

## Use of wooden shelves for cheese aging

Microbial pathogens can be controlled if food facilities engage in good manufacturing practice. Proper cleaning and sanitation of equipment and facilities are absolutely necessary to ensure that pathogens do not find niches to reside and proliferate. Adequate cleaning and sanitation procedures are particularly important in facilities where persistent strains of pathogenic microorganisms like *Listeria monocytogenes* could be found. The use of wooden shelves, rough or otherwise, for cheese ripening does not conform to cGMP requirements, which require that “all plant equipment and utensils shall be so designed and of such material and workmanship as to be adequately cleanable, and shall be properly maintained.” 21 CFR 110.40(a). Wooden shelves or boards cannot be adequately cleaned and sanitized. The porous structure of wood enables it to absorb and retain bacteria, therefore bacteria generally colonize not only the surface but also the inside layers of wood. The shelves or boards used for aging make direct contact with finished products; hence they could be a potential source of pathogenic microorganisms in the finished products.

Recent publications by Zangerl *et al.* in 2010 showed that *L. monocytogenes* survived cleaning and sanitation on wooden shelves used for cheese ripening. [Zangerl, P., Matschweiger, C., Dillinger, K., & Eliskases-Lechner, F. (2010). Survival of *Listeria monocytogenes* after cleaning and sanitation of wooden shelves used for cheese ripening. *European Journal of Wood and Wood Products*, 68(4), 415-419]. Another scientific paper by Mariana *et al.*, 2011, does not suffice to overcome the cGMP violation. [Mariani, C., Oulahal, N., Chamba, J.F., Dubois-Brissonnet, F., Notz, E., Briandet, R. (2011). Inhibition of *Listeria monocytogenes* by resident biofilms present on wooden shelves used for cheese ripening. *Food Control* 22, 1357-1362]. More importantly, the data in the Mariani, *et al.*, study showed that despite the use of unclean and clean native woods, *L. monocytogenes* strains were not completely inactivated or eradicated on the woods. The mere fact that *L. monocytogenes* survived in any wood sample studied should be of concern. A single surviving *L. monocytogenes* cell may grow and multiply and thus serve to contaminate cheese. Noteworthy is the fact that the authors suggested that further studies are required in order to establish the mechanism of inhibition by the bacteria described in the paper, which, for now, is only speculative. Thus the paper does not support the proposition for which it was offered, viz. that wooden shelves prevent contamination of cheeses with *L. monocytogenes*.

The primary concern for cheeses manufacturers should be prevention of cheese contamination with pathogens. Pathogenic microorganisms are not inherent natural contaminants of cheeses, therefore the sanitation of a cheese processing plant's equipment and environment play an important role in preventing pathogen contamination.