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IDENTIFICATION OF MYCOBIOTA IN SERBIAN SLAUGHTERHOUSES

ABSTRACT: Mould growth within slaughterhouses is not acceptable and is considered as both economic and aesthetic problem. Aim of this paper was to determine filamentous moulds in two slaughterhouses by investigating air, water, environment area and equipment. There were a total of 100 samples collected. According to Samson (2004), 6 genera were determined among which *Penicillium* and *Aspergillus* were the most frequent. Three *Penicillium* species were identified; the most frequent were *P. brevicompactum* and *P. solitum.* The presence of *P. verrucosum* was not established. The presence of mycotoxigenic moulds, such as *P. brevicompactum*, indicates possible contamination of environmental area with mycophenolic acid (MPA). Results of investigation indicated that more comprehensive survey should be made in order to get a better insight of mycobiota in slaughterhouses in Serbia.

KEY WORDS: moulds, slaughterhouses, contamination

INTRODUCTION

Fungi are ubiquitously distributed and they contaminate meat and meat products which can further lead to meat spoilage. Contaminated meat also presents a health risk due to production of mycotoxins. The main sources of moulds contaminating carcasses are air, water, walls and floors of slaughterhouses (Refai et al., 1993). Refai et al. (1993) and Mansour (1986) reported air as a source of *Penicillium* and *Aspergillus*. Mansour et al. (1986) and Refai et al. (1993) reported that *Aspergillus, Penicillium, Cladosporium* and *Mucor* were frequently isolated from the floors and walls of slaughterhouses. Aim of this paper was to determine the occurrence of filamentous moulds within two slaughterhouses by investigating air, water, environment area and equipment in order to get a better insight of mycobiota in slaughterhouses in Serbia.

MATERIAL AND METHODS

The investigation was carried out in two beef slaughterhouses in central Serbia, in mid-autumn. A total of 100 samples were taken, fifty samples from each slaughterhouse. Ten samples of air, water, floors, walls and equipment were analyzed mycologically on the plates of Dichloran-Rosebengal-Chloramphenicol-agar medium. In order to investigate the presence of spores in air, exposed plate method was used, with each plate being exposed to the air of the slaughterhouse for 1 minute. For the water-borne moulds, 1 ml of water from water line within slaughterhouse was spread on each plate. Floor and wall area of 100 cm^2 each was swabbed using template. All plates were incubated at the temperature of 25°C for 7 days. Fungi were identified from macro- and microscopic features according to the criteria of Samson (2004) and Pitt (1988).

RESULTS AND DISCUSSION

The obtained data from the slaughterhouses were joined. The results of this study are presented in Table 1 and Figures 1 and 2. A total of six genera and eleven species of moulds have been isolated from environmental swabs. As it can be seen from the table, the most frequently isolated genera were *Penicillium* spp. and *Aspergillus* spp. Three *Penicillium* species were identified; the most frequent were *P. brevicompactum* and *P. solitum.* In this study we did not determine the production of mycotoxins. However, there were a couple of them reported to be toxigenic (Ostrý, 2001). The presence of mycotoxigenic moulds, such as *P. brevicompactum*, indicates a possibility of contamination of environmental area by mycophenolic acid (MPA). Presence of *P. verrucosum* was not established. There were no moulds in the water from the slaughterhouse pipelines which collides with the findings of Ismail (1995). Regarding the equipment swabs, *P. chrysogenum*, *P. brevicompactum* and *Cladosporidium* spp. were isolated in 2, 7 and 91% of the cases, respectively. However, members of the genus *Penicillium* and *Aspergillus* are reported to produce the widest range of mycotoxins, among which are ochratoxin A, aflatoxins, patulin, citrinin, citreoviridin, griseofulvin, rubratoxin, and penicillic, cyclopiazonic, secalonic, or mycophenolic acids. Regarding *Cladosporium* spp. and *Mucor* spp., no report on their ability for mycotoxin production in meat has been published so far (Ostry and Ruprich, 2001).

Tab. 1 — Species of moulds isolated from environmental area

Species	Incidence percentage			
	Air	Water	Floor	Walls
Penicillium brevicompactum	19	0	8	2
Penicillium solitum	34	0	28	
Penicillium chrysogenum	5	0	7	3
Aspergillus flavus	17	0	18	
Aspergillus clavatus	0	0	2	

Aspergillus terreus	2	0	8	32
Cladosporium sphaerospermum	8	0	5	20
Cladosporium cladosporioides	5	0	2	18
Cladosporium herbarum	2	0	4	25
Scopulariopsis brevicaulis	0	0	2	
Alternaria alternata	2	0	7	
Mucor racemosus	6	0	9	

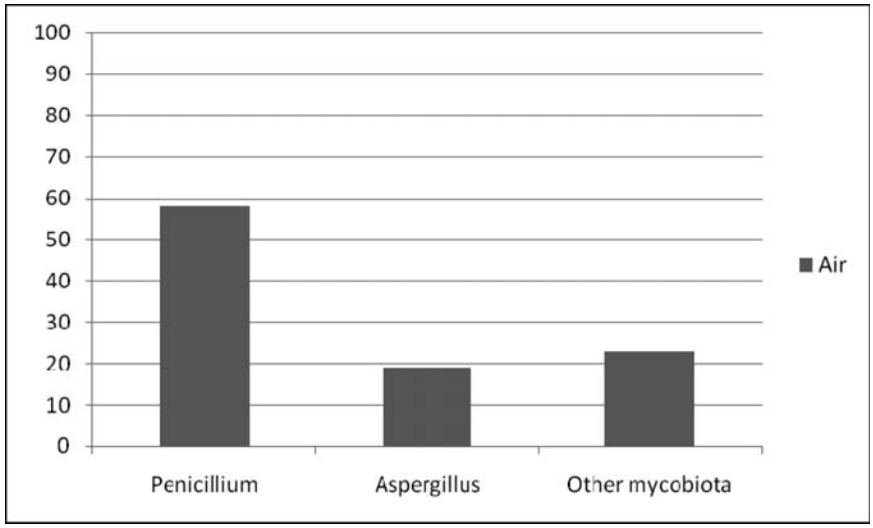

Fig. 1 — Share of *Penicillium* spp. and *Aspergillus* spp. in mycopopulation isolated from air

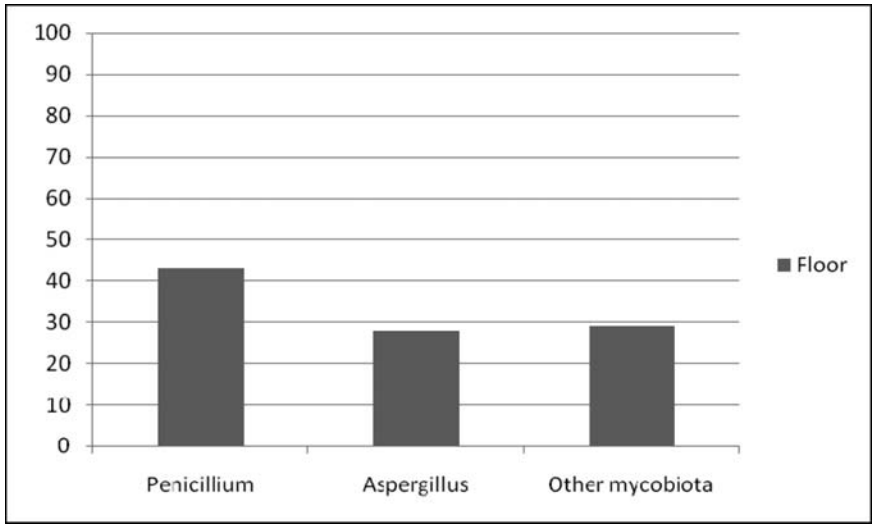

Fig. 2 — Share of *Penicillium* spp. and *Aspergillus* spp. in mycopopulation isolated from floor

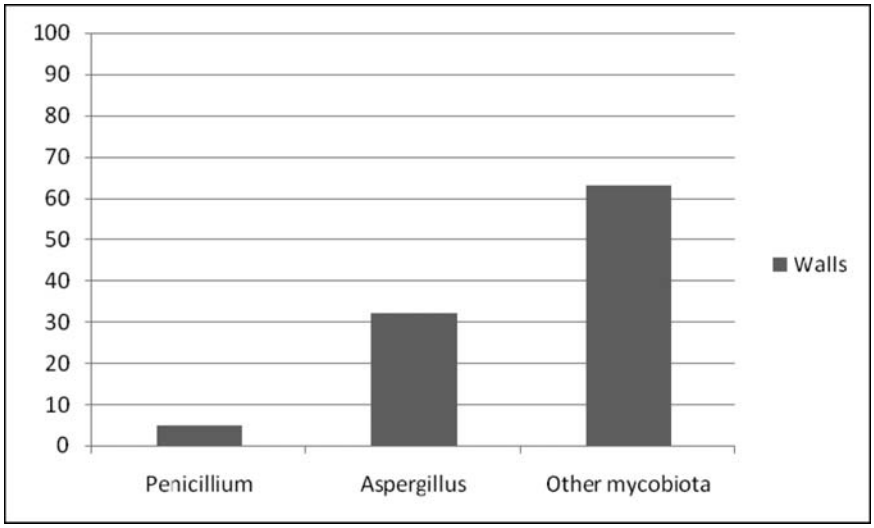

Fig. 3 — Share of *Penicillium* spp. and *Aspergillus* spp. in mycopopulation isolated from walls

CONCLUSION

The spores of moulds are always present in the environment enabling their survival even in extreme conditions. Therefore, it is practically impossible to eliminate them from food. The most frequent genera were *Penicillium* spp. and *Aspergillus* spp. There were no moulds in the water from the slaughterhouse pipelines. In general, the conditions during the slaughtering (relative humidity, air circulation) are suitable for cross-contamination and development of microscopic filamentous fungi on beef carcasses. Therefore, the prevention of mould development in the meat of slaughtered animals, as well as in the manufacturing rooms, stores and shops is of great importance in order to avoid the risk of mycotoxin production.

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ИДЕНТИФИКАЦИЈА МИКОБИОТА У КЛАНИЧНИМ ОБЈЕКТИМА У СРБИЈИ

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Резиме

Појава плесни у кланичним објектима није пожељна и сматра се економским и естетским проблемом. У циљу детерминације микобиота у два кланична објекта, ваздух, вода, радне површине и опрема испитани су на присуство филаментозних плесни. Испитано је укупно 100 узорака. Идентификацијом по Самсону утврђено је присуство 6 родова, а најчешћи су били *Penicillium* и *Aspergillus*. Идентификоване су 3 врсте из рода *Penicillium*, а у највећем броју узорака *P. brevicompactum* и *P. solitum*. Није утврђено присуство *P. verrucosum*. Присуство токсигених плесни као што је *P. brevicompactum* указује на могућност контаминације радних површина микофенолном киселином (MPA). Резултати истраживања указују на потребу интензивнијег испитивања и идентификације плесни у кланичној индустрији Србије.