



Making sense of *Salmonella* spp. serotyping results

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At the Animal Health Laboratory (AHL), all clinical *Salmonella* isolates are sent for serotyping to OIE Salmonella reference Laboratory (SRL) because of public health concerns. As a rule of thumb, if *Salmonella* spp. are isolated from multiple samples from the same farm, their colony morphology is examined. If they look similar, only one colony is selected for serotyping. If morphology differs, multiple colonies are sent. *Salmonella* isolates are sent to OIE SRL every Wednesday and it usually takes **6-8 weeks** to receive serotyping results back.

Salmonella taxonomy underwent a major overhaul in 2005 when *Salmonella enterica* and *Salmonella bongori* (formerly group V) were established as the only 2 species of salmonellas. At the same time, it was recognized that the *S. enterica* group is comprised of 6 subspecies:

1. *Salmonella enterica* subsp. *enterica* (group I)
2. *Salmonella enterica* subsp. *salamae* (group II)
3. *Salmonella enterica* subsp. *arizonae* (group IIIa)
4. *Salmonella enterica* subsp. *diarizonae* (group IIIb)
5. *Salmonella enterica* subsp. *houtenae* (group IV)
6. *Salmonella enterica* subsp. *indica* (group VI)

Differentiation of *Salmonella* **species** and **subspecies** is relatively straightforward and it can be done **biochemically**. However, within each *Salmonella* subspecies, isolates can be further divided into different serotypes. **Serotyping** of salmonellas is based on **immunological detection** of 2 groups of cell surface antigens: lipopolysaccharides (**O antigens**) and flagellin proteins (**H antigens**). Moreover, H antigens in salmonellas are usually expressed as phase 1 and phase 2 antigens, a feature unique to *Salmonella* sp. As a result, each *Salmonella enterica* serotype has a specific antigenic formula shown as a combination of letters and numbers. This **formula** consists of **subspecies designation** (i.e., I, II, IIIa, IIIb, IV, VI), **O antigens** (i.e., a number or combination of numbers), **phase 1** (i.e., lower case letter), and **phase 2 flagellin** (i.e., lower case letter or combination of numbers) **antigens** (Fig. 1). When all of the antigens are detected for a specific serotype of group I salmonellas, then that serotype is reported by a name. For example, *Salmonella enterica* subsp. *enterica* will be reported as serotype Typhimurium only if the following antigens are detected: S. I 4,5,12:i:1,2 (Fig.1). If any of these antigens are not detected, then that particular isolate will be reported by its antigenic formula only (e.g., S. I 4,5,12:i:-). In contrast to group I salmonellas, serotypes belonging to groups II through VI are always reported by their antigenic formulas only (e.g., S. IIIa 51:Z₄,Z₂₃:i:-).

