classified by the tri-variate DFA model for aflatoxins was 71.4%. In the case of uncontaminated samples, the percentage of samples correctly classified was 71.1%, while in the case of contaminated samples it was 75.0%.

Discriminant function used to identify fumonisin contaminated or uncontaminated samples included 6 e-nose sensors (W1C-aromatic, W3C-aromatic, W1S-broad-methane, W1W-sulphur-organic, W2W-sulph-chlor, W3S-methane-aliph). The overall leave-out-one cross-validated percentage of samples correctly classified by the six-variate DFA model for fumonisins was 81.7%. In the case of uncontaminated samples, the percentage of samples correctly classified was 87.9%, while, in the case of contaminated samples, it was 75.0%.

Even though a larger dataset is needed to perform an effective validation procedure, by using a dataset not included in the model e-nose seems to be a promising rapid/screening method to detect mycotoxin contamination in maize kernel stocks. From a technical perspective, contaminated samples misclassified as non-contaminated represent the worst outcome under in-field conditions in order to select samples that must undergo further accurate quantitative analysis.

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Evaluation of heavy metals in intensive animal production systems

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Modern animal production systems produce large quantities of manure by-products that can be used as nutrient resource and soil conditioner in agriculture. Manure is also recognized as a significant source of contaminants of groundwater, surface water and soil with heavy metals (HM). Some HM are essential and are used as feed additives to enhance growth performance, improve meat quality and control diseases. The spread of high amounts of HM in the environment causes their accumulation in the food chain with negative effects on human health. For sustainable animal production and to develop effective approaches to preserve soil and water quality from the HM pollution, it is necessary to know the nutritional basis of the interaction between organisms and environment. The aim of this study was to evaluate the HM pollution in intensive animal production systems in order to establish which elements could represent critic aspects in sustainability and to set-up experimental conditions of phytoremediation strategy. Samples of feed, faeces and drink water were collected from ten intensive breeding farms (dairy cow and swine) in the North of Italy. Obtained samples were dried (on DM basis, AOAC), mineralized and analyzed using inductively coupled plasma mass spectrometry in order to detect the following elements: Na, Mg, K, Ca, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Mo, Cd and Pb. Considering feed samples of growing animals, principal component analysis allowed to separate cattle from pigs. Swine diets presented the highest concentration of minerals, depending on the herd ages. In fact, the highest amount was observed in the weaning phase (Zn: 884.22 ± 1201.59 mg/kg DM; Cu 176.27 ± 28.68 mg/kg DM; Mn: 147.42 ± 51.56 mg/kg DM; Se: 0.68 ± 0.51 mg/kg DM) indicating that these additives were widely applied in swine production and that farmers tend to use more additives to promote the growth of pigs. Co, Ni, As, Mo, Cd and Pb elements resulted under tolerable intake levels and did not represent an apparent risk. The general increase of HM content was registered in the livestock output, reflecting their content in feeds. The data showed that swine manure was an important source of Zn, Cu, Mn and Se to the environment. For the development of effective strategies of phytoremediation, integrated in the animal production systems, the attention should be focused on mineral supplementation that represents the major HM output of modern intensive farms.

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Application of FT- NIRS to estimate chemical components of freeze-dry herbages of Tuscany natural pasture

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Near infrared spectroscopy has been successfully applied at analysis of animals feed, but not many authors have tested NIRs technologies on natural pasture and almost all the