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FLOQSwab™: A Field Study for evaluate the Microbiological Recovery From Surfaces for Environmental Monitoring

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Introduction

In food safety, microbiological work surface controls play an important role in the monitoring of contamination from the environment (Kusumaningrum *et al.,* 2003; Verran *et al.*, 2010). There is great interest and continued commitment of all the entities involved, food business operators, laboratories and companies producing laboratory principles, in order to guarantee greater security concerning the aspect of hygiene of work surfaces and its verification. (Moore & Griffith, 2002; Ismail *et al*., 2013)
In recent years has emerged the possibility of adopting innovative collection devices for the recovery of bacteria from food surfaces for-environmental monitoring. (Probst *et al*., 2010; Lahou & Uyttendaele 2014). The Copan flocked swab "FLOQSwab™" (figure 1) is an innovative pre-analytical specimen collection device that is compatible with all diagnostics from culture to molecular amplifications assays. The flocked swab contains short nylon fibber strands attached to molded plastic, with a hydrophilic layer of nylon pile that results in efficient collection and release of particulate matter.
Clinical data and previous studies have demonstrated flocked swab superiority over traditional collection devices from surfaces (Dalmaso *et al.,* 2008, Finazzi *et al.* 2016) in terms of recovery and release. Based on these studies, it was decided to verify the applicability of the flocked swab in the food industry for the recovery of bacteria from surfaces for environmental monitoring and detection of specific pathogens. The objective of this study was to compare traditional rayon swabs to flocked swabs for environmental monitoring carried out on different surfaces in dairies for the detection of bacteria.

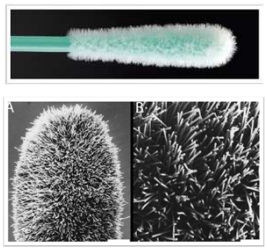


Figure 1: Pictures of a FLOQSwab™ tip using EM

Materials and Methods

In this study two different type of swabs, a FLOQSwab™ (Copan Italia, Brescia) and a traditional rayon tipped swab (Copan Italia, Brescia) were used to collect surface samples for environmental monitoring.
Samples were double collected from different surface materials: stainless steel, polypropylene, wood, and cupper. Samples were collected from different type of surfaces as tables, floors, walls, caldrons, molds, axis of seasoning and other tools for cheese-making.
The surfaces, usually areas of 100 cm^2, were sampled in contiguous areas with the two swabs according to ISO 18593:2004.
Seventy six surfaces were analyzed for detection of *L. monocytogenes (*LM*)* according to RT-PCR IQ-CheckTM Kit Bio-Rad, with confirmation of positive samples according to ISO 11290-1:1996 /Amd1:2004; 58 surfaces (21 stainless steel, 11 polypropylene, 6 cupper, 6 woods and 12 not known) were analyzed according to ISO 4833-2:2013 Cor1:2014 for total mesophilic count (TMC).

Figure 2: Processing room of a dairy

Results

Three surfaces out of 76 (3,95%) were positive for *L. monoctyogenes* by RT-PCR method; positivity was confirmed by ISO cultural method in 2 samples (2,63%) collected by FLOQSwab™, and only in 1 (1,32%) sample collected with traditional swab.

Figure 2: detection of LM from samples collected by FLOQSwab ™

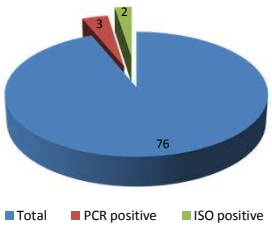
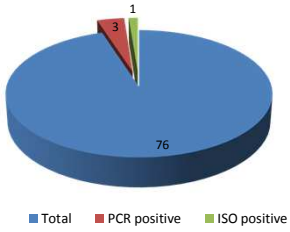


Figure 2: detection of LM from samples collected by Traditional rayon tipped swab



TMC data showed a higher recovery rate by FLOQSwab™ on 27 samples (46,6%); traditional swab had better performance, respect to FLOQSwab™, on 12 samples (20,7%). Relatively to TMC it should be noted that in several samples (19 = 32,7%) it was obtained a results of not detection (< 1 cfu / cm^2) with both the two kind of swabs. In Table 1 are reported the results obtained comparing in detail flocked and traditional swabs on different materials.

Table 1: Comparison between the two swabs on the different surfaces analyzed

	Stainless steel	Polypropylene	Wood	Cupper	Surface not specified
FLOQSwab™ higher recovery	9	6	1	8	3
Traditional Swab higher recovery	6	2	2	0	2
TOTAL	21	11	6	8	12

Results discussion and conclusion

The low number of positive samples for LM does not allow to express considerations about the greater efficacy of a type of swab related to the other in the recovery of this pathogen, although positivity was confirmed by ISO cultural method in 2 samples collected by FLOQSwab™, and only in 1 sample collected with traditional swab.
This study however demonstrated that FLOQSwabTM is a good food-surfaces collection device for environmental monitoring and shows a higher recovery rate on different types of surfaces. Concerning TMC analysis, FLOQSwab™ seemed to be more efficient on several materials such as polypropylene, stainless steel and cupper surfaces, while the traditional swab showed a higher recovery rate on wood.
In food safety, microbiological work surface controls play a fundamental role for the prevention of contamination from the environment. The sampling techniques usually applied underrate the level of contamination of different surfaces when in contact with food during food processing. This could give to food business operators false information about the level of cleanliness of the processing environments. Results obtained in this study are encouraging, due to an innovative collection tool, the FLOQSwab™, and can be proposed as improvement for the collection of environmental hygiene controls.
The use of swabs for the environmental sampling was discouraged in the past due to the poor recovery and for the risk of erroneous or underestimated results. The introduction of the FLOQSwab™ allows the operator to reintroduce the use of a swab as sampling tool for all the difficult to reach area to be monitored for hygiene assessment.

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Aknowledgment

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