



## NOTE

Public Health

# The importance of wild gecko as a source of human *Salmonella* infection

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**ABSTRACT.** A total of 201 wild geckos from the region of Mekong Delta, Vietnam were collected to determine the viable number and survival period of *Salmonella* in their feces. Of the 101 samples examined, 24 (23.8%) were *Salmonella* positive. These 24 geckos excreted *Salmonella* in their feces in a range of 1 to 8.6 log CFU/g with a mean of  $4.5 \pm 3.2$  log CFU/g. Among the *Salmonella* serovars, *Salmonella* Weltevreden was the most predominant serovar (37.5%). Moreover, *Salmonella* could survive for 6 weeks in gecko feces at room temperature in Vietnam. These results indicate that the wild gecko seems to play an important role as a reservoir for *Salmonella* and a source of *Salmonella* infection in humans in Southeast Asian countries.

**KEY WORDS:** feces, *Salmonella*, source of infection, survival, wild gecko

*Salmonella* is known to be one of the important human bacterial pathogens in both developed and developing countries. Human salmonellosis was found in 0.6 to 7% of the total human diarrhea cases in Southeast Asian countries such as Laos, Myanmar, and Vietnam [3]. Wild geckos were commonly found in the residential areas of these countries [12] and are widely distributed and seen in close contact with humans. Recently, some researchers indicated that geckos could harbor *Salmonella* at a relatively high rate in Southeast Asian countries [1, 5]. Humans could be infected with *Salmonella* via contact with reptiles, and reptiles were considered to be a reservoir for *Salmonella* and a source of human salmonellosis [4, 7, 9–11, 14, 15]. However, no report has been published on quantification and survival analysis of *Salmonella* in gecko feces. Therefore, this study was carried out to determine the number and persistence of *Salmonella* in gecko feces.

In this study, a total of 201 wild geckos (138 *Hemidactylus frenatus* and 63 *Hemidactylus platyurus*) were captured in the Mekong Delta region, located in the South of Vietnam. Of 201 gecko fecal samples, 101 were examined for the number of *Salmonella* in their feces. About 0.1 g of feces (rectum contents) in each sample was collected and suspended in 9 times volume of phosphate buffer saline (PBS, pH 7.2). Following this, 0.1 ml of the suspension diluted 10-fold with PBS was plated on mannitol lysine crystal violet brilliant green agar (MLCB, Nissui, Tokyo, Japan) and deoxycholate hydrogen sulfide lactose agar (DHL, Nissui). The number of *Salmonella* colonies was counted on these selective media, after incubation at 37°C for 24 hr. If suspected *Salmonella* colonies did not appear on the selective media, samples were enriched with Hajna tetrathionate broth (Eiken, Tokyo, Japan) at 37°C for 24 hr. A loopful of enrichment broth was then streaked on the selective agars. The suspected *Salmonella* isolates were examined for biochemical characteristics, and serovars were identified by following the methods described by Tran *et al.* [13].

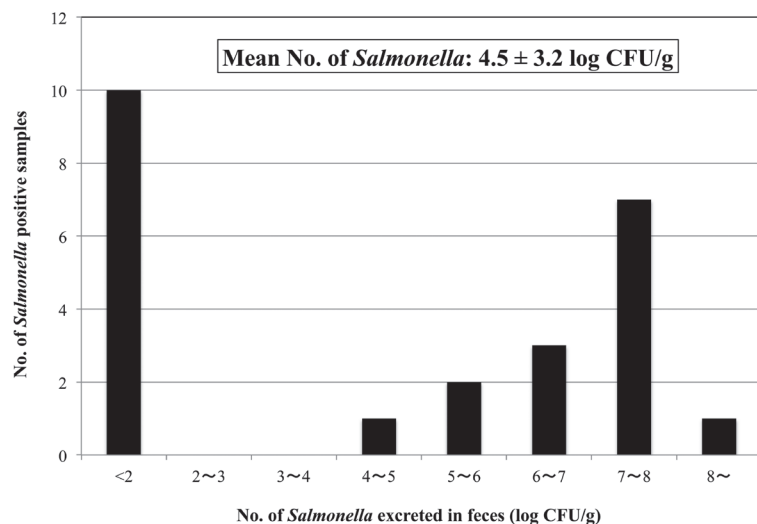
Of 101 gecko samples, 24 (23.8%) were *Salmonella* positive. Among these positive samples, 14 geckos excreted *Salmonella*  $\geq 4$  log CFU/g in their feces. The highest number of *Salmonella* in gecko feces was 8.6 log CFU/g, and the mean was  $4.5 \pm 3.2$  log CFU/g (Fig. 1). These results indicated that wild geckos excreted a high number of *Salmonella* in their feces. Moreover, of 24 *Salmonella* isolates, *S. Weltevreden* was the most predominant serovar (37.5%), followed by *S. Worthington* (12.5%), *S. Lexington* (8.3%), *S. Albany* (4.2%), and *S. Bellevue* (4.2%) (Table 1). *S. Weltevreden* is known to be the predominant serovar in human salmonellosis in Southeast Asian countries such as Thailand, Malaysia, and Philippines [2, 6]. Ly *et al.* [8] also reported that *S. Weltevreden* was isolated from human patients with diarrhea in the region of Mekong Delta, Vietnam. Therefore, wild geckos seem to be the potential source of *Salmonella* infection, especially *S. Weltevreden* serovar, and spread *Salmonella* in the environment of these countries.

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**Fig. 1.** The number of *Salmonella* excreted in gecko feces (log CFU/g). The number of *Salmonella* in gecko feces <2 (log CFU/g) was calculated as 1 (log CFU/g).

Of 201 gecko fecal samples, 101 were used for quantification analysis of *Salmonella* in gecko feces and 100 were divided into 2 groups. Fecal samples in each group were mixed and put into sterilized Erlenmeyer flasks (300 ml). These fecal mixtures were kept at the room temperature (25–30°C) of Vietnam for 10 weeks. About 1 g of fecal sample was taken from each mixture once a week for 10 weeks after storage. Isolation and identification of *Salmonella* from fecal samples were also done following the same methods as described above. In this experiment, *Salmonella* was isolated from fecal mixtures of both groups for 6 weeks after storage. However, no *Salmonella* was detected from fecal samples after 7 weeks. These results indicate that *Salmonella* can survive for a long time in gecko feces in normal environmental conditions in Vietnam. However, the mechanism involved in the survival of *Salmonella* for a long time in gecko feces in the environment is still unclear.

The present study indicated that the wild gecko seems to play an important role as a reservoir for *Salmonella* and a source of *Salmonella* infection in humans in Southeast Asian countries. Further research needs to be performed to evaluate the epidemiology of *Salmonella* in wild geckos of this region.

**CONFLICTS OF INTEREST.** No conflict of interest was declared.

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