

## Alistag™, a new coating agent for aging cheese and hams

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### Abstract

Aging rooms of dry-cured ham and cheese are subject to the development of mold and arthropods, above all mites, which cause the erosion of the external part of these food products, reducing their surface to dust and determining their progressive degradation. This work is meant to give the results of an experiment carried out to test the level of protection supplied by Alistag™, a coating agent based on Gluconodeltalactone, on a typical Sicilian cheese *cosacavaddu ibleo*. Alistag™ was applied by nebulization and by immersion. The two parameters took in consideration to evaluate their efficacy were the presence/absence of cracks and the level of dustiness on the surface of the cheese. Alistag™ turned out to be very efficient in protecting cheese both from the development of dust and from cracks; between the two kinds of application tested, immersion resulted to be the best one, for the protecting action lasts longer.

### Introduction

As it is known, during the aging process, ham and cheese frequently undergo infestations of mites, which erode the external part of the cheese, causing the pulverization of the surface of these food products, consequently decreasing their quality (Amoah *et al.*, 2016; Eales *et al.*, 1917; Geranio and Principato, 1997).

The most frequent mites found in aging rooms and on aged products are *Tyrophagus putrescentiae* and *Acarus siro* (Principato *et al.*, 2014). Their colonies can sometimes be contaminated also by other mites, among which *Glycyphagus domesticus* and *Lepidoglyphus destructor*, which have relevant dermatological interest, since they determine a scabies-like micro-papulopustular dermatitis, also known as *Glycyphagosis* (Principato and Lisi, 2004; Stingeni *et al.*, 1997, 2017).

It is clear that the peculiar dust generated on the surface of food products determine the decrease of their quality and often the onset of dermatological sanitary problems, not to be underestimated (Anderson and Fishman, 1948; Cevizci *et al.*, 2010).

For this reason the scientific community has been working hard to find remedies to solve this problem, testing new methodologies, such as microwaves, infrared rays, hot air, water vaporized at high pressure, ozone etc. but none of these methods is giving satisfying results after testing them (Armitage *et al.*, 1984; Pagani, 1989; Pagani and Ciampitti, 1991, 1992; Principato *et al.*, 1995; Principato and Cuteri, 1996; Sinha, 1964; Zhao *et al.*, 2016; Zdarkova and Voracek, 1993).

In this work we present the outcome of a new product, classified as *Coating agent*, applied on aging cheese, either by immersion or by irroration, giving outstanding results in protecting aged food from the development of this peculiar dust that damages its external surface.

### Materials and Methods

Between March and July 2017 a field experiment was carried out to test the level of protection obtained using Alistag™ on a typical Sicilian cheese *cosacavaddu ibleo*. Alistag™ is a coating agent, based on Gluconodeltalactone, able to provide a protective coating to the food product, promoting its natural aging. Alistag™ was specifically formulated to upholster aged cheese and meat transformed, not thermally treated (ham and other aged sausages). Alistag™ is found on the market as a liquid product in emulsion, ready to be used.

The factory where these tests were carried out is located in an industrial area in Ragusa, Sicily. There about 30,000 pieces of cheese *cosacavaddu ibleo* and *ragusano dop* are regularly aged.

The factory is divided in different areas: salting, aging, cleaning, working phase (partitioning and packaging) and storage rooms for packaged products. In all those environments temperature and humidity are controlled; in particular, in the aging rooms temperature of 15°C and 85% RH are registered. This factory was chosen to carry out these tests because for about two years managers have noticed relevant damages on aging cheese, like more or less wide cracks and dust on the surface of it, sometimes causing also the disappearance of the brand marks impressed on the food products (Figures 1 and 2).

The test was carried out on 15,000 pieces of *cosacavaddu ibleo*: after washing

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and brushing all the pieces of cheese and after cleaning the hallway of the rooms in which cheese is kept to age, n° 5000 pieces were relocated without having applied Alistag™ on them (control group), n° 5000 pieces were relocated in the aging rooms and Alistag™ was applied by nebulization, n° 5000 pieces were immersed in a tank with Alistag™ for about 10 seconds and relocated in the aging rooms. One hundred and forty (140) liters of Alistag™ were used, 80 liters by nebulization (using a thick drop sprayer) and 60 liters by immersion.

To evaluate the efficiency of the protection obtained with Alistag™, n° 50 pieces of *cosacavaddu ibleo* for each group (150 pieces in total) were checked after 30 days for the next 4 months by the same people. Two parameters were evaluated: presence and absence of cracks and the level of dustiness on the surface of the cheese. For this last parameter for each piece of cheese a variable number was conferred from 0 to 3 based on the percentage of dust spread on the surface: 0 = absent; 1 = puntiform areas, damaging ≤10%; 2 = areas with a diameter of about 5 cm, damaging >10% up to 50%; 3 = wide areas, damaging >50% up to ≤100%.

## Results

Table 1 shows the results that were observed in the next 4 months from the test.

Regarding the presence of dust, the table shows exclusively the variable value of the level of dustiness. Instead, regarding the presence of cracks, for each period of observation and for each group of cheese the number of pieces in which cracks were spotted and the relative percentage were indicated. The results show that, in the first two months, the dustiness was completely absent on the forms of cheese where Alistag™ was applied by immersion. Instead, by nebulization, the efficacy was complete for the first month, but it persisted, in a very satisfactory way, in the second month. With respect to the protection from cracks forming, Alistag™ proved effective for an even more prolonged time.

## Discussion

The results of this first test clearly show the efficacy of the action performed by Alistag™ to protect food products from those two main damages complained in the

factory that produces *cosacavaddu ibleo*. In particular, if compared with the pieces that were washed, brushed and relocated in the aging rooms without applying Alistag™ on them (control group), those on which Alistag™ was applied showed the total absence of the dust after 30 days from the application.

The pieces of cheese where Alistag™ was applied by nebulization showed a slight formation of the dust as puntiform areas after 60 days, whereas those immersed in the product appeared completely untouched, showing the first signs of dust only after the third month.

On all the pieces of cheese on which Alistag™ was applied, the level of dustiness was much lower compared with the control group, never spreading over 50% of the surface even after 4 months from the application.

Regarding the damage caused by the cracks, the results of the test also turned out to be excellent. Alistag™ guaranteed a total absence of cracks on the surface of the cheese for 60 days, showing a slight presence of them only on a very little number of pieces after the third and fourth month (involving at the max 10% of the forms of cheese).

As it was already mentioned about the level of dustiness, also regarding the occurring of cracks, results showed that the application of Alistag™ by immersion was more efficient than the application by nebulization. This fact is clearly due to the uniform distribution of Alistag™ on the surface of the forms of cheese as the whole piece is submerged; furthermore the application by immersion turned out to be easier and faster than the application by nebulization for there is no need of any specific tool (nebulizer, working coat, masks etc.), so it is preferable for the application on a large number of food products.

In relation to the results obtained, in order to achieve an optimal protection, the recommended application mode is twofold, since it initially involves the application of Alistag™ by nebulization and then by immersion. Nebulization is the most practical method during the first curing phase, as it does not involve the manipulation of cheese forms, and can be carried out on a bimonthly basis to maintain the integrity of the food. Instead, at the end of aging period, the immersion guarantees the whole integrity of the cheese form (which will persist for about 4 months), and the application is not problematic because the cheese has to be



Figure 1. Crack on aging cheese.



Figure 2. Dustiness on aging cheese.

Table 1. Summary of the results of the experiment to evaluate the efficiency of the protection obtained with Alistag™.

Post-treatment period	Control group		Alistag™ by nebulization		Alistag™ by immersion	
	Level of dustiness	Presence of cracks (%)	Level of dustiness	Presence of cracks (%)	Level of dustiness	Presence of cracks (%)
1 <sup>st</sup> month	1	2/50 (10)	0	0/50 (0)	0	0/50 (0)
2 <sup>nd</sup> month	2	22/50 (44)	1	0/50 (0)	0	0/50 (0)
3 <sup>rd</sup> month	3	47/50 (94)	2	2/50 (4)	1	0/50 (0)
4 <sup>th</sup> month	3	50/50 (100)	2	5/50 (10)	2	1/50 (2)

manipulated for the sale.

Eventually, factory workers conducted an organoleptic test on the forms of cheese on which Alistag™ was applied, concluding that Alistag™ does not alterate in anyway the taste and the flavor of cheese.

## Conclusions

The coating agent Alistag™ turns out to be extremely efficient in protecting cheese from the formation of dustiness and cracks on its surface, damages that not only decrease the value of the food product, but also often alterate its organoleptic features. Similar experimental tests were carried out in the laboratory on cured hams and the results obtained were overlapping with those of the present work carried out in the field.

Between the methods of application tested, immersion appears to be the best one, as the protecting action lasts longer and gives a complete protection from dustiness and cracks for over 60 days.

After this time, the first damages slowly start to appear again, but in a very irrelevant level in the third month.

Therefore it can be considered that the application of Alistag™ every 3 months is efficient enough to protect cheese during the entire time of aging process, optimizing the production.

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