Introduction

Urinary tract infections (UTI) are a major health concern in breeding herds and one of the major causes of death or culling of female breeding pigs. Infections may be caused by ascending bacterial pathogens from the external genitalia to the bladder and kidneys as a consequence of coitus and parturition, and incomplete closure of the vulva and/or damaged or relaxed urethra. Beside pathogens like Escherichia (E.) coli, Streptococcus/ Staphylococcus/ Klebsiella/ Pseudomonas/ Aeromonas/ Bacteroides spp. and Actinobaculum suis, also intensive housing conditions, type of housing (e.g. dog-sitting position) and low hygiene standards are part of the multifactorial picture of UTI.

Materials and methods

Farms in Germany, the Netherlands and Slovenia with a history of UTI in sows were included in the clinical trial. Housing and management conditions were maintained unchanged during the trial.

Results

At inclusion, E. coli was identified in 75.2% of the positive animals. Thereof, 56.7% were E. coli without showing hemolysis or mucoid growth, 0.6% hemolytic E. coli and 17.8% mucoid E. coli.

When comparing the percentage eradication rates of all E. coli isolated and E. coli of mucoid growth, a 30-60% higher eradication rate was seen for mucoid E. coli. The MUS showed a significant reduction (p<0.05) within each treatment group compared to inclusion 3 and 14 days after treatment initiation.

Discussion

Uropathogenic strains (UPEC) of E. coli are characterized by the expression of distinctive bacterial properties, products, or structures referred to as virulence factors helping the organism overcome host defenses and colonize or invade the urinary tract. Mucoid strains develop a capsule which is an important virulence factor, defending UPEC by antiphagocytic surface properties and against immune responses. In human surveys, non-mucoid strains of E. coli were not found in non-clinical cases but were isolated from cases suffering from UTI.

The virulence factor of mucoid growth enables the E. coli to more efficiently adhere to and damage bladder epithelium than E. coli strains without virulence factors. It is postulated that a higher percentage of the non-specified E. coli isolates in our study had no virulence factors and were part of the normal non-pathogenic flora of the vaginal and anal region. They were washed-out while catching the mid-stream urine but could not be eliminated by antimicrobial therapy due to the continuous re-colonization.

The low efficacy of the control product (amoxicillin without clavulanic acid) in both, the E. coli strains in general and the mucoid strains is thought to be due to the beta-lactamase-secreting activity of E. coli.

Based on the results observed, Baytril® 10% Injectable Solution, used as an antimicrobial therapy for sows suffering from urinary tract infection associated with E. coli, was shown to reduce the infection pressure on animal and farm level for UPEC. Therapy with Baytril® 10% can help to interrupt infection cycles and should be part of an eradication program including improvement of housing conditions, herd management and hygiene standards for breeding animals (sows, boars) as well as of gestation programs in sows and gilts.

References


Acknowledgments

The authors thank P. Kopp and C. Hafner for the diagnostic part (VetMedLabor, Devison of IDEXX, Germany), the investigators D. Homann, C. Sudendey, K. Pfannes, M. Ritter, J. Beisl (Germany) and T. Gider (Slovenia) as well as P. Klein for the statistical analyses (dsh statistical service GmbH, Germany). The clinical field study reported herein was performed in compliance with the current national laws and regulations.