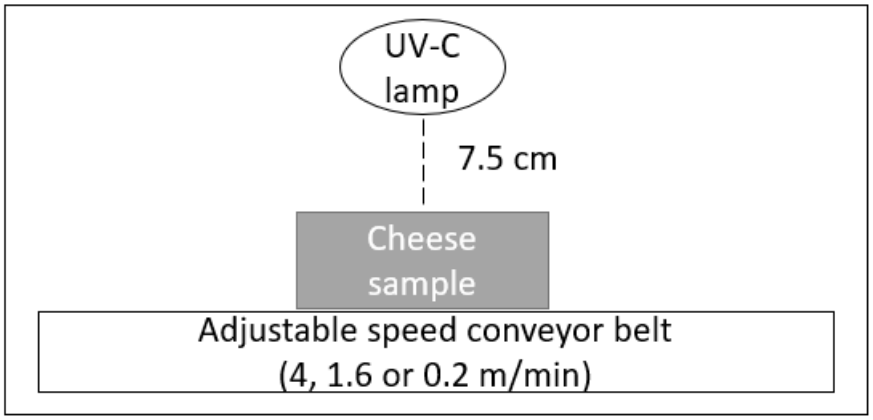
Possibilities of using the continuous type of UV light on the surface of lor (whey) cheese: Impacts on mould growth, oxidative stability, sensory and colour attributes during storage

Muge Urgu-Ozturk

SUPPLEMENTARY FILE



Supplementary Figure S1. Schematic representation of UV light treatment of lor (whey) cheese

Supplementary Figure S2. Images of UV light equipment and treatment of lor (whey) cheese

Material and methods

Thiobarbituric acid reactive substances (TBARS)

Method of Kristensen & Skibsted (1999) was modified to determine the secondary lipid oxidation products. For this assay, 6 g of sample were added to 18 ml of 0.67% w/v thiobarbituric acid in 50% v/v aqueous acetic acid, and homogenized with a Ultra Turrax homogenizer for 2 min. 6 ml of the prepared suspension was transferred to test tube and mixed with 3.5 ml of chloroform for 5 min at the medium speed setting by vortex (Fisher Scientific Co., Pittsburgh, PA). After that, the mixture was centrifuged for 15 min and the aqueous phase was transferred to another test tube. Then, the test tube was placed in a water bath at 100 ˚C for 10 min, and cooled to room temperature. The absorbance of the solution was measured with a spectrophotometer (T-60; PG Instruments, Lutterworth, UK) at 450 nm and the result was expressed as absorbance unit per gram of cheese (A_{450}/g cheese).

Protein Carbonyls

The protein-bound carbonyl content is the most commonly used marker of protein oxidation (Dalle-Donne *et al*., 2003). Protein carbonyls in cheese samples were measured following the procedure by Oliver *et al*. (1987). A cheese homogenate, containing approximately 2 mg protein, was prepared using 10 ml of 0.15 N potassium chloride and the homogenate was divided into two equal parts of 1 ml. 10% Trichloroacetic acid (TCA; final concentration) was added to precipitate proteins, and samples were centrifuged at 2,000 g for 10 min to obtain the pellets. One pellet was mixed with 1 ml of 2 N hydrochloric acid (HCl), while the other one was mixed with 1 ml of 20 mM 2,4-dinitrophenylhydrazine (DNPH; w/v) in 2 N HCl. After the samples were incubated at 30 °C for 1 hr, they were reprecipitated with TCA. After then, the pellets were washed twice with 1 ml of ethanol:ethyl acetate (1:1, v/v) and centrifuged at the same condition. The precipitates were finally resuspended in 1 ml of 6 M guanidine HCl

with 20 mM sodium phosphate buffer (pH 6.5). The carbonyl content was calculated at 370 nm using an absorption coefficient of 22000 L/mol·cm. The protein concentration was analyzed by measuring the absorption at 280 nm using bovine serum albumin as the standard. Results were expressed as nmol of carbonyls per mg of protein.

Supplementary Table S1. Pearson correlations between lipid oxidation, protein oxidation and colour attributes of lor cheeses

	PV	$TBARS_{450\ nm/g}$	$TBARS_{532\ nm/g}$	Carbonyl	L*	a*	b*	BI	Δ*E*	Chroma	Foreign flavour	Overall impression
PV	-	.960**	.885**	.859**	-.418*	.619**	.861**	.828**	.869**	.847**	.872**	-.928**
$TBARS_{450\ nm/g}$	.960**	-	.928**	.814**	-.364	.671**	.870**	.823**	.831**	.852**	.838**	-.930**
$TBARS_{532\ nm/g}$	.885**	.928**	-	.807**	-.530**	.746**	.785**	.792**	.808**	.773**	.824**	-.902**
Carbonyl	.859**	.814**	.807**	-	-.685**	.586**	.752**	.821**	.920**	.764**	.742**	-.761**
L*	-.418*	-.364	-.530**	-.685**	-	-.294	-.322	-.564**	-.655**	-.378	-.416*	.346
a*	.619**	.671**	.746**	.586**	-.294	-	.634**	.654**	.505*	.632**	.575**	-.662**
b*	.861**	.870**	.785**	.752**	-.322	.634**	-	.936**	.832**	.990**	.877**	-.908**
BI	.828**	.823**	.792**	.821**	-.564**	.654**	.936**	-	.826**	.970**	.826**	-.845**
Δ*E*	.869**	.831**	.808**	.920**	-.655**	.505*	.832**	.826**	-	.819**	.839**	-.839**
Chroma	.847**	.852**	.773**	.764**	-.378	.632**	.990**	.970**	.819**	-	.858**	-.887**
Foreign flavour	.872**	.838**	.824**	.742**	-.416*	.575**	.877**	.826**	839**	858**	-	-.931**
Overall impression	-.928**	-.930**	-.902**	-.761**	.346	-.662**	-.908**	-.845**	-.839**	-.887**	-.931**	-

* Correlation is significant at the 0.05 level.

**Correlation is significant at the 0.01 level.

PV: Peroxide value, TBARS: 2-thiobarbituric acid reactive substances, L*: lightness-darkness, a*: red-green colour, b*: yellow-blue colour, ΔE: colour difference with untreated control lor cheese as a reference, BI: browning index.