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T38 Relationships between Pb, As, Cr, and Cd in soil and water in agricultural and industrial areas with heavy metals contents from individual cow milks. X. W. Zhou[1,2], H. Soyeurt[2], N. Zheng[1], C. Y. Su[1], and J. Q. Wang*[1], [1]*Key Laboratory of Quality & Safety Control for Milk and Dairy Products of Ministry of Agriculture and Rural Affairs, Institute of Animal Sciences, Chinese Academy of Agricultural Sciences, Beijing, China,* [2]*TERRA Research and Teaching Centre, Gembloux Agro-Bio Tech, University of Liège, Gembloux, Belgium.*

Various industrial activities lead to environment pollution with heavy metals. Heavy metals enter the food chain of dairy cows especially through feed and water. This study investigated the relationships between milk heavy metals' contents in individual cows with that in soil and water in industrial and agricultural areas. Sixty milk samples (10 per farm) were collected from the udder during milking. Six underground water and 6 soil samples were collected at the same farm that milk sampling. Levels of Pb, As, Cr and Cd in milk and water samples were measured by ICP-MS. Lead, Cr and Cd in soil were measured by AAS, and As was detected by AFS. Heavy metal contents in milk from agricultural and industrial areas were compared using Kruskal-Wallis tests. Spearman correlations were calculated between the studied metal contents in milk with that in water and soil. Ranges of Pb, As, Cr and Cd in milk were 0.025–10.45, 0.002–1.53, 0.017–5.01 and 0.006–0.27 μg/L. Mean levels of Pb, As, Cr and Cd were 0.07, 3.58, 1.80, 0.01 μg/L in water and 17.57, 7.91, 39.93, 0.15 mg/kg in soil, respectively. Contents of Pb and Cd in milk from agricultural area were significantly lower ($P < 0.01$) than that from industrial area. Significant ($P < 0.01$) higher As residue was observed in milk from agricultural area. No difference showed for Cd. Levels of As ($r = 0.37$) in milk and water were positively correlated. Those results suggested that As could be partially introduced into milk by cows' drinking water. A moderate positive correlation was found for Cr ($r = 0.60$) and Cd ($r = 0.66$) between milk and soil; and a negative value was observed in water for Cr ($r = -0.60$) and Cd ($r = -0.75$). Therefore, the contents of Cr and Cd in milk can be related to cows' feed that produced in Cr and Cd polluted soil. Lead ($r = -0.37$) levels in milk showed a negative correlation with Pb in soil, this leading no firm conclusions about the origin of Pb contamination in milk. The obtained results indicated that Pb, As, Cr and Cd in milk have complex source; water and soil in the farm had a partial contribution based on the obtained correlation amplitude.

Key Words: milk, individual cows, heavy metals

T39 A mycotoxin deactivator improves milk coagulation properties in dairy cows challenged with *Fusarium* mycotoxins deoxynivalenol and fumonisins in TMR. A. Gallo[1], P. Bani[1], T. Bertuzzi[1], B. Doupovec[2], J. Faas*[2], D. Schatzmayr[1], and E. Trevisi[2], [1]*Department of Animal Sciences, Food and Nutrition (DIANA), Faculty of Agriculture, Food and Environmental Science, Universita Cattolica del Sacro Cuore, Piacenza, Italy,* [2]*BIOMIN Research Center, Tulln, Austria.*

Mycotoxins, secondary metabolites of toxigenic fungi, affect animal and human health worldwide. Two mycotoxins commonly found in dairy rations are the *Fusarium* mycotoxins deoxynivalenol (DON) and fumonisins (FUM). Under field conditions, it has been shown previously that milk of dairy cows exposed to mycotoxins had a significantly lower curd quality and curd firmness in comparison to cows not exposed to mycotoxins. The aim of this trial was to investigate the effect of DON and FUM in the feed on milk quality and rennet coagulation properties of dairy cows. A feeding trial was conducted using 12 Holstein cows in a randomized block design. Cows received either (1) a control diet (CTR), (2) a TRM contaminated with *Fusarium* mycotoxins (0.4 mg/kg DON and 1.1 mg/kg FUM) (MTX), or (3) the contaminated TRM supplemented with a mycotoxin deactivator (MD) (35 g/animal/day) (MTX+MD). The contamination level was lower than the recommended maximum values for dairy feed in Europe (5 mg/kg DON and 50 mg/kg FUM) and represent contamination levels that can be commonly detected in dairy rations. Each of the 3 experimental periods consisted of a 3-week treatment period followed by a 2-week clearance period. Individual milk samples were taken once a week for determination of coagulation properties (curd firming time k20 in minutes and curd firmness a30 in mm). The GLM (General Linear Model) procedure of SAS (SAS 9.4 TS, 2018) was used and LSMeans were compared post-hoc. The treatments had no significant effect on casein content, titrable acidity and clotting time of the milk. The mycotoxin diet showed however significant negative effects on curd firmness (a30) as well as curd firming time (k20) and in both parameters the addition of MD alleviated these negative effects (a30: CTR: 30.44 mm; MTX: 25.06 mm; MTX+MD: 32.44 mm; $P < 0.05$, k20: CTR: 8.07 min; MTX: 13.0 min; MTX+MD: 9.71 min; $P = 0.05$). In conclusion, dietary concentrations of FUM and DON commonly detected in dairy rations had a negative effect on milk rennet coagulation properties. The MD counteracted these negative effects.

Key Words: mycotoxin, milk coagulation properties, mycotoxin deactivator

T40 Effect of temperature variation on raw whole milk density and its impact on milk payment system for Irish dairy Industry. P. Parmar*[1], J. T. Tobin[1], J. Grant[3], J. A. O'Mahony[2], and L. Shalloo[1], [1]*Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork, Ireland,* [2]*University College Cork, Cork, Ireland,* [3]*Teagasc Food Research Centre, Ashtown, Dublin, Ireland.*

Variation in temperature induces variance in milk density and estimation of fat content and subsequently affects the milk payment since fat content is an integral part of multiple component pricing systems. Thus, the objective of this study was to determine the effect in whole milk density due to variations in temperature. Whole milk samples were collected from morning milking of 32 individual dairy cows of national average genetic merit once every 2 weeks over a period of 6 weeks from the Teagasc research farm, in Kilworth, Co. Cork, Ireland. A total of 93 samples were assessed on the rapid testing technique Dairyspec FT system (Make- Bentley) for milk compositional analysis. Density of milk was evaluated using 2 methods, a portable density meter DMA 35 (a standard industrial method for quick results) and desktop version DMA 4500M (a standard lab testing method for higher accuracy levels), and also to compare and determine accurate density factor dependent upon processing temperature for weight-volume calculations. Statistical analysis using ANOVA showed a significant difference in means of densities (F, 78.866 > F-crit., 3.947 and $P < 0.01$) measured at different temperatures. The results were then analyzed using PROC GLM procedure, SAS software to develop a quadratic model and identify the relationship (linear or curved) between temperature and density. The output indicated a significant nonlinear relationship ($P = 0.0008$) with the model equation defining the curvature and density-temperature relationship ($r^2 = 0.659$) as Density = 1.033 + 0.0000632 × temp − 0.0000114 × temp^2. There was an inverse correlation between whole milk density and temperature (i.e., as temperature increased, milk density decreased).