

Motility is one of the key diagnostic criteria that define the genus *Salmonella*. This is included in the definition of *Salmonella* given in Edwards and Ewing's Identification of Enterobacteriaceae, 4th edition (Ewing, 1986).

“The genus *Salmonella* is composed of motile bacteria that conform to the definitions of the family Enterobacteriaceae and the tribe SALMONELLEAE...”

The vast majority of *Salmonella* isolates which have been characterized are motile. This is supported by various reports and studies. For example: Less than 0.001% of the 458,081 *Salmonella* isolates contained in the 1982-1992 CDC Surveillance report belong to the only two non-motile *Salmonella* species, *S. pullorum* and *S. gallinarum*. Both are poultry pathogens.

Edwards and Ewing's Identification of Enterobacteriaceae 4th Edition indicated that of the 933 *Salmonella* cultures studied, only 26 (2.8%) are non-motile. Among the 26 non-motile cultures, 24 belong to either *S. pullorum* or *S. gallinarum*.

Name of Study	No. of Cultures	Motiles		Non- Motiles			
		#	%	#	%	<i>S. pullorum</i> / <i>S. gallinarum</i>	Other
Ewing & Ball (1964)	371	351	94.6	20	5.4	20	0
Martin et al. (1967)	562	556	98.9	6	1.1	4	2
Edwards & Ewing ¹	933	907	97.2	26	2.8	24	2
CDC <i>Salmonella</i> ² Surveillance (82-92)	458,081	458,055	99.9	26	<0.01	NA	NA

Results of other studies conducted to determine the presence and distribution of *Salmonella* in food, feed, and dairy products all support the above data.

¹ Edwards and Ewing Study is based on the combined results of the Ewing and Ball and Martin et al. studies.

² CDC Study only provided separate data for typed *Salmonella*.

Presence and Distribution of *Salmonella* Species

Study	Sample Type	No. of species isolated	Non-motiles detected
Wilder & MacCready 1966	Poultry, Equip. Environmentals	24	0
Schaffner et al. 1967	Coconut	40	0
Bryan et al. 1968	Turkey, Environmentals	17	<i>S. pullorum</i>
Smyser & Snoeyenbos 1968	Animal Feed	20	0
Blackburn & Ellis 1973	Dried Milk Chocolate, gelatin, sausage	12	0
Zecha et al. 1976	Turkey, Environmentals	11	0
D'Aoust & Maishment 1979	Egg powder, Cocoa powder Chocolate, gelatin, sausage	12	0
D'Aoust et al. 1980	Chicken, Turkey, High & low moisture foods	36	0
Fraiser & Koburger 1983	Clams, Oysters, Crabs	11	0

The two species of non-motile *Salmonella* (*S. pullorum* and *S. gallinarum*) are host adapted to poultry (Bergey's Manual of Systemic Bacteriology, Vol. 1, 1984) and have very low virulence for humans. This is consistent with the CDC survey ranking of the most frequently reported *Salmonella* serotypes from human sources in 1998. 10 serotypes accounted for 70.3% of reported cases, while another 10 accounted for an additional 11.1%.

Rank	Serotype	No. Reported	Percent
1	<i>Typhimurium</i> *	8777	26.0
2	<i>Enteritidis</i>	5900	17.5
3	<i>Newport</i>	2266	6.7
4	<i>Heidelberg</i>	1894	5.6
5	<i>Javiana</i>	1165	3.5
6	<i>Agona</i>	988	2.9
7	<i>Montevideo</i>	823	2.4
8	<i>Oranienburg</i>	690	2.0
9	<i>Muenchen</i>	638	1.9
10	<i>Infantis</i>	590	1.8
	Subtotal	23,731	70.3%

**Typhimurium* includes var. *Copenhagen*

Being host adapted to poultry, *S. pullorum* causes white diarrhea in chicks and *S. gallinarum* causes fowl typhoid. A successful national eradication program via the National Poultry Improvement Plan has been in existence for over 40 years. As a result, the incidence of these species has been significantly reduced. It is noteworthy that the incidence of *S. pullorum* and *S. gallinarum* in the 1964 Ewing report was 5.4% and in the 1967 Martin report was 1.1%. By the time of the 1993-1997 CDC report, the incidence was less than 0.001%.