

# SIV Strain Variation

## And the Consequences for Vaccination Programs: The Importance of Diagnostic Monitoring

### Identifying Strain Differences

Genetic sequencing of SIV is an effective tool in evaluating changes in the virus. Even more importantly, analysis of the amino acid variation at the crucial antigenic sites (epitopes) can be used to determine significant (antigenically relevant) differences.

Newport has developed several unique tools for identifying and comparing the various SIV isolates affecting a herd. TallySSS Strain Selection Software™ applies human influenza models to analyze swine influenza strains: it counts the number of amino acid differences at various antigenic sites, compares the homologous and heterologous assay results between two isolates to determine cross-reactivity, and calculates the chance of potential conformational changes in the hemagglutinin gene.

Newport's HT-SN™ High-Throughput Serum Neutralization Assay antigenically categorizes SIV isolates to further characterize the isolates, monitors antigenic drift, and identifies possible new emergent clusters.

### Vaccines that Fail to Protect

The changing nature of the virus, and the genetic diversity that results, means that **off-the-shelf, "one-size-fits-all" commercial vaccines may fail to protect** against new strains. Customized Newport PINPOINT® Evidence-based Biologics<sup>SM</sup> SIV vaccines provide a logical alternative. An increasing number of swine producers and veterinarians have recognized the value of using homologous vaccine antigens.

### Importance of Routine Diagnostic Monitoring

One of the important aspects of developing and maintaining a vaccination program against SIV is continued diagnostic monitoring. It is crucial, whether using a commercial or autogenous vaccine, to routinely assess the SIV strains in a herd. This will help to alert the attending veterinarian to the possibility of an impending break if a new strain is detected. In the case of herds using commercial vaccines, **the detection and identification of a new strain may be the first sign that a PINPOINT vaccine may be indicated.** In herds already using an autogenous vaccination program, detection of a virus significantly different than the vaccine strain provides the opportunity to reformulate the vaccine with the new virus included.

**To conduct an effective SIV monitoring program, nasal swabs may be taken from a representative sampling of hogs on a routine basis, perhaps every 3 to 4 months.** (Viral nasal swabs are available from Newport Diagnostic Laboratory.) Virus isolation is then performed to detect virus being shed. If/when virus is isolated, it can then be sequenced to compare against previous isolates. The same virus may then be used as seed for autogenous vaccine production if desired.

## A Two-Step Process for Isolate Selection



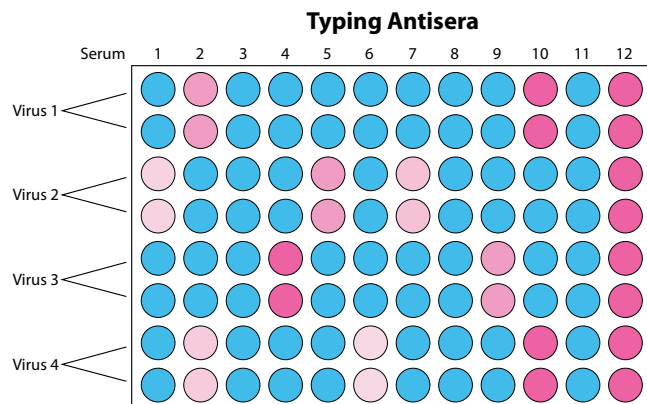
First, TallySSS applies human influenza virus models to analyze SIV strains by calculating Genetic Distance, Antigenic Distance, and Polar/Non-polar Score. Potential cross-reactive isolates are then selected based on the genetic distance for further analysis using HT-SN.

**Sample Analysis**    **Green** = Predicted cross reactivity in the neutralization assay. **Red** = lack of cross reactivity.

Isolate 1	Isolate 2	Genetic Distance	Polar/Nonpolar Score
A Swine MN 02 to:	A Swine Indiana 88	4	7
	A Swine Indiana 00	6	9
	A Swine Iowa 30	5	14
	A/New York/1/2003(H1N1)	19	28
	A/swine/Ontario/52156/2003(H1N2)	18	28
A Swine Indiana 88 to:	A Swine MN 02	4	7
	A Swine Indiana 00	6	9
	A Swine Iowa 30	2	16
	A/New York/1/2003(H1N1)	18	34
	A/swine/Ontario/52156/2003(H1N2)	18	36
A Swine Indiana 00 to:	A Swine MN 02	6	9
	A Swine Indiana 88	6	9
	A Swine Iowa 30	4	19
	A/New York/1/2003(H1N1)	18	35
	A/swine/Ontario/52156/2003(H1N2)	18	37
A Swine Iowa 30 to:	A Swine MN 02	5	14
	A Swine Indiana 88	2	16
	A Swine Indiana 00	4	19
	A/New York/1/2003(H1N1)	19	26
	A/swine/Ontario/52156/2003(H1N2)	19	28
A/New York/1/2003(H1N1) to:	A Swine MN 02	19	28
	A Swine Indiana 88	18	34
	A Swine Indiana 00	18	35
	A Swine Iowa 30	19	26
	A/swine/Ontario/52156/2003(H1N2)	1	2
A/swine/Ontario/52156/2003(H1N2) to:	A Swine MN 02	18	28
	A Swine Indiana 88	18	36
	A Swine Indiana 00	18	37
	A Swine Iowa 30	19	28
	A/New York/1/2003(H1N1)	1	2



Next, isolates with high genetic similarity are assayed using HT-SN to determine potential for cross-neutralization and isolate candidates for vaccine production.



Alamar Blue Readout  
Live cells reduce the blue dye to a pink color.