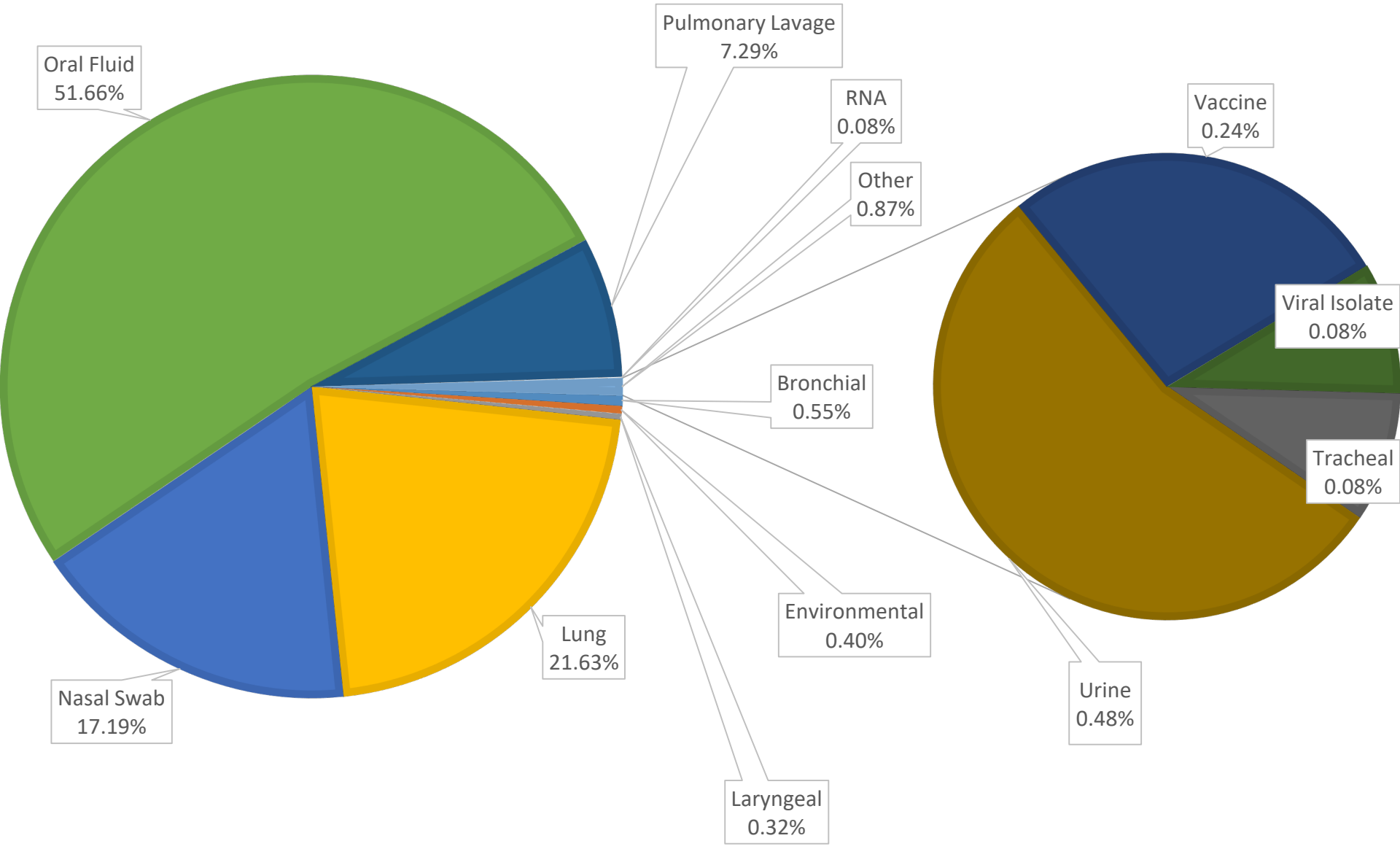
Influenza A Virus Diversity in US Swine

University of Minnesota Veterinary Diagnostic Laboratory Report

Jerry Torrison, Mary Thurn, Marie Culhane

Types of Specimens Received



Specimens for influenza surveillance

Garrido-Mantilla *et al. BMC Veterinary Research* (2019) 15:61
https://doi.org/10.1186/s12917-019-1805-0

BMC Veterinary Research

RESEARCH ARTICLE Open Access

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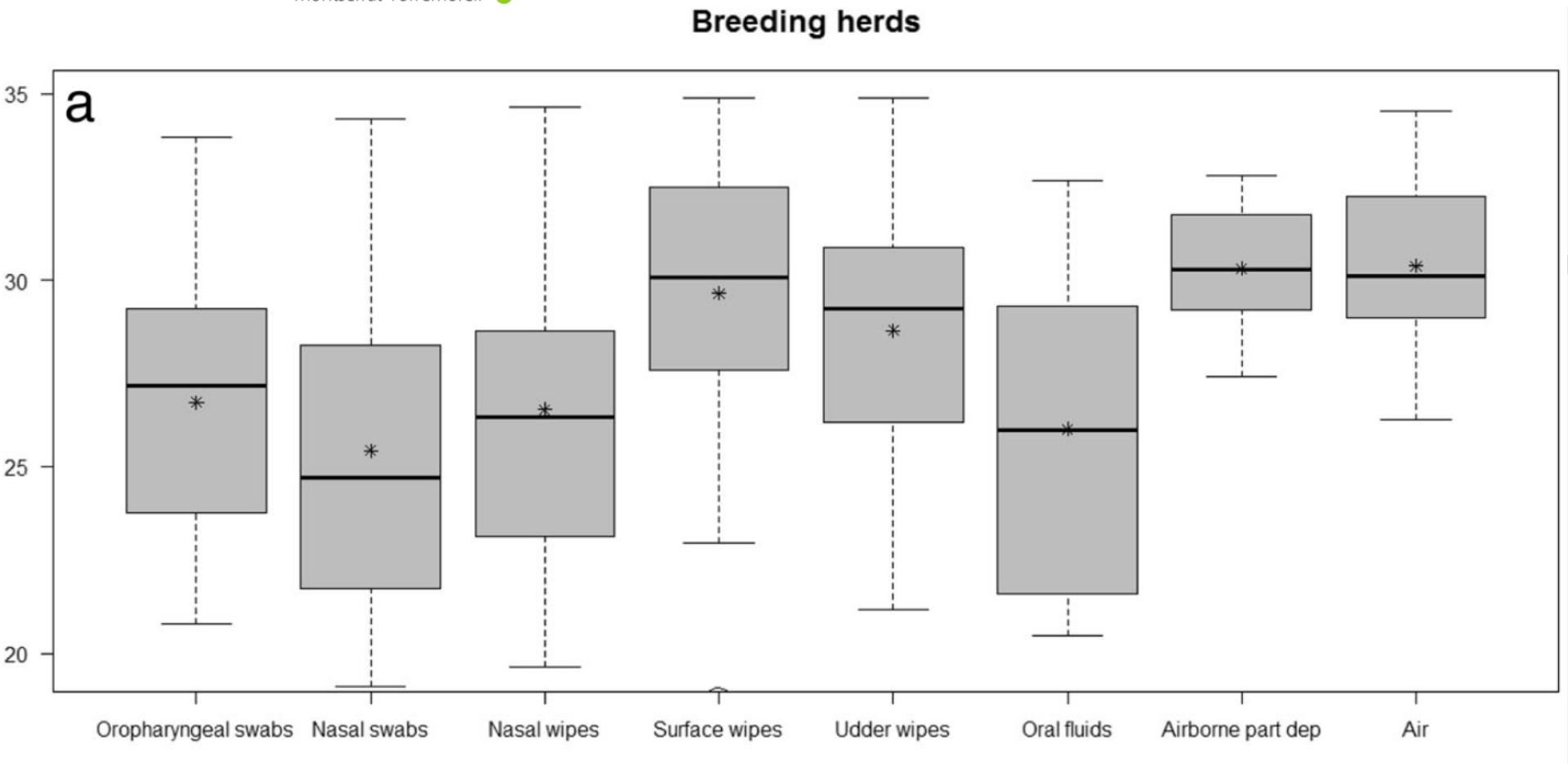

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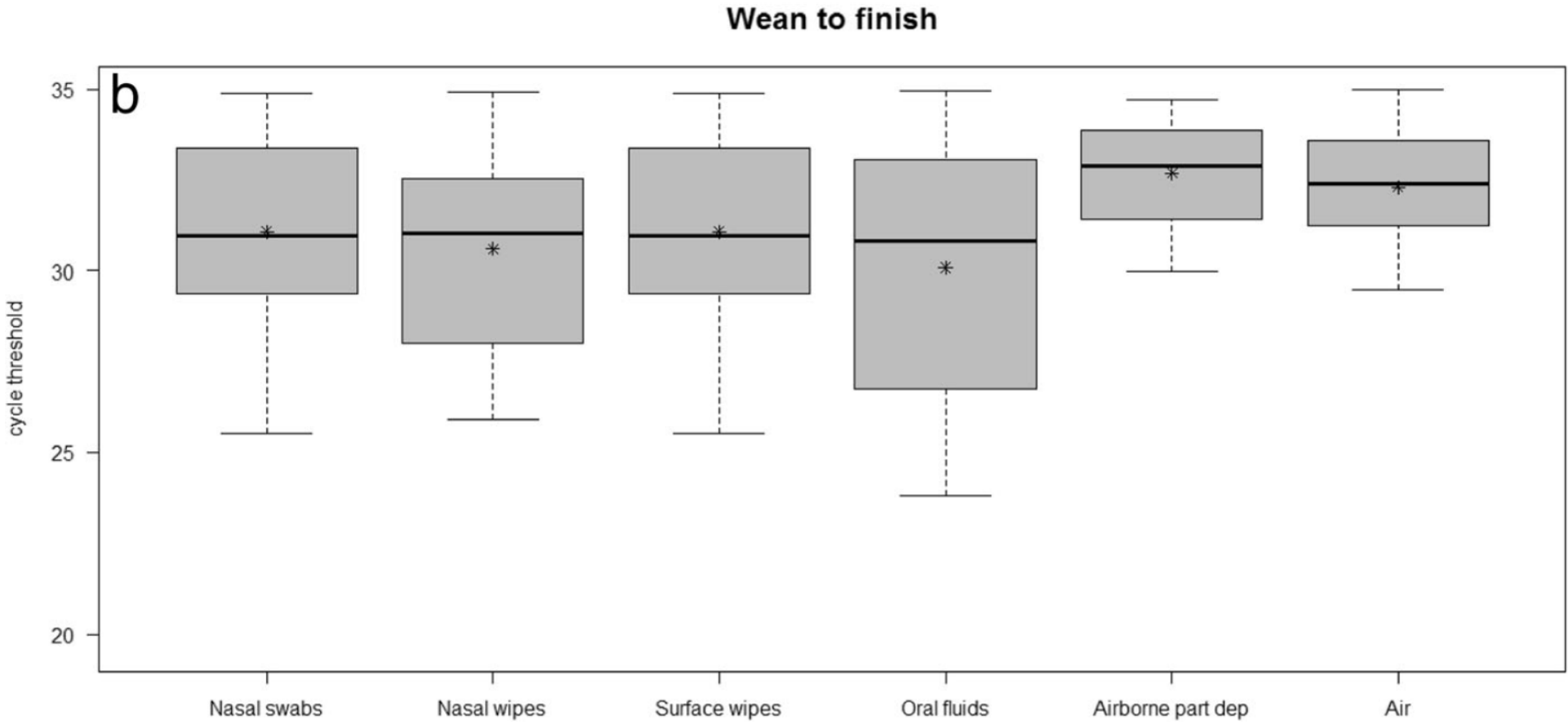

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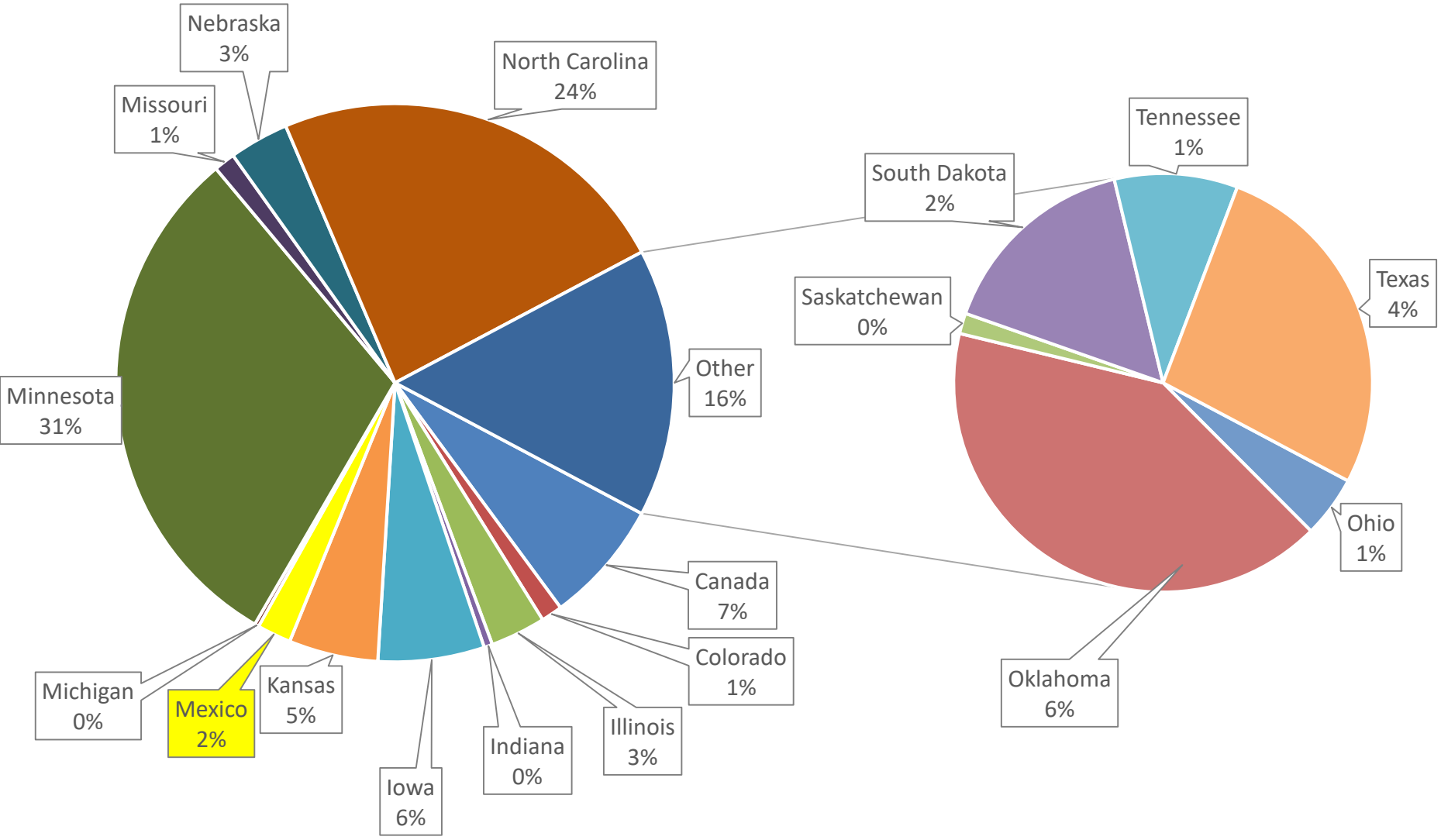
Table 5 Odds ratios (OR) of finding a positive result by sample type using a multivariate analysis considering two random effects (farm and litter or pen) and using the pooled nasal swab as baseline

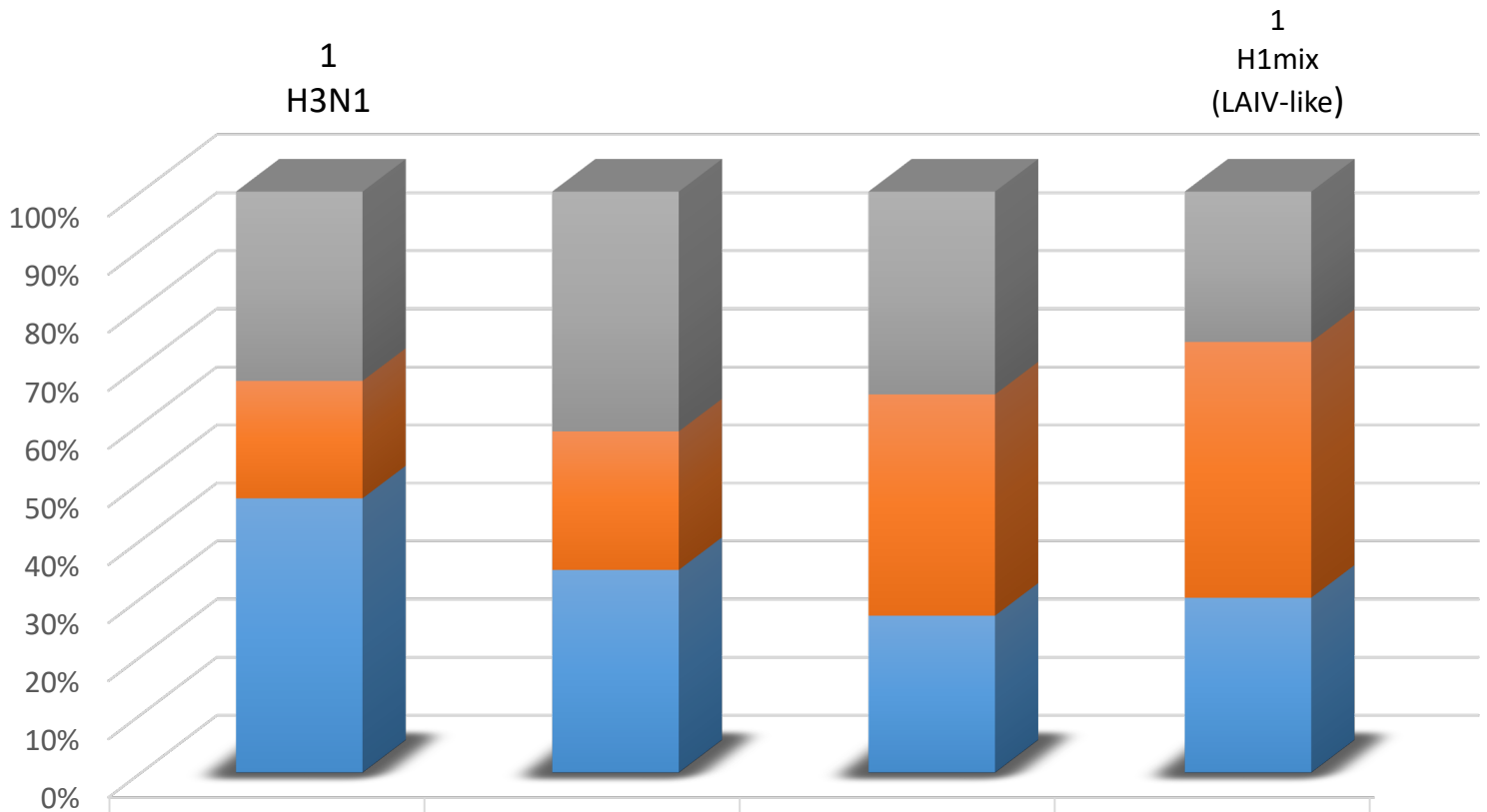
Sample type	N	Positive samples / Total samples (%)	β[a]	SE β[b]	OR (95% CI)	*P* value
Nasal swab	90	49/90 (54.4)	0.371	0.702	Reference	–
Nasal wipe	90	51/90 (56.7)	0.199	0.447	1.22 (0.51–2.95)	0.66
Oropharyngeal swab	40	32/ 40 (80)	2.088	0.714	8.07 (2.13–35.7)	0.003
Oral fluid	55	41/55 (74.5)	2.284	0.635	9.81 (3.02–37.3)	< 0.001
Surface wipe	90	62/ 90 (68.9)	1.354	0.478	3.87 (1.55–10.2)	0.004
Udder wipe	40	34/40 (85)	2.803	0.79	16.5 (3.88–89.0)	< 0.001

[a]β: regression coefficient
[b]SE β: Standard error of the regression coefficient
Nasal swabs, nasal wipes and oropharyngeal swabs were tested in pools of three

Locations of Submitted Specimens

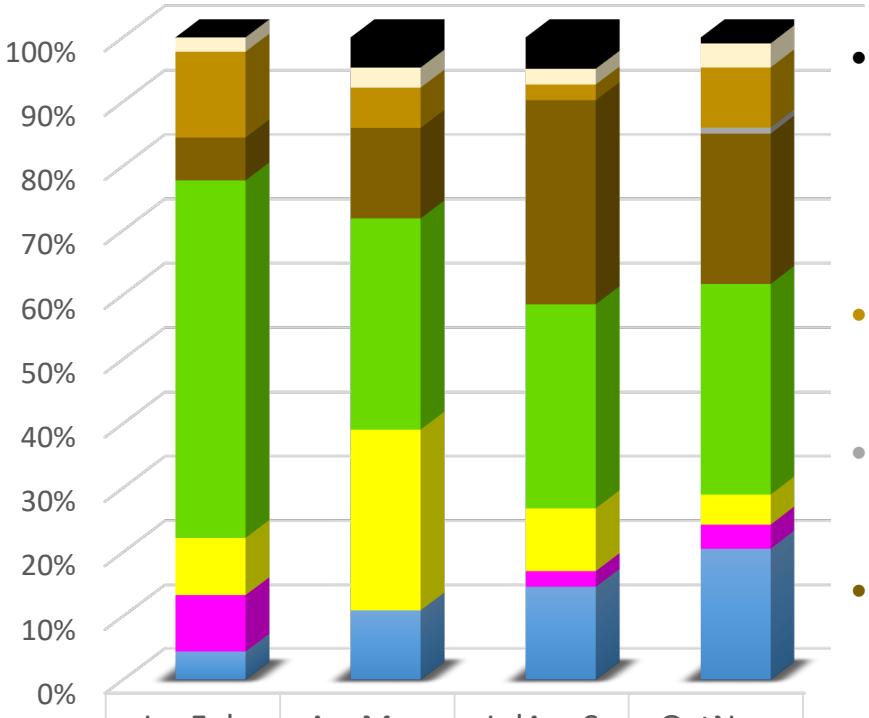


2018 Subtypes by Quarter



	JanFebMar	AprMayJun	JulAugSep	OctNovDec
H3N2	29	45	22	37
H1N2	18	26	24	63
H1N1	42	38	17	43

H1 Clades 2018



	JanFeb Mar	AprMay Jun	JulAugSep	OctNov Dec
ND gamma2-betalike	0	3	2	1
1B.2.2.2, delta 1b	1	2	1	4
1B.2.2.1, delta 1a	6	4	1	10
1B.2.2, delta 1	0	0	0	1
1B.2.1, delta 2	3	9	13	25
1A.3.3.3, gamma	25	21	13	35
1A.3.3.2, H1N1pdm09	4	18	4	5
1A.2, beta	4	0	1	4
1A.1.1, alpha	2	7	6	22

- gamma2-beta-like 1A.2.3-like
  - USA – MN, OK, NE

delta 1b 1B.2.2.2

  - USA
- **delta1a 1B.2.2.1**
  - USA
- **delta1, 1B.2.2**
  - USA (TX only)
- **delta 2 1B.2.1**
  - USA
- **Gamma 1A.3.3.3**
  - USA

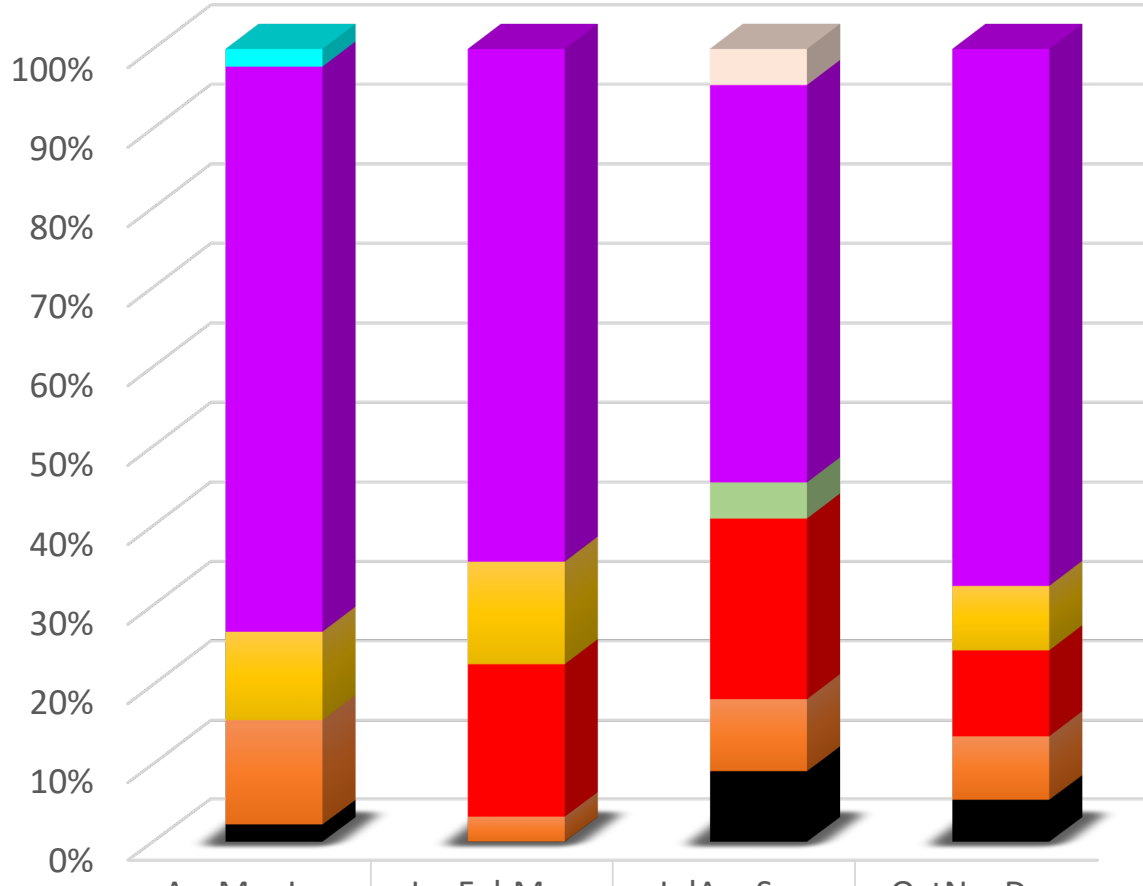
npdm 1A.3.3.2

  - Canada, USA, Mexico
- beta 1A.2
  - USA (KS, OK, TX
- alpha 1A.1.1
  - CANADA, USA

H1 – NA Pairings

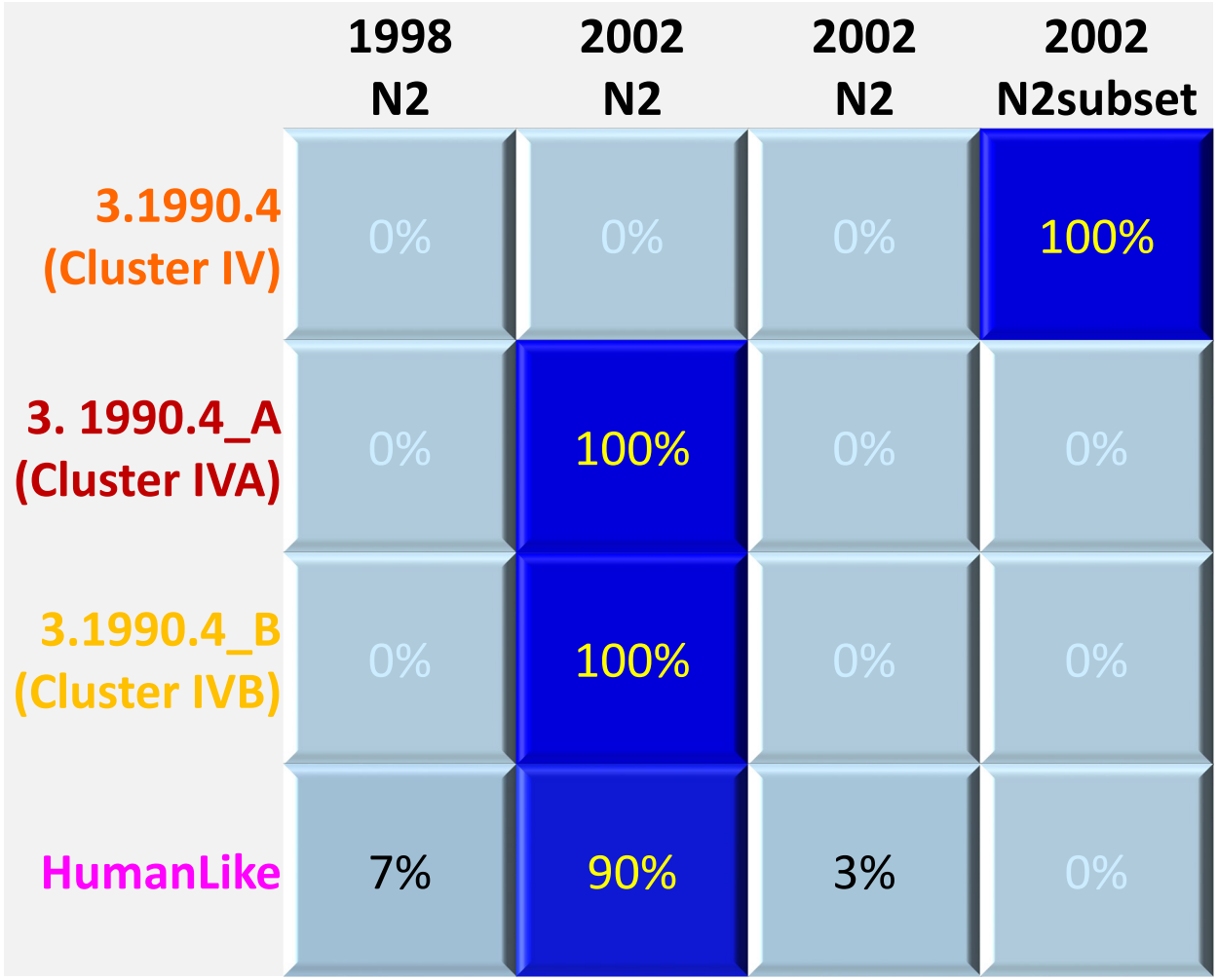
	1998 N2	2002 N2	2002 N2	classical swine N1	pandemic N1
1A.1.1, alpha	8%	92%	0%	0%	0%
1A.2, beta	0%	0%	0%	100%	0%
1A.2-3, gamma 2-beta-like	0%	0%	0%	100%	0%
1A.3.3.2, H1N1pdm09	0%	0%	0%	0%	100%
1A.3.3.3, gamma	0%	4%	0%	96%	0%
1B.2.1, delta 2	94%	6%	0%	0%	0%
1B.2.2, delta 1	0%	0%	100%	0%	0%
1B.2.2.1, delta 1a	22%	78%	0%	0%	0%
1B.2.2.2, delta 1b	0%	100%	0%	0%	0%

H3 “Clades” 2018



	Column1	AprMayJun	JanFebMar	JulAugSep	OctNovDec
CANADA	3.Other-Human-1990 (Cluster II)			1	
US (MI)	3.2010_other (HuSeas)	1			
US	3.2010.1 (HumanLike)	32	20	11	25
US (MN)	3.1990.4_D			1	
US, CANADA	3.1990.4_B	5	4		3
US	3.1990.4_A		6	5	4
US(MN), CAN & MEX	3.1990.4	6	1	2	3
US (OK, MN)	3.1990.3.LAIV-like	1		2	2

H3 – NA Pairings



OFFLU meeting
27 February 2019
Paris, France

It will likely continue to be difficult to control influenza due to high IAV-S genetic diversity in pig populations.