

OVTENE : EFFECT ON THE PRESERVATION OF FOODS

introduction

Ovtene is a plastic material , consisting largely of calcium carbonate (CaCO_3) added in a homogeneous way in high density polyethylene (HDPE) and titanium dioxide (TiO_2) . The presence of a high amount of filler has the function of improving on the one hand the mechanical properties of the material [1] , making it more flexible and extensible , and other barrier properties and surface . The incorporation of a high amount of mineral fillers is also able to give the product an appearance as similar as possible to the paper , more pleasing to the consumer , and also provide a barrier to light, jointly responsible together with other factors , in altering of foods.

Ovtene is considered a single material , 100% recyclable plastics. Unlike conventional multilayer packaging , this allows to avoid all the steps involved in the recycling process , such as the separation of the layers that compose the multilayer , their washing, drying and reprocessing , or all processes that require a great deal of energy and work, and that make the final product more expensive.

Ovtene can be used for all food matrices excluding those which have a pH equal to or less than 4.5.

From the studies carried out in collaboration with the Department of Food Science , University of Udine, Ovtene , due to its special characteristics , features of the positive trends with regard to the effectiveness in prolonging the shelf life of packaged products compared to other films comparison (eg . polyethylene and polypropylene) .

Ovtene offers a range of products for all the major needs of food packaging bench . From bags to sheets coils to ByOvtene , patented wrapping ensures that , once closed , the perfect sealing of the product without the use of additional bags . This casing is in particular intended to dynamometers gastronomy , where the effectiveness of the conservation of the packaging provided to the consumer seems to be crucial.

Ovtene : assessment of effectiveness in relation to different categories of foods

Ovtene has the advantage of delaying the processes microbiological and physico-chemical alteration of food . When placed in contact with food , it creates a special " micro-climate " that does not suffocate the product , does not disperse odors and prevents changes in the structure of the food for more days. Consequently, the packaged food will keep longer and more better , keeping the freshness of the moment when it is cut and portioned the point of sale .

In this section, will be treated the positive effects of Ovtene catogorie on the following foods :

- Dairy products
- Meat products
- Fish products
- Bakery

Dairy Products

Studies conducted in collaboration respectively with the Department of Food Science , University of Udine and the Parmigiano-Reggiano Consortium , have shown that when Ovtene is placed in contact with the food matrices such as soft cheese or Parmigiano Reggiano, these have a better shelf life than a traditional food packing .

In the case of soft cheese , were investigated the rheological properties of structural cohesion (network strength) and loss of the elastic behavior compared to the same product

stored in a conventional reference material (a laminate obtained with films based on polyethylene and polystyrene) after 9 15 and 21 days (Fig. 1) .

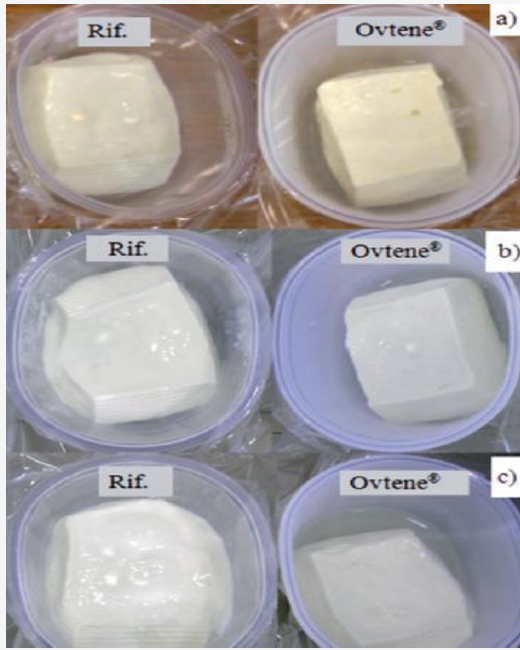


Figure 1: Samples of soft cheese stored at 4 ° C in the laminate obtained with films based on polyethylene and polystyrene (ref) and in Ovtene after (a) 9 , b) and 15 (c) 21 days.

The results showed the best behavior for the cheese kept in Ovtene . The study also examined the microbiological aspects . The evolution of the population of lactic acid bacteria in time is significantly reduced in the samples of soft cheese stored in Ovtene than those packaged in conventional packaging of reference similar to that previously described (Fig. 2) . It should be noted that the inhibition of the growth of lactic acid bacteria reduces the acidification and the softening of the food matrix , better preserving the Stracchino in time. Furthermore, the development of lactic acid bacteria in a food matrix gives a particular sensory profile of [2] which can give a negative character , as it is not used as starter bacteria in cheese making .

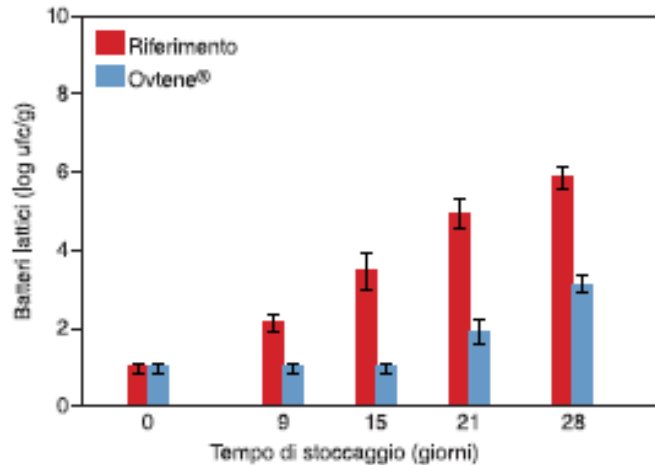


Figure 2: Evolution of the population of lactic acid bacteria over time in samples stored in laminated soft cheese made with polyethylene and polystyrene (Reference) and Ovtene

The collaboration with the Consortium of Parmigiano Reggiano has also led to an experiment to evaluate the effect of different types of packaging on the conservation of slices (300 g) Parmigiano Reggiano aged for 24 months and stored at refrigeration temperatures ($3 \pm 1 ^\circ \text{C}$), simulating the domestic conditions : Opening the door of the refrigerator at least three times a day and subsequent ignition of the bulb inside the refrigerator. The tests have demonstrated the effectiveness of Ovtene for as little as 7 days , including the materials taken into account and brought into contact with the samples in question (film wrap , aluminum packaging , rigid plastic containers and two types of Ovtene , Box and bag) , the packaging consisting Ovtene are able to significantly inhibit the development of molds than the other materials (Fig. 3 b). The trend is even more evident with the progress of time of storage. The images of the samples represented in Figure 3 taken at the beginning and end of the experiment are consistent and confirm what has been shown by the experimental data .

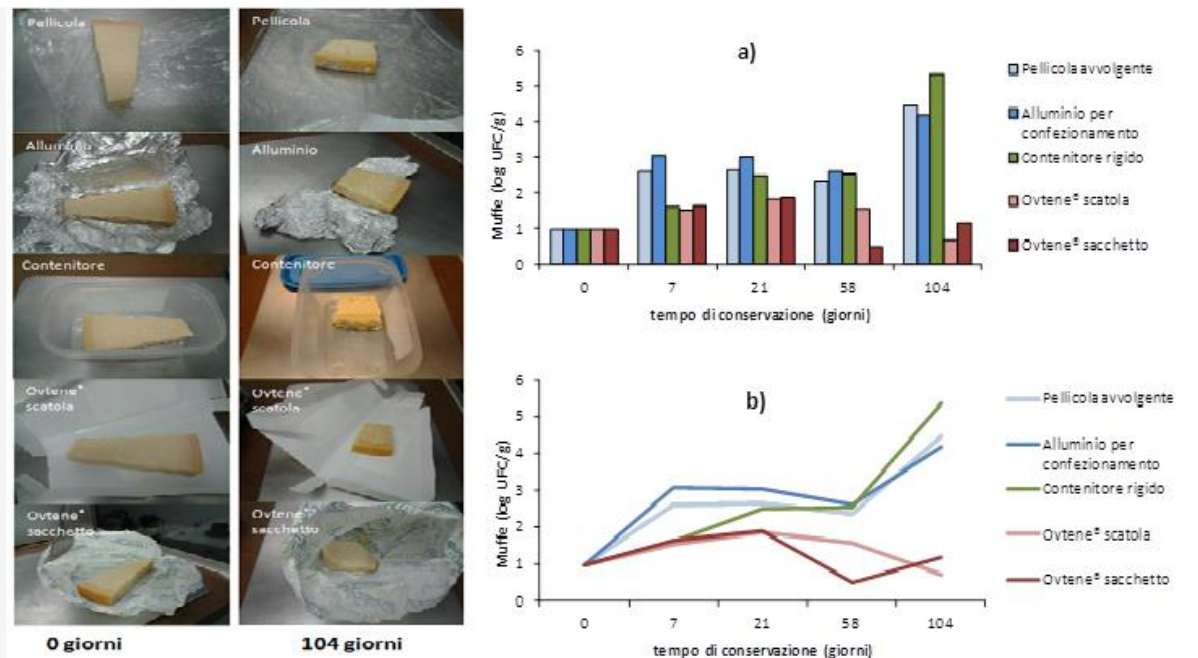


Figure 3: Evolution of the population of mold over time in samples of Parmigiano Reggiano stored in various types of packaging. The left image is the visual feedback to the analytical data (a) and (b) at time 0 and 104 days.

meat products

In a test conducted on slices of fresh lean beef (thickness of about 5 mm) , obtained from adult bovine national origin , in perfect condition post- slaughter and deboning Ovtene was confronted with a coated paper having the reference function . Manual packaging made was conducted in such a way as to maximize the contact between the meat and the packaging material. The samples were kept at a temperature of $5 \pm 1^{\circ} \text{C}$.

The images of the state of the meat after 0 , 24 and 51 hours of conservation are depicted in Figure 4 as regards the packaging in coated paper , and Figure 5 for packaging in Ovtene .

The color of meat is the main criterion of choice by the consumer . The elements that determine the color is the pigment content (myoglobin) and their oxidation state. The content of the red is linked to the redox equilibria in charge of myoglobin : the bright red color occurs when oxygenated myoglobin (oxymyoglobin) , while the color brown (metmyoglobin) is generated by the oxidation of myoglobin and oxymyoglobin and its formation is the progression of the deterioration of the food. In light of the results , it can be noted that the development to darkening due to the formation of metmyoglobin seems to be more pronounced in the sample placed in contact with the coated paper. As regards the production of exudate , can be observed as an absorption by the coated paper to produce a degradation , as opposed to Ovtene , which is more effective for this aspect .

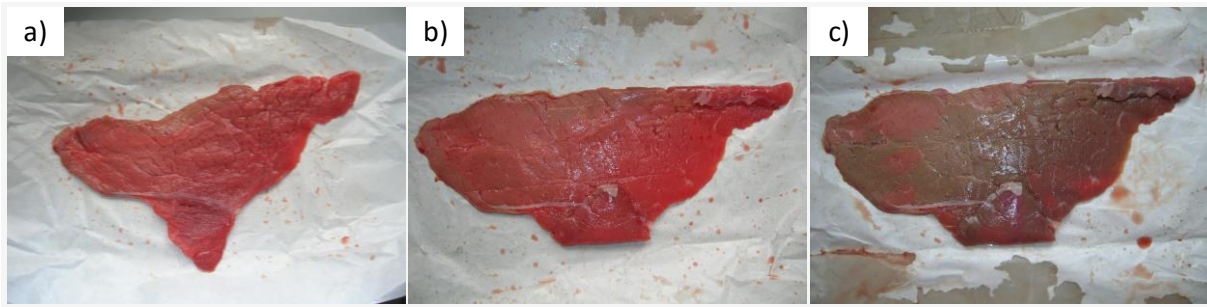


Figure 4: Representation of the slices of beef stored in polythene to (a) time 0 , (b) time 24 h (c) time 51 hours.

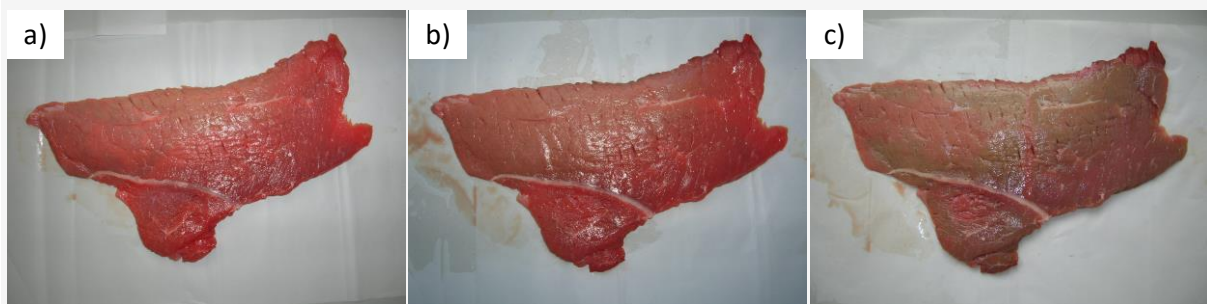


Figure 5: Representation of the slices of beef stored in polythene to (a) time 0 , (b) time 24 h (c) time 51 hours

The tests carried out in respect of shelf life of samples of mortadella sliced (thickness 0.13 cm) have demonstrated the efficacy of Ovtene . In any packing materials were packed between two slices and stored 3-6 ° C. Ovtene has been compared with the polypropylene film .

A next test performed on mortadella , has allowed to understand the effectiveness of Ovtene against a reference material (aluminized paper) . For the test in question was used a trained panel to evaluate the sensory properties of mortadella packaged in different materials under study. The parameter considered for the evaluation of the state of degradation of the product was the acceptability in terms of a potential purchase of the same . 100% represents the maximum value , where all members (ten) of the panel would buy the product. The samples of mortadella were stored at a temperature of 3-6 ° C. The results are shown in Figure 6 and testify the ability of Ovtene better preserve the food . In fact, after 5 days of storage , almost 70 % of the panel had thought that the sausage could be sold as a function of the sensory characteristics , unlike the samples stored in the reference , where no member of the panel had considered good its sensory characteristics .

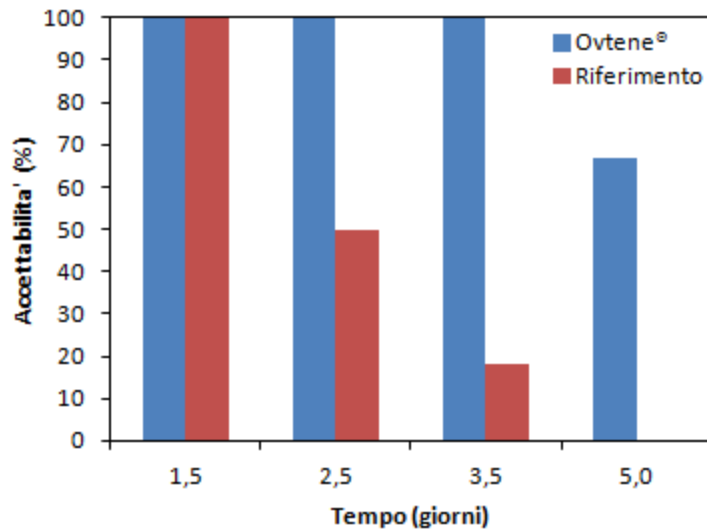


Figure 6: Acceptability of mortadella function of time of storage in Ovtene and packaging in a reference (aluminized paper).

fish products

The fish product used was salmon (*Salmo salar*) salted and smoked, trimmed and vacuum packed. For this experiment, a film of Ovtene was compared with a traditional multilayer film used as a reference and is obtained through a coupling PE / aluminum / cardboard / PE. The reference material is normally used as a support on which to place the salmon fillets. The salmon fillets, removed from their original packaging, were placed on sheets of Ovtene and reference (Fig. 7).

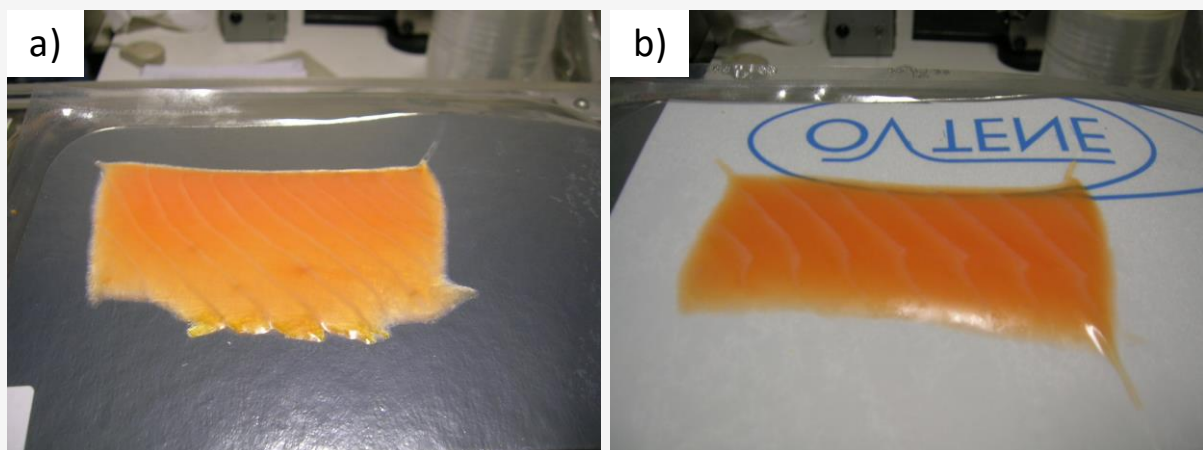


Figure 7: Smoked Salmon Fillet wrapped on (a) reference and (b) Ovtene, the seventh day of storage in the refrigerator.

Everything was packed in a nylon bag. The samples (9 for each type of storage) were stored in refrigeration and freezing condition for 35 days and characterized

from the point of view of the state of lipid oxidation . Sensory analysis was performed initially on the third day and thereafter every seven days until the conclusion of the trial.

The oxidation state was evaluated through the determination of the thiobarbituric acid (TBAR) . This allows to determine the secondary products arising from the oxidation reactions , and in particular aldehydes , exploiting the high reactivity of the 2- thiobarbituric acid (TBA) with carbonyl compounds . The malonilalidaide (MDA) is one of the products of lipid oxidation and is the main compound to be followed to assess the state of lipid oxidation . The result, expressed as mg MDA per kg of substance , is higher in products that are more oxidized . Figure 8 represents the values of MDA for the samples stored under conditions of freezing and refrigeration, according to the different type of material used for packaging . One can observe how Ovtene is more effective in the reduction of oxidative events compared to the material used as the reference , both in conditions of freezing both refrigeration . Sensory analysis was consistent with the results obtained from the determination of TBAR . As early as the third day there was a loss of exudate from the thread positioned on the support of reference. A presence of exudate occurred to load the thread stored in Ovtene the seventh day . At the end of the trial the thread placed on Ovtene was almost completely dehydrated , while the reference filed a lighter color , a very unpleasant odor and exudate dispersed.

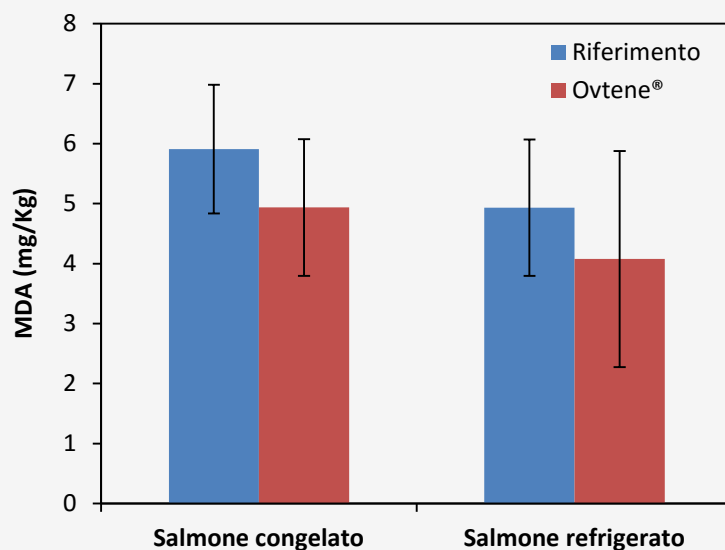


Figure 8: Contents of MDA in the samples frozen and chilled . The amount of sample analyzed was equal to 2 g .

Bakery products

Samples of sliced bread were studied by following the development of molds according to the different types of packaging. The samples in question were packed in Ovtene and compared with samples packaged in PET as a control. The experiment was conducted using the optimized protocol in the laboratories of the University of Cork (School of Food and Nutritional Sciences, University College Cork

, Ireland) as reported in the article published by Dal Bello et al. (2007) [3] . The results demonstrate how Ovtene is capable of delaying in time the spread of fungal mycelium on the product itself with respect to that of the control (Fig. 9) .

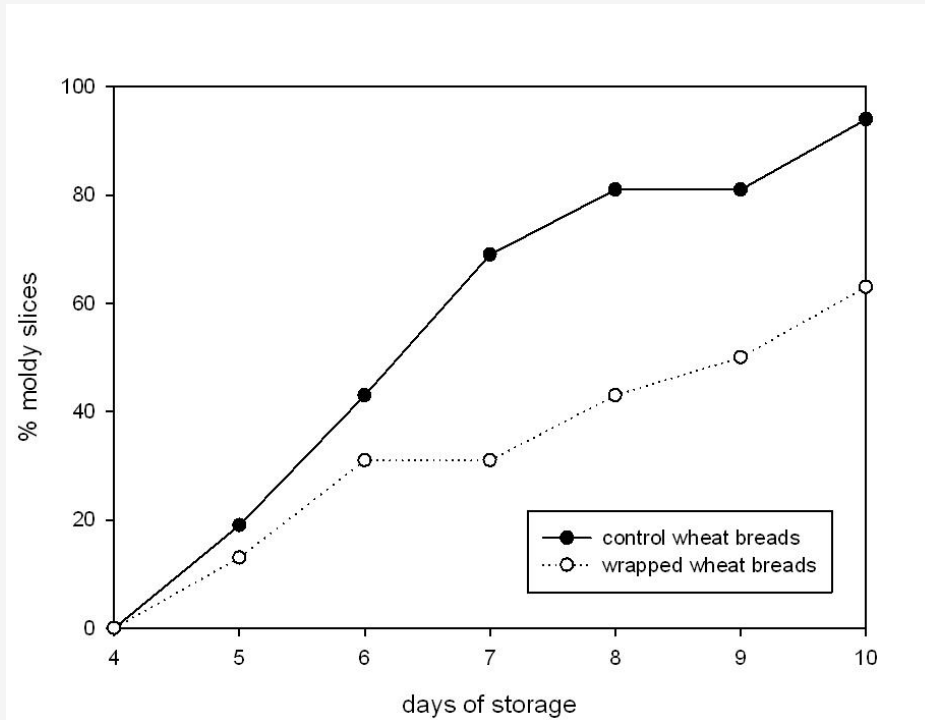


Figure 9: Percentage of moldy slices as a function of days of storage for the two types of packaging tested.

conclusion

As shown by the tests performed and reported in the previous section , Ovtene has proven to be effective against the various categories of foods used , delaying the degradation of the same and maintaining better their quality over time. The effectiveness of Ovtene is due to its chemical-physical characteristics , which would lead to an inhibition of the growth of microorganisms responsible for the deterioration of the food matrix , with particular reference to molds. Not to be neglected is also the photo - catalytic effect induced by UV- Vis (both at ambient conditions that the light source inside the cold room) , which could have played a role in slowing microbial growth and conservation of chemical-physical characteristics and consequently sensory food tested.

Bibliografia

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