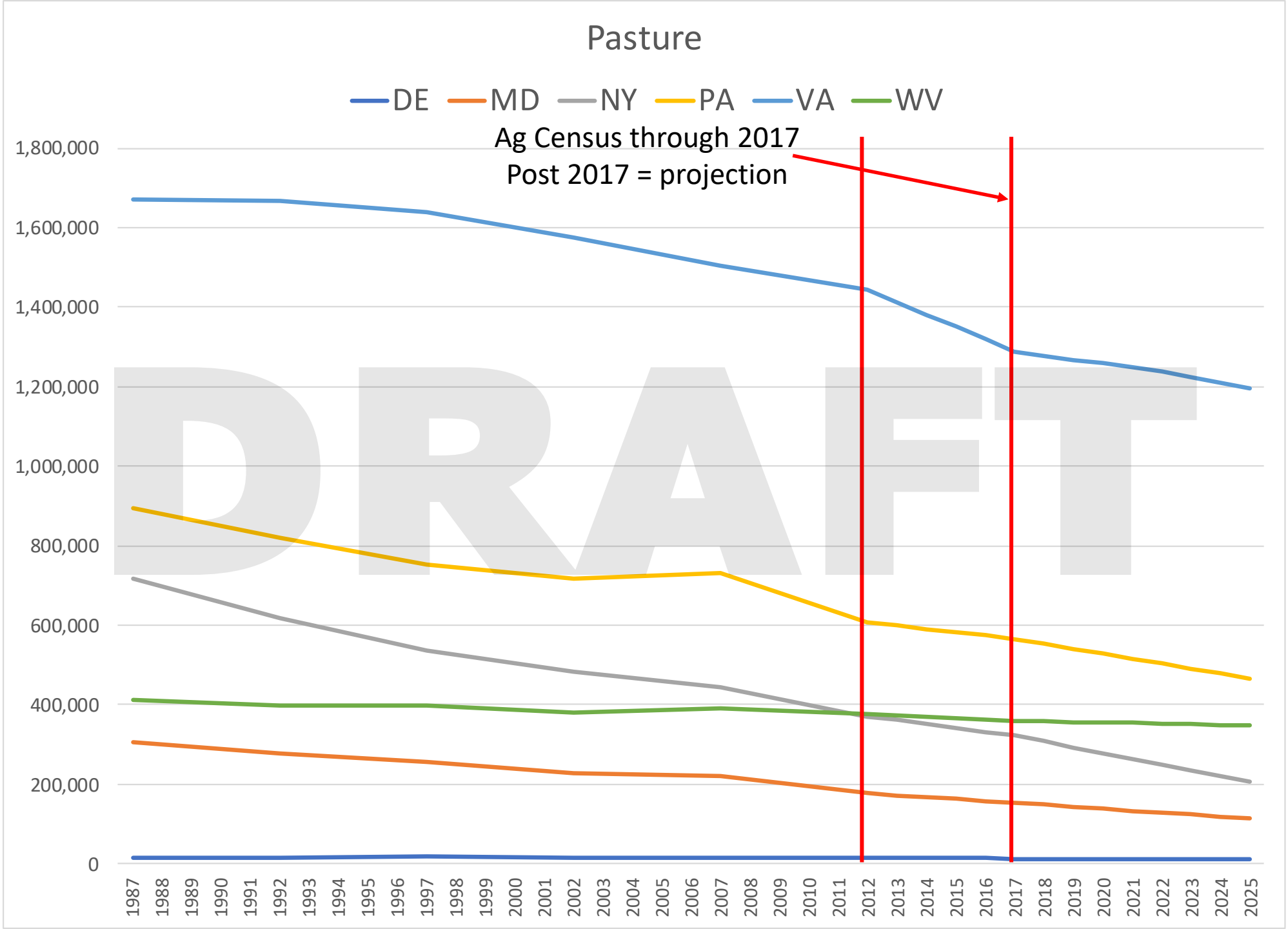

Leguminous Hay
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025


Leguminous Hay
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Other Hay
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Other Hay
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Pasture
DE
MD
NY
PA
VA
WV
Ag Census through 2012
Post 2012 = projection
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025


Pasture
DE
MD
NY
PA
VA
WV
Ag Census through 2017
Post 2017 = projection
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1987
1988
1989
1990
1991
1992
1993
1994
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
2023
2024
2025

State Phase III WIPs

Agriculture

- According to the states' final Phase III Watershed Implementation Plans, 82% of the Nitrogen load reductions to the Chesapeake Bay will come from the agriculture sector.
  - Since the TMDL, it's estimated that 84% of the Nitrogen load reductions have come from wastewater controls.

Monitored Loading Trends

RIM Station, 1985-2018 and 2009-2018

Table 1. Summary of long-term (1985-2018) and short-term (2009-2018) trends in nitrogen, phosphorus, and suspended-sediment loads for the River Input Monitoring stations.

[Improving or degrading trends classified as likelihood estimates greater than or equal to 66 percent]

Monitoring station	Total nitrogen load		Total phosphorus load		Suspended-sediment load	
	Long term	Short term	Long term	Short term	Long term	Short term
SUSQUEHANNA RIVER AT CONOWINGO, MD	Improving	No Trend	Degrading	No Trend	Degrading	Improving
POTOMAC RIVER AT WASHINGTON, DC	Improving	Improving	Improving	No Trend	Improving	No Trend
JAMES RIVER AT CARTERSVILLE, VA	Improving	Improving	Improving	Improving	Degrading	Improving
RAPPAHANNOCK RIVER NR FREDERICKSBURG, VA	Improving	Degrading	Degrading	Degrading	Degrading	Degrading
APPOMATTOX RIVER AT MATOACA, VA	No Trend	Degrading	Degrading	Degrading	No Trend	Degrading
PAMUNKEY RIVER NEAR HANOVER, VA	Degrading	Degrading	Degrading	No Trend	Degrading	Degrading
MATTAPONI RIVER NEAR BEULAHVILLE, VA	No Trend	Degrading	Degrading	Degrading	Degrading	Degrading
PATUXENT RIVER NEAR BOWIE, MD	Improving	Improving	Improving	Improving	Improving	No Trend
CHOPTANK RIVER NEAR GREENSBORO, MD	Degrading	Degrading	Degrading	Degrading	Improving	Degrading

Together, the 9 RIM stations reflect loads delivered from 78 percent of its 64K-square-mile watershed

https://cbrim.er.usgs.gov/data/RIM_Load_Trend_Summary_1985-2018_Combined.pdf

Water Quality Standards Attainment