

Influenza Vaccine Manufacturing

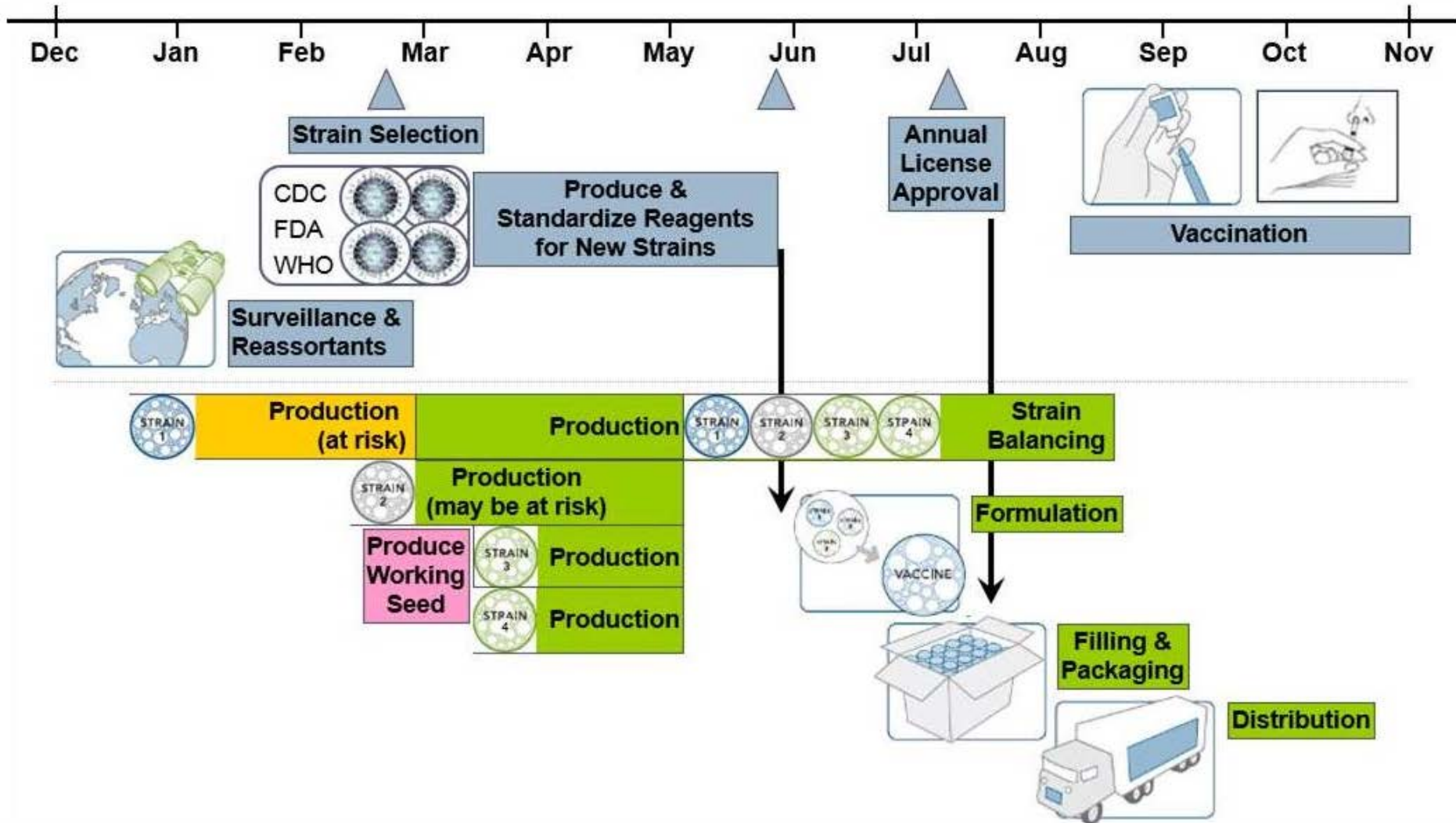
Industry Perspective for 2017-18 Northern
Hemisphere Influenza Vaccine Supply

Vaccines and Related Biological Products Advisory Committee

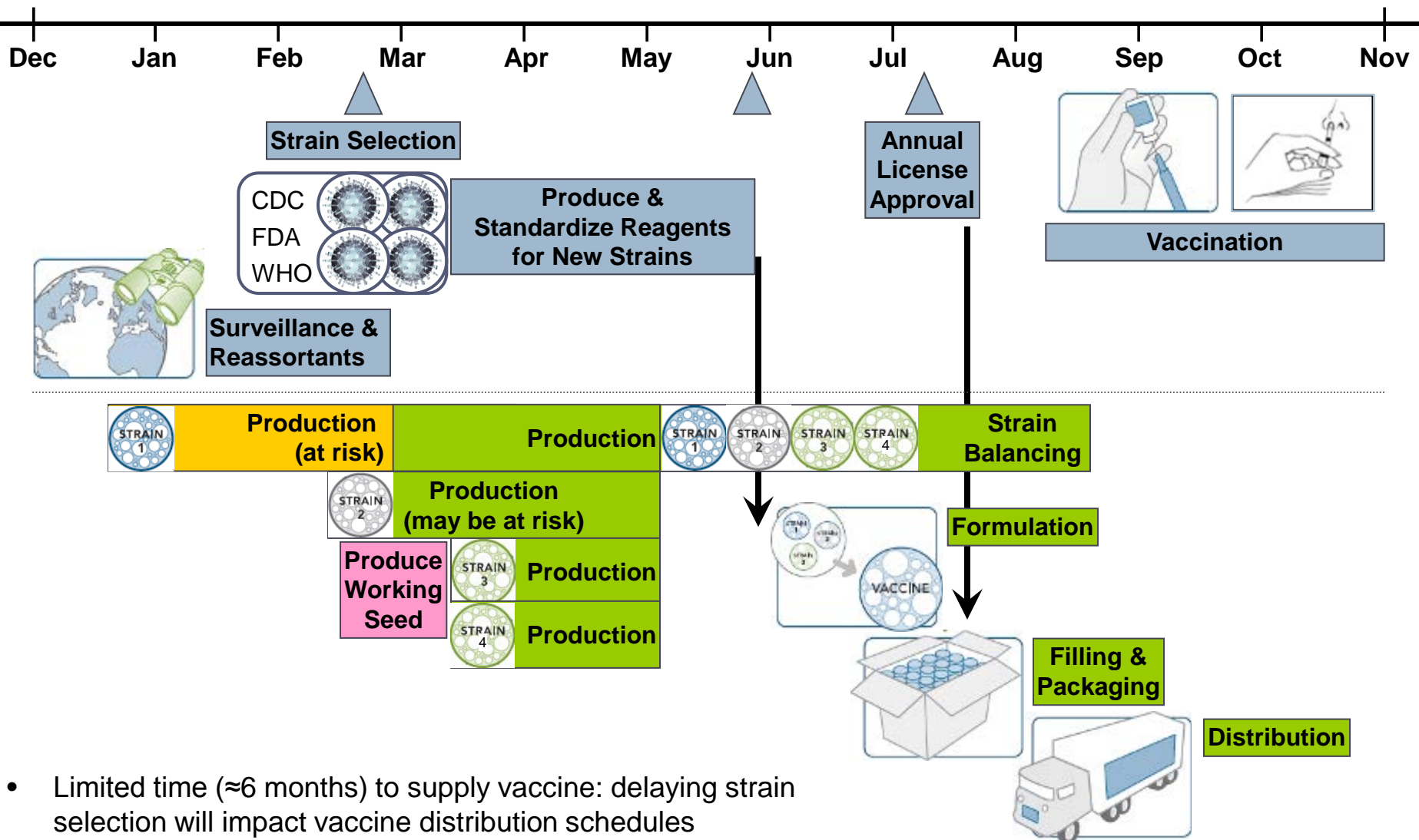
09 March 2017

The FDA CBER requested this annual summary of information from influenza vaccine manufacturers supplying the U.S., for purposes of a general presentation to the VRBPAC. This summary has been prepared from a variety of public sources, and was reviewed by Sanofi Pasteur, GSK, Protein Sciences, AZ/MedImmune and Seqirus

Annual Influenza Vaccine US Supply Timeline



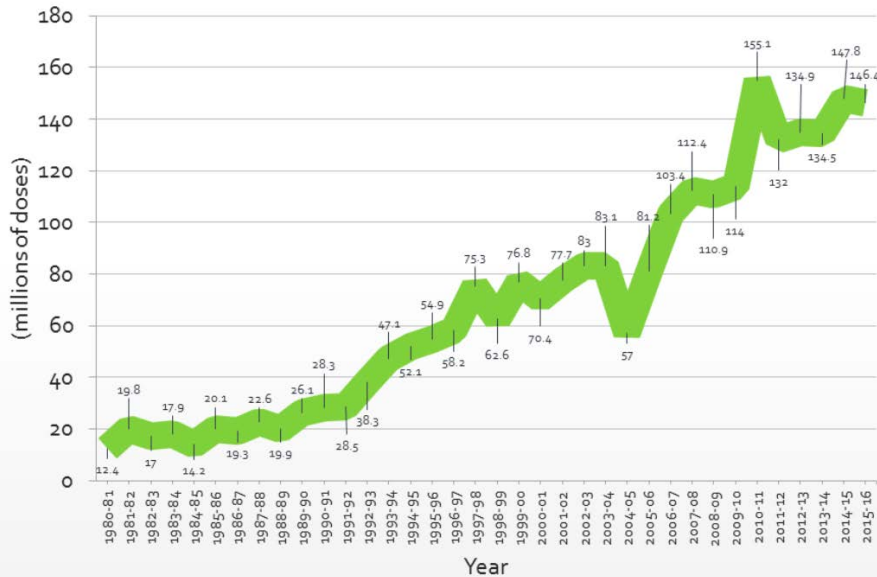
Annual Influenza Vaccine US Supply Timeline



- Limited time (≈6 months) to supply vaccine: delaying strain selection will impact vaccine distribution schedules

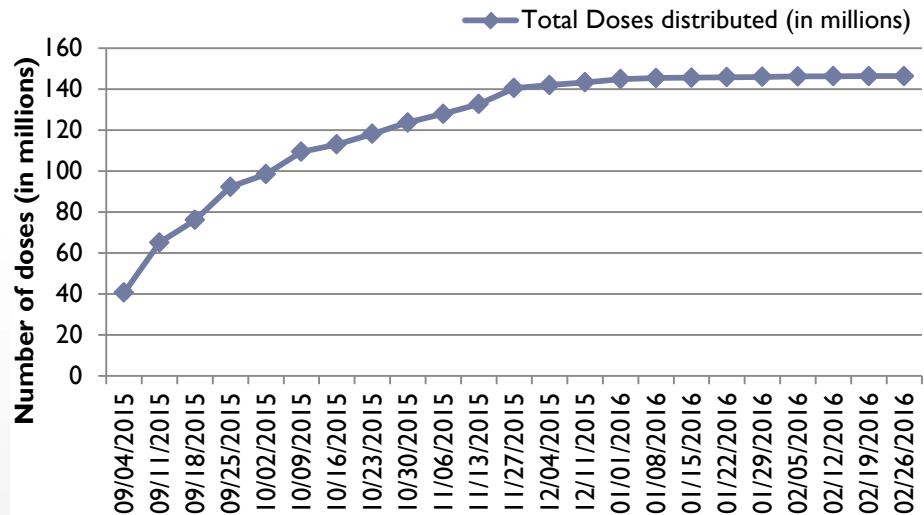
US Influenza Vaccine Distribution: 1980-2016*

1980/81-2015/16 Seasons – Total Doses



Graphic by CDC, data reported by influenza vaccine manufacturers and selected influenza vaccine distributors.

2015-2016 Season – Total Doses



- Vaccine supply requires well-matched strains, sufficient quantities, timely pre-season delivery
- To date (23 Feb 2017) ≈ 145.7 million doses distributed in 2016/2017 NH season

*Reported to CDC by manufacturers and selected distributors <http://www.cdc.gov/flu/professionals/vaccination/vaccinesupply.htm>

Concerns Regarding Later Strain Recommendations

- Later strain recommendations mean manufacturers carry out a larger proportion of their manufacturing campaigns at risk (currently up to two months)
- If the strains manufactured “at risk” are not recommended, a later strain recommendation results in a larger number of batches being discarded which in turn results in potential resource limitations with the risk of the timing/quantity of vaccine supply being impacted.
- The total number of seasonal influenza doses distributed has increased significantly which makes it even more challenging to supply the required number of doses within the expected timelines when there is a later strain recommendation.

Identified improvements – Seasonal Influenza Improvement Initiative (SIVI)

Suggested improvements include:

- Confirmed, representative virus/es or CVVs identified
- Identify high-growth reassortants and prospective yields (including for “non front runner” viruses)
- Prepare antigens and critical reagents for release testing at risk

These need to be in place before any benefit is seen

Manufacturers Preparations for Upcoming NH 2017/18 Season

- Tracking surveillance data through summaries of WHO TC's that include a table listing viruses of interest
- Use of websites such as Flunet and Fluview
- Tracking availability of CVV's for manufacturing through WHO chaired Technical TC's and updates from WHO CC's that have been extended from the WHO SH recommendation (Sep 2016) as a result of the later WHO NH recommendation (Mar 2017)
- A spreadsheet of viruses of interest and stage of preparation of CVV's has been developed and shared providing timely updates on strain selection/development status

Influenza Strains Evaluated for NH 2017/18*

- **A(H1N1):** **A/Michigan/45/2015-like**
 - A/Michigan/45/2015
 - A/Scotland/P2/2015
 - A/Lisboa/32/2015
 - A/Singapore/GP1908/2015
 - A/Slovenia/2903/2015
- **B Victoria:** **B/Brisbane/60/2008-like**
 - B/Brisbane/60/2008
 - B/Texas/2/2013
 - B/Florida/78/2015
 - B/Brisbane/63/2014
 - B/Florida/33/2014
 - B/Brisbane/46/2015
- **A(H3N2):** **A/Hong Kong/4801/2014-like**
 - A/Hong Kong/4801/2014
 - A/New Caledonia/71/2014
 - A/Hong Kong/7127/2014
 - A/Singapore/GP2050/2015
 - A/Victoria/673/2014
 - A/Norway/2178/2014
- **B Yamagata:** **B/Phuket/3073/2013-like**
 - B/Phuket/3073/2013
 - B/Brisbane/9/2014
 - B/Utah/9/2014
 - B/Arizona/10/2015
 - B/California/12/2015

*WHO recommended strains for 2017-2018 highlighted in red

http://www.who.int/influenza/vaccines/virus/recommendations/2017_18_north/en/

Nagoya Protocol: Background & Potential Impact

- Developed from access-and-benefit sharing discussions at the Convention on Biodiversity (CBD), adopted in 2010 and came in to force October 2014
- Main objectives:
 - Ensure access to genetic resources and related traditional knowledge for potential use
 - Ensure users and providers of genetic resources and related traditional knowledge agree on fair and equitable sharing of benefits arising from their use
- Potentially impacts seasonal/pandemic flu strain availability as pathogens included – concerns most recently raised at CBD and WHO executive forums, key developments:
 - WHO and CBD encouraged to identify and develop means to mitigate the potential impact of Nagoya obligations on the sharing of influenza strains to avoid hindering development of vaccines by approximately 3 months
 - Support escalating PIP Framework and WHO GISRS to the status of specialized international instruments for access-and-benefit sharing so both seasonal and pandemic influenza viruses become exempt from time constraining Nagoya obligations in future

Unknown impact on influenza vaccine availability for the US market

Potential Impact of Nagoya Protocol on Supply Influenza Strains

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Note: Nagoya Protocol does not currently impact recombinant vaccines

Concluding Comments

- Timely strain selection and vaccine supply requires close collaboration between multiple stakeholders to ensure sufficient provision of vaccine each season
- 2017-2018 season manufacture preparedness ongoing however further improvements identified to be implemented to mitigate later strain recommendations
- Adherence to the Nagoya Protocol could result in a delay in influenza vaccine supply; the WHO and CBD are collaborating to identify means to mitigate

Thank you for your attention...