

resistant. The highly significant association with serum resistance was confirmed for the four genes; *AS87_09335*, *AS87_00480*, *AS87_05195*, and *AS87_04050* ($P < 0.00001$). The *AS87_09335* gene was presented in all 33 (100%) isolates resistant to serum and the gene was identified from only 7 (6.9%) of 102 isolates sensitive to serum, which is the highest degree of association among 6 genes followed by *AS87_00480*, *AS87_05195*, *AS87_04050*, *AS87_01015*, and *OmpA*. *AS87_00480*, *AS87_05195*, and *AS87_04050* genes were confirmed in 30 (90.9%), 16 (48.5%), and 32 (97.0%) of 33 isolates resistant to serum and were identified from 26 (25.5%) of 102, 7 (6.9%) of 102, and 18 (40.9%) of 44 isolates sensitive to serum, respectively. On the other hand, lack of significant association were observed in *AS87_01015* and *OmpA* genes ($P = 0.246$ and $P = 0.100$).

Conclusions: We confirmed that serum resistance is one of virulence factors in RA by showing highly significant correlation between serum resistance and virulence causing systemic infection. In addition, three proteins located in outer membrane, *AS87_09335*, *AS87_00480*, and *AS87_05195* were suggested to be related with serum resistance by the correlation between serum resistance and gene presence. This research was supported by Agricultural Biotechnology Development Program (314023-3), Technology Commercialization Support Program(315035-5), Ministry of Agriculture, Food and Rural Affairs and Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry and Fisheries through Agriculture, Food and Rural Affairs Research Center Support Program, funded by Ministry of Agriculture, Food and Rural Affairs (716002-7).

References:

- [1] Seo HS, SY Cha, M Kang, HK Jang. (2013). Chicken embryo lethality assay for determining the virulence of *Riemerella anatipestifer* isolates. *Avian Pathology*, 42(4), 387-392.
- [2] Wang X, C Ding, S Wang, X Han, S Yu. (2015). Whole-genome sequence analysis and genome-wide virulence gene identification of *Riemerella anatipestifer* strain Yb2. *Applied and Environmental Microbiology*, 81(15), 5093-5102.

P-160

Serovars and antimicrobial resistance of *Avibacterium paragallinarum* in South Korea during 2011- 2015

Ok-Mi Jeong, Byung-Woo Jeon, Byung-Kook Choi, Chun-Tae Lim, So-Youn Youn, Hye-Jin Lee, Hee-Soo Lee, Min-Su Kang*

Avian Disease Division, Animal and Plant Quarantine Agency, South Korea

Introduction: Infectious coryza, caused by *Avibacterium paragallinarum* (*Av. paragallinarum*), is an acute respiratory disease of chickens. The major economic effect of the disease is attributed to increased culling rate in broilers and a marked reduction in egg production of laying and breeding hens. *Av. paragallinarum* has been classified into three serovars, A, B

and C by the Page scheme. In Korea, only serovar A of *Av. paragallinarum* has been reported based on molecular methods. This study validated the distribution of *Av. paragallinarum* serovars using traditional serological method and tested for antimicrobial resistance of the isolates.

Materials and Methods: *Av. paragallinarum* were isolated from chickens of clinically suspected cases and slaughter house in Korea between 2011 and 2015. The Isolates were identified by HPG-2 PCR known to be specific for *Av. paragallinarum* and serotyped by performing hemagglutination-inhibition (HI) tests with specific antisera to serovar A(0083), B(0222), and C(Modesto) as described previously. The disk diffusion test was performed according to the Clinical Laboratory Standards Institute (CLSI) recommendation with some modifications (Chukiatsiri *et al.*)

Results: A total of 20 isolates of *Av. paragallinarum* were identified and serotyped. Sixteen isolates were serovar A and 4 isolates were non-typable. All isolates were susceptible to amoxicillin/clavulanic acid, ceftiofur, gentamicin and spectinomycin. High levels of resistance, including intermediate resistance, were observed for lincomycin, cloxacillin and erythromycin (> 70%). Non-typable isolates were more resistant to antibiotics tested than serovar A isolates in Korea.

Conclusions: Outbreaks of infectious coryza due to serovar A have been reported and vaccine for only serovar A has been used for control in Korea. In this study, non-typable isolates of *Av. paragallinarum* were found in Korea and their antimicrobial resistance was higher than that of serovar A isolates of *Av. paragallinarum*. Appropriate strategies to these non-typable variant isolates of *Av. paragallinarum* are needed for control of infectious coryza in chickens.

References:

- [1] Blackall PJ, 1989, *Clin. Microbiol. Rev.*, 2(3):270-277.
- [2] Chen X, Mifflin JK, Zhang P and Blackall PJ, *Avian Dis.*, 1996, 40:398-407.
- [3] Blackall PJ, Eaves LE and Aus G, *Avian Dis.*, 1990, 34(3): 643-645
- [4] Chukiatsiri K, Sasipreeyajan J, Blackall PJ, Yuwatanichsampan S., and Chansiriponchai N., *Avian Dis.*, 2012, 56:359-364.

P-161

Tick Monitoring at Horse Riding Course, Horse Ranch, and Horse Stables Site from April to September, 2016

Hyun-Ji Seo¹, Heung-Chul Kim², Mi-Sun Yoo¹, Do Hyun Han¹, Suk-Chan Jung¹, Yun Sang Cho^{1*}

¹Bacterial and Parasitic Disease Division, Animal and Plant Quarantine Agency, 177 Hyeoksin 8-ro, Gimcheon-si, Gyeongsangbuk-do, 39660 Republic of Korea, ²25th Medical Detachment, 168th Multifunctional Medical Battalion, 65th Medical Brigade, Unit 15247, APO AP 96205-5247, Yongsan, Seoul, Republic of Korea

Introduction: Tick is an important vector that transmits