Recent Characterisation of *Salmonella* Strains Isolated from Chickens in Zambia

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ABSTRACT. Among the 23 *Salmonella* strains isolated from 21 diseased chickens and 2 embryonated eggs in 6 poultry farms near Lusaka City in Zambia, serovars identified were *S.* Gallinarum (11 strains), *S.* Agona (7 strains), *S.* Alamo (1 strain), *S.* Infantis (1 strain), *S.* Virginia (1 strain), *S.* Haifa (1 strain), and *S.* Dublin (1 strain). *S.* Gallinarum was detected at the highest incidence and from all the poultry farms. Fourteen serovars have been reported for the chickens in Zambia so far. Three serovars (*S.* Alamo, *S.* Haifa, *S.* Virginia) were newly identified in this study. — KEY WORDS: poultry, *Salmonella*, serovar.

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Poultry salmonellosis has almost been reported all over the world. In Zambia, however, there are only a few existing reports on avian salmonellosis [2, 3]. So far there are 14 serovars of *Salmonella* recognized from poultry in Zambia. These are *S.* Bonn, *S.* Dublin, *S.* Enteritidis, *S.* Gallinarum, *S.* Heidelberg, *S.* Infantis, *S.* Kisarawe, *S.* Oranienburg, *S.* Rubislaw, *S.* Typhimurium, *S.* Weltevreden, *S.* Worthington, *S.* Agona, and *S.* Schwarzengrund [1, 3]. The present paper gives the recent serovars of *Salmonella* existing in chickens in Zambia and discusses the public health implications of these serovars.

Between July, 1992 and March, 1993, 23 strains of *Salmonella* were isolated from 23 out of 250 chickens submitted to the School of Veterinary Medicine, University of Zambia for diagnosis of salmonellosis and other diseases from 6 poultry farms around Lusaka City. The clinical history of the majority of these samples submitted was of high mortality especially in 7–21 days old chicks and diarrhea, dullness, huddling, pasty vents, somnolence, and death in case of adult chickens. The liver, spleen, heart, or embryonated egg were inoculated into the enrichment media (selenite brilliant green medium, Nissui Pharmaceutical Co., Tokyo, Japan) and incubated at 37°C overnight. A loopful of the enrichment broth was then streaked on blood agar (Oxoid Ltd., Basingstoke, Hants, England) and MacConkey agar (Oxoid Ltd., Basingstoke, Hants, England) and incubated at 37°C overnight. Suspected *Salmonella* single colonies were then picked and later subjected to conventional biochemical and serological tests. Identification of *Salmonella* serovars was done by the use of *Salmonella* antisera supplied by Denka Seiken Co., Tokyo, Japan.

The identified serovars were *S.* Gallinarum (11 strains), *S.* Agona (7 strains), *S.* Haifa (1 strain), *S.* Alamo (1 strain), *S.* Virginia (1 strain), *S.* Dublin (1 strain), and *S.* Infantis (1 strain) (Table 1). The commonest serovar was *S.* Gallinarum (47.8%) followed by *S.* Agona (30.4%). Six of 7 *S.* Agona serovars, interestingly enough, were isolated from the same farm near Lusaka City. On the other hand, *S.* Gallinarum appeared to be evenly distributed as this was isolated from all sampled farms. Probably for the first time in Zambia, *S.* Haifa, *S.* Alamo, and *S.* Virginia were isolated from chickens. Equally there is no record either from animals or poultry of these serovars having been isolated before in Zambia. *S.* Dublin though known to be a serovar mainly affecting cattle was also isolated from the chicken embryonated eggs.

In Zambia, the poultry industry is currently developing very rapidly with small scale farmers being in the forefront. Probably with this development, *Salmonella* infection in poultry farms and hatcheries also appears to be on the increase as evidenced by the appearance of new serovars (*S.* Alamo, *S.* Virginia, and *S.* Haifa) in the present paper, which have not been encountered before. Zambian poultry farmers import a lot of breeding parent stocks from many parts of the world and the appearance of these new strains could possibly be linked to these importations. Previously it was generally accepted that there was only *S.* Gallinarum/Pullorum affecting poultry in Zambia but the present result probably indicates the existence of more other serovars. It is probably now correct to state that there exist many serovars of *Salmonella* in the Zambian chicken population. It now remains to be investigated whether all these serovars would be clinically significant. One farm was found to be predominantly contaminated with *S.* Agona (Table 1). There is a likelihood that this contamination could probably have had a common source, but elaborate investigations need to be done to determine whether these serovars have the same genetic origin. DNA fingerprinting would offer such a possibility. The possible existence of these new serovars (*S.* Alamo, *S.* Virginia, and *S.* Haifa) in the animal population needs to be explored. The public health significance of these serovars also requires urgent investigation as some of the diarrhea cases often reported in humans could be attributed to some of these serovars if consumed through contaminated poultry products.

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Table 1. *Salmonella* serovars isolated from Chickens in Zambia

Farm[a)]	Chick no.	Specimen type	O antigen	H antigen (phase 1)	H antigen (phase 2)	Serovar
Hybrid	DC 196–1	Culture[b)]	6,7	g,z_{51}	1,5	*S.* Alamo
Hybrid	DC 273	Culture	8	d	1,2	*S.* Virginia
Hybrid	DC 354	Culture	6,7	r	1,5	*S.* Infantis
Hybrid	DC 529–1	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC 529–4	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC 529–5	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC 529–6	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC 529–8	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC 529–9	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC K4	Culture	4,12	f,g,s	–	*S.* Agona
Hybrid	DC K10	Culture	1,9,12	–	–	*S.* Gallinarum
Bera	DC 130	Liver	1,9,12	–	–	*S.* Gallinarum
Bera	DC 139	Heart	1,9,12	–	–	*S.* Gallinarum
Bera	DC 186–2	Heart	1,4,12	z_{10}	1,2	*S.* Haifa
Tamba	DC 299–1	Embryonated egg	1,9,12	g,p	–	*S.* Dublin
Tamba	DC 299–2	Liver	1,9,12	–	–	*S.* Gallinarum
Tamba	DC 344	Embryonated egg	1,9,12	–	–	*S.* Gallinarum
CC	DC 408	Liver	4,12	f,g,s	–	*S.* Agona
CC	DC K12	Liver	1,9,12	–	–	*S.* Gallinarum
Poultry Breeders	DC 420–1	Spleen	1,9,12	–	–	*S.* Gallinarum
Poultry Breeders	DC 420–2	Spleen	1,9,12	–	–	*S.* Gallinarum
Poultry Breeders	DC 420–3	Spleen	1,9,12	–	–	*S.* Gallinarum
Makeni	DC 420–4	Spleen	1,9,12	–	–	*S.* Gallinarum
Makeni	DC 486	Spleen	1,9,12	–	–	*S.* Gallinarum

a) All the farms are located around Lusaka City.
b) *Salmonella* cultures were obtained from Hybrid farm.

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