



## Tracking and Identifying Enterobacteriaceae Contamination in Darkling Beetles (Tenebrionidae) as One of the Reservoirs of Bacteria Persistence Poultry Farms

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### Abstract

**BACKGROUND:** Poultry farming is one of the most productive and economic agricultural sectors. However, the bacterial contamination and the activity of darkling beetles (Tenebrionidae) as a potential reservoir of *Salmonella* in meat poultry farms can inflict direct and indirect damages.

**OBJECTIVES:** The present study aimed to identify the darkling beetles and their accompanying Enterobacteriaceae contamination in Isfahan chicken farms.

**METHODS:** Darkling beetles were collected and identified based on their morphological aspects from different parts of 16 poultry farms (4 from each geographical area) in Isfahan Province, Iran. Then, 80 samples of darkling beetles were cultured on selective-differential media culture of the Enterobacteriaceae family using the homogenization and enrichment method. The isolated bacteria were identified based on physiological and molecular characteristics. Also, specific antisera were used to determine serological groups.

**RESULTS:** The results revealed that all collected darkling beetles' samples belonged to the species *Alphitobius diaperinus* (Col., Tenebrionidae), and from 80 microbial culture samples from the beetles, isolated bacteria belonged into 4 genera: *Escherichia sp.* (20 isolates, 25 %), *Klebsiella sp.* (8 isolates, 10 %), *Proteus sp.* (22 isolates, 27.5 %), and *Salmonella sp.* (30 isolates, 37.5 %). Among them, the *Salmonella* genus accounted for the highest percentage of darkling beetles' contamination. In the serological assay, the isolated *Salmonella* were classified into two serogroups, A (23 isolates, 76.67 %) and C (C2 and C3) (7 isolates, 23.33 %), which the A serogroup was the most frequent.

**CONCLUSIONS:** In this study, the *A. diaperinus* species was isolated and identified for the first time from poultry farms, and this pest, with a high percentage of *Salmonella* infection, is introduced as one of the reservoir sources of bacterial contamination in the broiler farms.

**Keywords:** *Alphitobius diaperinus*, Enterobacteriaceae, *Klebsiella*, *Salmonella*, Poultry farm

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### Figure Legends and Table Captions

**Table 1.** Results of Microbial Culture Experiments and Abundance of Bacteria Isolated From *A. diaperinus*.

**Table 2.** The Mean (%) ± Standard Error of Bacterial Contamination in *A. diaperinus* in Different Regions.

**Table 3.** The Mean (%) ± Standard Error of Different Bacterial Contamination in Live and Dead Adult Insects of *A. diaperinus*.

**Figure 1.** Gel Electrophoresis of Polymerase Chain Reaction (PCR) Products of *Salmonella sp.* Isolated From Darkling Beetles (*A. diaperinus*).

**Note:** Lane M: 100-bp DNA ladder; Lane 1: PCR mixture without DNA template as negative control 1; Lane 2: PCR mixture with DNA template of *Bacillus sp.* as negative control 2; Lane 3, 4, 5, and 6: *Salmonella sp.* isolates.