FOOD SAFETY: **ADVANCES IN FOOD SAFETY**

0299 Effectiveness of a mycotoxin binder to minimize transfer of aflatoxin from feed to milk in Nili-Ravi buffaloes. N. Aslam[1], I. Rodrigues[2], A. ul Haq[3], A. Cowling[1], H. M. Warriach[4], D. M. McGill[1], and P. C. Wynn[*1], *[1]Graham Centre for Agricultural Innovation, Charles Sturt University, Wagga Wagga, Australia, [2]BIOMIN-Singapore Pte. Ltd., Singapore,[3]Buffalo Research Institute, Bhunniky, Pakistan, [4]University of Veterinary and Animal Science, Lahore, Pakistan.*

Mycotoxins resulting from fungal contamination of feeds provide a major limitation for dairy production in Pakistan. The objectives of this study were to observe the extent of transfer of aflatoxinB1 in feed to the aflatoxinM1 metabolite in milk in Nili-Ravi buffaloes and to evaluate the efficacy of a mycotoxin binder incorporated into feed to minimize this transfer. Multiparous animals ($n = 28$) were randomly distributed to four groups corresponding to 2 treatments each with 2 levels in a factorial design. Animals were offered mycotoxin contaminated concentrate ration (2.5 or 5 kg/day) and corn (200 or 400 g/day) providing a total of 1475 µg (groups A and B) or 2950 ug (groups C and D) of aflatoxinB1 together with either 80 kg (groups A and B) or 70kg (groups C and D) of aflatoxin free fresh cut berseem clover (17.8% DM). AflatoxinB1 concentrations in feed for the low and high groups were therefore 88.7 and 171.2 ug/kg DM. Groups B and D were given 50 g of mycotoxin binder daily mixed with feed while groups A and C were kept as controls. Feed samples were analyzed by HPLC in Romer Labs Pte. Ltd., Singapore for aflatoxinB1 and milk samples were evaluated by ELISA for the liver metabolite aflatoxinM1. There was a highly significant difference ($P < 0.001$) in total daily aflatoxinM1 concentration in milk between animals fed the two concentrations of aflatoxinB1. The mean for those fed 2950 µg/day was 112.62 µg/kg of milk, almost double the concentration of 62.19 µg/kg in buffalo fed 1475 µg/day (SED = 5.99). The mean daily concentration of aflatoxinM1 in milk of animals from both treatment groups fed with 50 g of mycotoxin binder was 76.51 µg/kg, nearly 22 µg lower than those without mycotoxin binder 98.31 ± 5 µg/kg (SED = 5.99: $p < 0.01$). The interaction between the 2 treatments was not statistically significant. The total carryover of aflatoxinB1 from feed to aflatoxinM1 in milk was 5.06 and 4.14% for group A and C (without mycotoxin binder) and 3.37 and 3.50%, for groups B and D respectively fed the mycotoxin binder. Thus buffaloes are highly efficient at transferring mycotoxins in feed to the aflatoxinM1 metabolite in milk, while mycotoxin binder is capable of alleviating without preventing this contamination risk. In spite of this, the concentrations in milk still exceeded the European Union minimum standard of 0.05 µg/kg by over 150 fold. Strategies to minimize fungal contamination of concentrate feeds remains of importance for food security in Pakistan.

Key Words: aflatoxinM1, aflatoxinB1, transfer, milk, mycotoxin binder, Nili-Ravi buffaloes

0300 Use of silage bacteria as enterosorbents to reduce aflatoxin contamination. Z. Ma*, J. J. Romero, S. K. Williams, and A. T. Adesogan, *Dep. of Animal Sciences, University of Florida, Gainesville*.

The aim was to determine the effects of bacteria strain, viability and pH on the aflatoxin B_1 (AFB_1)-binding capacity of silage bacteria. In Experiment 1, each of 10 silage bacteria strains (Table 0300) was screened for their AFB_1–binding capacity by growing them on de Man-Rogosa-Sharpe broth to a population of 10^9 cfu/ml in quadruplicate. The suspension was centrifuged at 2500 × *g* for 10 min and the pellet was suspended in a 1.5-mL solution (5 µg/ml) of AFB_1 in phosphate buffered saline (PBS) for 24 h at 20°C. Bacterial (bacteria suspended in PBS) and AFB_1 Controls were also incubated. Supernatant samples after centrifuging were used to quantify the presence of unbound aflatoxin by High-Pressure Liquid Chromatography. Data were analyzed as a completely randomized design. Each bacterium bound more than 18% of AFB_1, and the greatest responses occurred with *L. plantarum* R2014 (32.95%), *L. buchneri* R1102 (30.30%) and *P. acidilactici* EQ01 (25.38%). In Experiment 2, the latter 3 strains were tested to determine how pH and bacterial viability influence their ability to bind AFB_1. Bacterial cells (10^9 cfu/ml) were incubated in either 4 mL of PBS (viable cells) or 2M HCL (dead cells) and centrifuged as described above. Pellets were incubated in quadruplicate in AFB_1 solution as above at pH 6, 2.5 and 8 to simulate the pH in the rumen, abomasum and intestine of dairy cows, and AFB_1 binding was quantified. Data were analyzed as a completely randomized design with a 3 × 2 × 3 factorial treatment arrangement. Dead cells of *L. plantarum* R2014 (32.62% vs. 24.78%) and *L. buchneri* R1102 (45.05% vs. 17.77%) bound more AFB_1 than viable cells, whereas a contrasting response was detected for *P. acidilactici* EQ01 (2.44% vs. 21.92%, respectively). The pH of 2.5 increased AFB_1 binding compared with pH 6 and 8 ($P < 0.05$). All bacterial strains showed AFB_1–binding ability but the efficacy was dependent on the bacteria strain, viability and pH. More work is required to test the ability of the bacteria to bind AFB_1 in animal feeds.

Key Words: aflatoxin, silage bacteria, enterosorbents

Table 0300. Bacterial strains tested for AFB_1 binding capacity

Bacteria	Strain
Lactobacillus plantarum	R2014
	EQ12
	PT5B
Lactobacillus buchneri	R1102
Pediococcus acidilactici	R2142
	EQ01
Pediococcus pentosaceus	EQ44
	IA38
Propionibacterium jensenii	SE253
Propionibacterium acidipropionici	EQ42

0301 Effect of starter culture as a source of microbial contamination on the quality and safety of yogurt products in Egypt. M. M. Motawee[*1], W. E. D. I. Saber[2], and S. A. Ibrahim[3], [1]*National Organization for Drug Control and Research, Giza, Egypt,* [2]*Department of Microbiology, Giza, Egypt,* [3]*Food Microbiology and Biotechnology Laboratory, North Carolina A&T State University, Greensboro*.

Yogurt is one of the most common dairy foods in Egypt, yet the stability and shelf-life of yogurt remain a challenge to local producers. Thus, the objective of this study was to examine the effect of starter culture as a source of contamination on the quality and safety of yogurt product. In this study, we examined three groups of yogurt products. In group one, we collected 100 commercial yogurt products available in the marketplace. In group two, we made 10 yogurt batches ourselves using different yogurt starter cultures obtained from the local dairy industry. In group three, we made yogurt using yogurt culture from food microbiology stock culture. We then evaluated the types of microbial groups in relation to spoilage before and after storage of yogurt under chill condition and examined the microbial quality during storage at 7C for 14 d. Our results showed that during storage, there was an undesirable change in the commercial products as well as in yogurt products made with commercial starter cultures. All samples in groups one and two tested positive for *Aspergillus* spp. aflatoxin M1 and *Salmonella* spp. By contrast, the use of the control starter cultures prevented the presence of these contaminants in group three. Our results thus demonstrated that the use of a safe starter culture would be a promising approach to ensure the safety and quality of yogurt when it reaches the consumer.

Key Words: starter culture, yogurt, safety

0302 Effectiveness of pulsed light treatment on the inactivation of pathogenic and spoilage bacteria on cheese surface. J. Proulx[*1], L. Hsu[1], B. Miller[1], G. Sullivan[1], K. Paradis[2], and C. I. Moraru[1], [1]*Cornell University, Ithaca, NY,* [2]*McGill University, Montreal, QC, Canada.*

Cheese products are susceptible to post-processing cross-contamination that can lead to both food safety issues and significant losses due to spoilage. Pulsed Light (PL) treatment, consisting of short, high-energy light pulses, could represent a solution to address this issue since it is a nondestructive technology that can effectively inactivate microorganisms on surfaces. This study examined the effectiveness of PL on the inactivation of the spoilage microorganism *P. fluorescens* and the pathogen surrogates *E. coli* ATCC 25922 and *L. innocua.* The effect of inoculum level, cheese surface topography, and the presence of clear polyethylene packaging were evaluated in a full factorial experimental design. The challenge microorganisms were grown to stationary phase: *P. fluorescens* 1150 was grown at 30°C in tryptic soy broth (TSB) while *E. coli* ATCC 25922 and *L. innocua* FSL C2–008 were grown at 37°C in TSB and brain heart infusion (BHI), respectively. White cheddar and processed cheese, chosen for their different surface topography, were cut into 2.5 cm × 5 cm slices. The samples were then spot inoculated using ten droplets of 10 µL per slice, resulting in an initial concentration of either 5 or 7 log CFU/slice. Inoculated samples were dried overnight at 4°C. For treatments through packaging, sterile UV-transparent low-density polyethylene packaging was placed on top of the inoculated cheese samples immediately before the PL treatment. Cheese samples were then exposed to PL doses of 1.1 to 13.2 J/cm^2. PL-treated samples were stomached for 2 min in Butterfield Phosphate Buffer, the extract then plated on selective media and survivors enumerated by standard plate counting (SPC). When survivor counts fell below the SPC detection limit, the most probable number was used. Experiments were performed in triplicate and data were analyzed using a general linear model. PL was most effective against *E. coli*, achieving a maximum log reduction of 5.4 ± 0.3, at a dose of 13.2 J/cm^2. For *P. fluorescens*, a maximum log reduction of 3.7 ± 0.9 and for *L. innocua* a maximum log reduction of 2.9 ± 0.8 at 13.2 J/cm^2 were obtained. The process parameter effects tested showed varying statistical significance when used in different combinations, but PL treatments through packaging and without packaging consistently resulted in similar inactivation levels. This study suggests that PL has strong potential for decontamination of cheese surface.

Key Words: pulsed light, cheese, pathogenic and spoilage bacteria

0303 Evaluation of heavy metals, phenol, and polycyclic aromatic hydrocarbons on singed skin-on red Sokoto buck goats. O. A. Babatunde*[1], O. O. Olusola[2], O. J. Aremo[2], and W. Y. Akwetey[1], *[1]kwame Nkrumah University of Science and Technology, Kumasi, Ghana, [2]University of Ibadan, Ibadan, Nigeria.*

The safety of skin-on meat obtained from singed carcasses needs to be assessed. This study was therefore performed to investigate the concentration of heavy metals (Pb, Cd, Zn, Mn and Cu), phenol and polycyclic aromatic hydrocarbons (PAH) in red Sokoto buck goat carcasses singed using fire wood, kerosene, scrap tyre and liquefied gas (LG). A total of twenty four good grade red Sokoto buck goats weighing between 18-20 kg were randomly distributed into each of the four treatments in a completely randomized design. Each treatment was replicated six times. PAH levels were highest in scrap tyre singed carcasses (0.040 mg/kg) and least in LG singed carcasses (0.001 mg/kg). Pb and Mn were below detectable limit in carcasses singed with LG while the concentrations were similar ($P >$ 0.01) in the other treatments. Cd was not detected in any of the treatments. Zn concentration was highest in carcasses singed with kerosene (0.005 mg/kg). The level of phenol ranged from 0.02 Gae/kg in LG singed carcasses to 0.38 Gae/kg when scrap tyre was used. Material used in singeing was found to have profound effect on heavy metal, phenol and PAH depositions on skin-on meat from red Sokoto buck goats.

Key Words: skin-on, singed, heavy metal, phenol, polycyclic aromatic hydrocarbon, red Sokoto