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Effects of high levels of deoxynivalenol and zearalenone contaminated feeds on urine metabolites of piglets

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Deoxynivalenol (DON) and zearalenone (ZEN) are common food contaminants produced by Fusarium sp. Mycotoxins are a potential health hazard because of their toxicological effects on both humans and livestock. The aim of this study is to investigate, in pigs, the effect of higher concentration of DON and ZEN exposure on urine metabolites. In the present study, 15 eight-week-old piglets were randomly assigned to the following three different dietary treatments for 4 weeks: a control group (fed a standard diet), and the DON and ZEN groups, fed a diet containing 8 mg/kg DON and 0.8 mg/kg ZEN respectively. After 4 weeks of treatment, all the pigs were euthanized and urine samples were collected directly from the urinary bladder using syringe. The metabolites of urine were analyzed using UPLC-Q-TOF MS. Total of 5 metabolites were significantly different (P<0.05) in DON and ZEN dietary treatments when compared with the control group. The metabolites of N,N-Dimethylarginine, Prolyl-4-hydroxyproline, 6-methyladenosine, Dihyroxy-1H-indole glucuronide, and Tert-butyl (2Z)-(5-cyano-4,4,5-trimethyl-2-pyrrolidinylidene) ethanoate were significantly increased in DON exposed group than control group. Contrarily, three metabolites such as Tert-butyl (2Z)-(5-cyano-4,4,5-trimethyl-2-pyrrolidinylidene), prolyl-4-hydroxyproline, and N,N-Dimethylarginine, were significantly decreased in ZEN dietary group, but Dihyroxy-1H-indole glucuronide and 6-methyladenosine were increased in ZEN dietary group. We speculate that because of the acute toxicity of DON and ZEN (particularly DON), we found metabolites in the urine of the treatment groups. Additional studies are needed to investigate the potential relationships between DON- and ZEN toxicity and higher levels of metabolites excretion from the urine.

Recent Publications

- 1. Reddy K E et al. (2018) Effects of high levels of deoxynivalenol and zearalenone on growth performance, and hematological and immunological parameters in pigs. Toxins. 10(3).pii:E114. Doi:10.3390/toxins10030114.
- 2. Reddy K E et al. (2018) Deoxynivalenol- and zearalenone-contaminated feeds alter gene expression profiles in the livers of piglets. Asian-Australasian Journal of Animal Science. 31(4):595-606. Doi:10.5713/ajas.17.0466.
- 3. Reddy K E et al. (2017) Effects of graded concentrations of supplemental lead on lead concentrations of supplemental lead on lead concentrations in tissues of pigs and prediction equations for estimating dietary lead intake. PeerJ. 5:e3936. Doi:10.7717/peerj.3936.
- 4. Reddy K E et al. (2017) Early weaning with different dietary regimen for calves stimulates later rumen developments, growth and carcass traits in Hanwoo cattle. Asian- Australasian Journal of Animal Science. 30(10):1425-1434. Doi:10.5713/ajas.17.0315.
- 5. Reddy K E et al. (2017) Effect of different early weaning regimens for calves on adipogenic gene expression in Hanwoo loin at the fattening stage. Livestock Science. 195:87-98. Doi:10.1016/j.livsci.2016.11.014..

Biography

Kondreddy Eswar Reddy obtained his Doctoral Degree from Sri Krishnadevaraya University, Anantapur, India. He currently holds a Research Associate position at National Institute of Animal Science of Rural Development Administration, Jeonju, Republic of South Korea. His current work focuses on (i) developing ways to improve quantity and quality of native Hanwoo cattle by using high nutritional diet and (ii) developing toxicity testing methods and screening of animal biomarkers for potential hazards in feeds. He has total seven and half years of Postdoctoral and Research Professor experience at different reputed institutions in Republic of South Korea. He has been trained and gained expertise in animal and plant genomics by visiting various laboratories in India and Republic of South Korea. He has published his research findings in esteemed international journals with high impact factor. He has constantly received several national and international awards and prestigious fellowships from India and Republic of South Korea.

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