(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 December 2010 (02.12.2010)

PCT

(10) International Publication Number
WO 2010/136405 A1

(51) International Patent Classification:
A23B 4/20 (2006.01) *A23B 9/26* (2006.01)
A23B 4/30 (2006.01) *A23B 9/32* (2006.01)
A23B 5/12 (2006.01) *A23L 3/3454* (2006.01)
A23B 5/20 (2006.01) *A23L 3/3526* (2006.01)
A23B 7/158 (2006.01) *A23L 3/3589* (2006.01)
A23B 7/16 (2006.01)

(21) International Application Number:
PCT/EP2010/057059

(22) International Filing Date:
21 May 2010 (21.05.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09382081.9 26 May 2009 (26.05.2009) EP
61/228,658 27 July 2009 (27.07.2009) US

(71) Applicant *(for all designated States except US)*: **LABORATORIOS MIRET, S.A.** [ES/ES]; Pol. Ind. Can Parellada, C. Géminis, 4, E-08228 Les Fonts de Terrassa (Barcelona) (ES).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **ROCABAYERA BONVILA, Xavier** [ES/ES]; C. Ripoll, 4, E-08184 Palau-Solità (Barcelona) (ES). **FIGUERAS ROCA, Sergi** [ES/ES]; C. Pujades, 283, 2° A, E-08005 Barcelona (ES). **CARPINTERO CORDERO, Eloy** [ES/ES]; C. Ramiro el Monje, 18, E-22212 San Lorenzo del Flumen (Huesca) (ES). **PIERA EROLES, Eva** [ES/ES]; C. Secretari Coloma, 41-43, 3° 2a, E-08025 Barcelona (ES).

(74) Agent: **GILLE HRABAL STRUCK NEIDLEIN PROP ROOS**; Brucknerstr. 20, 40593 Düsseldorf (DE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

WO 2010/136405 A1

(54) **Title**: NOVEL METHOD FOR THE TREATMENT OF FOOD PRODUCTS

(57) **Abstract**: The invention is a method for the treatment of food products, wherein the food product is cut in slices or in cubes, and the slices or cubes are treated with an antimicrobial solution in the form of a cloud of droplets, characterized in that the treatment with the antimicrobial solution is conducted during the cutting of the slices or the cubes. The invention is also a cutting device for conducting the method of the invention. This cutting device contains at least one nozzle or system of spray dosage for the simultaneous treatment of the slices of the food product and the cutting blade.

Novel method for the treatment of food products

Description

The present invention relates to a new method for obtaining a high degree of antimicrobial effect in food products, particularly in food products which are cut in slices.

Background of the invention

Food products such as cheese, meat, sausages, hams, fish, fruits and confectionery products, etc are regularly provided in sliced form. Specific amounts of sliced or cut products in cubes are offered in supermarkets for the convenience of customers and staff. The cutting machines which are in use for slicing food products are however a critical source of contamination and the most careful cleaning of the machines is needed. One of the reasons for considering the slicing machines as a source of contamination is the difficulty to clean them because of the sharpness of the blade along with other components of the equipment.

Another source of microbial contamination, especially on the surface of the product, is the hand manipulation of food products for slicing, cutting in cubes, grinding, etc. As a consequence of the contamination the shelf-life of a sliced and packed food becomes very short usually only few days. Manual methods used for cutting, slicing, staking and packing, since they do not allow for an effective protection; they expose food to the environment enabling oxidation and microbial contamination.

Several attempts have been made to improve sanitary conditions of the cutting machines or the systems that expel antimicrobials in spray form.

In CA 2 517 282 A1 a method is described of cleaning a food slicing machine during use with a stream of ozonated water. The cutting blade of the slicing machine is subjected to the treatment with the ozonated water to achieve the wanted antibacterial effect. However, the purpose of this application is only to clean the slicing machine but not to treat the food against microbial contamination.

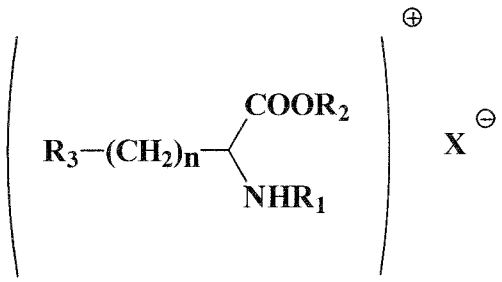
US 2007/0166441 discloses a system and a method for on-site re-use of the antimicrobial solution. This system is able to collect the unspent antimicrobial solution

which did not contact the raw food products and is located in the conveyor rail where it is sprayed.

WO 2009/024586 concerns an article of manufacture for holding sliced food. This invention guarantees a maximum hygiene level as no handling of the food is required post slicing. This system reduced the microbial contamination that can be due to the manipulation of food products.

US 2008/0115649 relates to the presence of foldable flaps that protect the sliced surfaces of food products. This system hermetically seals the food during the manufacturing process and is free of contamination from unsuitable handling and from the oxidation of the product.

On the other hand, cationic surfactants of formula (1) are known as preservatives used in food, cosmetic and pharmaceutical industry. Cationic surfactants have turned out to be highly effective against microbial proliferation and at the same time safe for intake in humans and mammals in general. For all of this, cationic surfactants are an attractive tool in the industry.



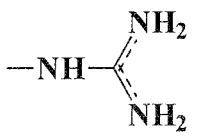
where:

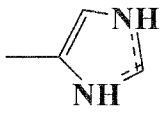
X^- is a counter ion derived from an organic or inorganic acid, preferably Br^-, Cl^- or HSO_4^-, or an anion on the basis of a phenolic compound;

R_1: is linear alkyl chain from an saturated fatty acid, or hydroxyacid from 8 to 14 atoms of carbon bonded to the α- amino acid group through amidic bond.

R_2: is a lineal or branched alkyl chain from 1 to 18 carbon atoms or aromatic.

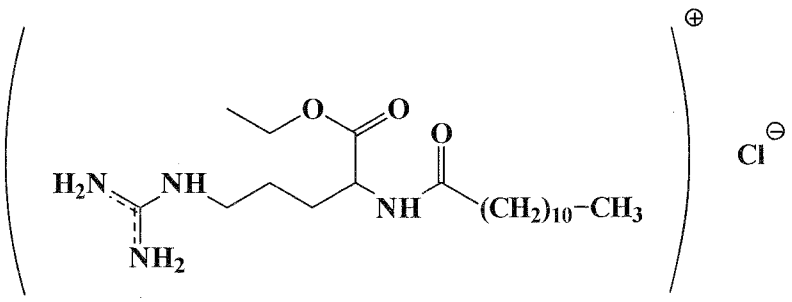
R_3: is:





and n can be from 0 to 4

Since the discovery that cationic surfactants derived from the condensation of fatty acids and esterified dibasic amino acids are highly effective protective substances against microorganisms until now, several publications and patents have been issued or published. More specifically, there is a cationic surfactant known as ethyl-N$^{\alpha}$-lauroyl-L-arginate HCl (hereinafter LAE) with the chemical structure of formula (2) that has been patented around the world disclosing its manufacturing processes (WO 96/21642, WO 01/94292 and WO 03/064669) and also its applications in foods (WO 02/087328, WO 03/034842, WO 03/094638, WO 2007/014580, WO 2008/095534, WO 2009/033508, PCT/EP2008/067425, EP 08 382025.8, US 61/116,705 and EP09382007.4), in cosmetic field (WO 03/013453, WO 03/013454 and WO 03/043593) and medical applications (WO 2008/014824 and EP 08 382007.6). Thus, for all of this, it can be said that at present LAE is a well-known compound for its use as an antimicrobial agent.



(2)

All of the above patents and patents applications belong to Grupo LAMIRSA and are related to the surprising efficacy of LAE when it is applied on food and cosmetic products or in medical devices. Some of these applications refer to the synergistic effect observed from the combination of LAE with other antimicrobial solutions, other ones refer to the surprising effect of LAE against virus or fish parasites or as acaricidal or esporicidal agents.

LAE as the preferred type of cationic preservative of the above formula (2) has been described for its antimicrobial effect on food products such as meat products. In the application WO 96/21642 the effect of LAE on ham has been described. In a specific example in the document, ham was treated according to a conventional method used in the food industry. The ham was injected with brine which contained LAE, thereafter the hams were massaged for 48 hours using vacuum drums and then cooked in a manner to achieve a temperature of 69°C in the middle of the ham. The result obtained with this method was better than was achieved with a conventional antimicrobial treatment.

The art is steadily seeking methods to improve the methods for attaining an optimal degree of antimicrobial effect. It has been observed, that the act of slicing food is constituting a high risk of contamination to the food products. An improvement of the slicing methods is sought to reduce the danger of contamination to an acceptable low level.

There is a need to provide a food slicing system that slices food products ensuring maximum hygiene in order to avoid microbial contamination that finds its origin in the cutting system or during the manipulation of the product. To improve this slicing process there is a need to incorporate a spray system in the slicing machine that would disperse in a homogeneous way an antimicrobial solution onto the surface of each slice or cut of the food product.

Summary of the invention

It is the object of the present invention to provide a further effective method for the antimicrobial treatment of food products, in particular food products which are cut into slices, such as meat, cheese, sausages, ham, fruit, fish, confectionery products, etc.

The invention provides a method of preventing the microbial contamination of sliced food products by the treatment of the slices, at the same time that they are being cut, with an antimicrobial solution or a combination of antimicrobial solutions.

The method of the invention provides a cloud of droplets with the antimicrobial solution homogeneously distributed in it. During the slicing, the food product passes through this cloud absorbing totally and homogenously the antimicrobial into its surface.

It is the purpose of this invention to provide a new way to apply an antimicrobial, in liquid or aerosol form, onto the surface of sliced foods. This application will allow to apply the exact quantity of antimicrobial onto the surface of food avoiding the loss of the antimicrobial in the conveyor rail or in the environment.

This invention solves the problem of poor sanitary conditions of the blade of the slicing system by means of spraying the antimicrobial solution on the blade when it is slicing food products (such as ham, sausages, cheese, fruits, meat, fish, etc). This new way of treatment protects all sliced surfaces with the antimicrobial solution and extends the shelf life of the sliced product.

The inventors unexpectedly observed a homogeneous distribution and good impregnation of the antimicrobial in an effective amount, into the sliced food, avoiding the syneresis usually originated when antimicrobial solutions are applied in large quantities.

Brief description of the drawings

In order to better show the characteristics of the present invention a detailed description of the preferred embodiments will be given hereinafter, as an example only, but without limiting the scope of the invention and with reference to the appended drawings, wherein:

Figure 1 represents a device according to the invention involving a conventional cutting machine that incorporates a spraying system to treat food products with antimicrobial solutions. The slicing machine contains at least one system of spray dosage located in front of the blade in order to spray the food at the same time that it is cut and two additional systems of spray dosage where the antimicrobial is sprayed as an additional treatment.

Figure 2 is a block diagram of the treatment of foodstuff with the present invention

Description of the invention

It is the solution of the present invention to provide a method for the treatment of food products, wherein the food product is cut in slices or in cubes, and the slices or cubes are treated with an antimicrobial solution in the form of a cloud of droplets, characterized in that the treatment with the antimicrobial solution is conducted during the cutting of the slices or the cubes.

The inventors have surprisingly observed that with this invention, the amount of antimicrobial applied in the food is the minimum required to inhibit the growth of microorganism and that it is distributed in the whole surface of the cut product homogeneously. This invention surprisingly avoids the loss of antimicrobial solution and the treatment of the food product in an excessive amount that would not be required.

The conventional manner of treating food products leads to considerable variations in the concentration of the antimicrobial products within the food product. Since at least the low-concentration areas must have the required concentration to achieve the wanted antimicrobial effect, the high-concentration areas will be relatively overloaded in the sense that these contain more of the antimicrobial product than is truly required. This kind of variation may be avoided to a large extent in the method of the invention.

Surprisingly, the application of an effective amount of antimicrobial solution results in an economic benefit because there is no loss of antimicrobial solution. In this invention, the total amount of antimicrobial added in the slicing machine remains into the surface of the sliced or cut food. This overcomes one of the disadvantages in the conventional manner of the treatment of sliced food products which results in the major loss of the treatment liquid during treatment and slice transportation which leads to substantial losses in the conveyor belt.

Experimentally, it has been observed that the treatment with an effective amount of antimicrobial solution avoids the syneresis of the food product which is the

consequence of an excessive amount of antimicrobial applied into the food in other methods.

The precise amount of antimicrobial can easily be determined by one skilled in the art given the teaching of this application.

Unlike other conventional antimicrobial treatment methods, the present invention affords a better efficacy of the antimicrobial because it is surprisingly well impregnated and homogeneously distributed in the sliced food matrix. Moreover, the blade and the food product are simultaneously treated with the antimicrobial solution.

The antimicrobial can be sprayed onto the sliced food in liquid form or in aerosol form. In both cases, there is generated a cloud of droplets containing the antimicrobial or mixture of antimicrobials homogeneously distributed into it. The cut or sliced food product passes through the cloud completely absorbing the antimicrobial or mixture of antimicrobials.

The treatment can be done continuously or through a system of pulses (discontinuously). For the discontinuous case, the machine expels the antimicrobial only when the blade cuts or slices the food product.

The treatment according to the present invention leads to the equal treatment of both sides of the sliced food product. Through the generation of the cloud of droplets the slice which passes through this cloud is homogeneously treated. As soon as the food product is sliced, the slide passes through the cloud before coming down on the surface of the conveyor belt. Accordingly, also the lower side of the slice which comes into contact with the surface of the conveyor belt is subjected to the antimicrobial treatment and will not be contaminated with microorganisms.

One embodiment of the slicing machine is shown in Fig. 1. The figure represents a slicing machine C of a conventional arrangement. The position B in the figure displays the position of the food product which shall be cut in slices or in cubes. The food product is transported in the slicing machine from the initial position B in the direction of the position A, which corresponds to the position of the cutting

blade. After being cut the slices or cubes of the food product are further transported to any of the conveyor belts E to the final position for being packaged. The position D corresponds to a display for the visual control of the cutting procedure. The machine is furnished with a spraying machine 6 for applying the antimicrobial solution. The embodiment represented in the figure contains a spraying system with three separate systems 1, 3 and 7 of spray dosage that allows the expel of the antimicrobial solution or the combination of antimicrobial solutions at three different points of the machine. One of these systems of spray dosage 7 is located before the slicing, another one 3 is located in front of the blade and the third system of spray dosage 1 is located once the food product is sliced or cut. Additional components that form part of the slicing machine are: an element 5 to control the activation of the slicing machine, an element 4 to control the speed of the slicing, and an element 2 for the activation of the final spray dosage.

The system of spray dosage 3 located in front of the blade expels the antimicrobial solution or combinations of antimicrobials, producing a cloud of droplets with the antimicrobial homogenously distributed in this cloud. During the slicing, the food product sliced pass through this cloud absorbing totally and homogeneously the antimicrobial present in the cloud. There is no loss of antimicrobial and its distribution into the slice is surprisingly homogeneous. Moreover, at the same time the blade of the slicing machine is treated with the antimicrobial.

The inventors have observed different efficacies depending on the antimicrobial solutions sprayed in the slicing machine. Those treatments with cationic preservatives derived from the condensation of fatty acids and esterified dibasic aminoacids have better efficacy in inhibiting or reducing the growth microorganisms in sliced food. Between these types of cationic preservatives, the preferred one is LAE according to formula (2).

For the specific case of LAE, it is preferred to dissolve this solid compound, directly before use in one of the following preferred solvents of food grade: water, ethanol, propylene glycol, isopropyl alcohol, other glycols, mixtures of glycols and mixtures of glycols and water or any other type of food grade solvent. If the treatment shall be performed at a specific pH value the use of a corresponding buffer solution

may be recommendable. The cationic preservatives are preferably introduced in the method of the invention as a solution in an aqueous liquid.

Addition of further solvents is possible, such as any organic solvent, as long as this further added solvent does not cause any negative effect on later consumption by human consumers.

The composition of LAE with a food grade solvent optionally comprises auxiliary components and excipients. Such auxiliary components and excipients can be thickening agents (e.g. xanthan gum, guar gum, modified starches), anti-foam agents (e.g. dimethylpolysiloxane, silicon dioxide), products to obtain the optimal pH value (e.g. phosphates, tartrates, citrates, lactates), colouring agents (e.g. curcumin, tartrazine, erythrosine), and aroma products. It is preferred, that the preservative composition comprises the cationic preservative in an amount of from 0.01% to 10% by weight relative to the whole weight of the preservative composition.

The food products which are sliced may usually be meat and poultry products, such as ham, turkey, corned-beaf or any other meat product which is usually offered to customers in sliced form. The method is suitable to be used in other food products as well. Such other food products will be for instance cheese, fish products or fruits, so far as slicing is used as a method of preparation.

To achieve the wanted antimicrobial effect of LAE on the surface of the sliced food products it is required to achieve a local concentration at the surface of the sliced food preparation in the range of 1 to 5000 ppm or 0.001 to 1 mg/cm^2, preferably from 10 to 200 ppm, all concentrations given as the amount of the cationic surfactant in relation to the weight of the treated food product slice.

It is one of the surprising advantages of the invention, that through the treatment with the cloud of droplets the blade is permanently subjected to the contact with the antimicrobial solution as well. Through this constant treatment of the blade it is observed, that the blade is maintained in excellent hygienic conditions for a considerable time. The same blade can be used for continued working without the need to clean the blade during a shift or during the production of a certain product.

This observation is one of the big advantages of the method of the present invention. Cleaning of the blade can under conventional conditions only be performed by interruption of the cutting process and dismantling the cutting machine. The possibility to conduct the complicated cleaning activity less frequently is a great economic advantage. It saves time and is more economic since it is now not necessary to interrupt the machine regularly for cleaning the blade.

Examples

The following examples illustrate the field of application of this invention and the values may be extended or changed without losing the effects which are sought, as will be apparent to the skilled person with an understanding of the teaching herein.

Example 1:

This example illustrates the activity of an antimicrobial solution of LAE against aerobic mesophilic bacteria when applied in a sliced cured cooked ham using the method of the invention.

Sliced cured cooked ham was prepared in the LAMIRSA pilot plant following standard procedures of the industry.

Cured cooked ham has been treated with LAE.

A formulation of LAE has been applied during the slicing of the cured cooked ham. LAE (diluted at 1% w/w) has been sprayed on the surface of each ham slice, using a conventional spraying systems device.

For this specific experiment, the details of the conditions were:

Weight of the slices obtained = 30 g / slice

Dimensions of the slices obtained = 175 x 130 mm

Cutting speed = 210 slices / minute

System of spray dosage distance = 35 cm

Liquid pressure = 0.9 bar

Air pressure = 0.7 bar

Treatment flow of 1% LAE = 1.6 g/s

Applied dose of LAE = 150 mg/kg

These conditions can be modified according to the type of food matrix desired to slice.

Then, the treated slices were vacuum-packed. The final concentration of LAE in each ham slice was 150 ppm.

A control sample of cooked cured ham was sliced. In this case, no preservative was added through the spray system during the slicing of the ham.

All the samples were prepared in the same day. All samples were vacuum packed in plastic bags and stored at 4°C.

Analysis of mesophilic aerobes (Triptic Soy Agar, 35°C, 48 hours) was done at three different samples per day of analysis (initial, 7 days, 14 days and 30 days) and treatment.

Microbiological Results

In the following table the results are shown:

Table 1.

		Control sample	Sample treated with LAE
Day 0	Log CFU/g	2.0	2.0
		2.0	2.0
		2.0	2.0
	Mean value	2.0 ± 0.0	2.0 ± 0.0
Day 7	Log CFU/g	3.7	2.3
		3.9	2.0
		4.0	2.0
	Mean value	3.8 ± 0.1	2.1 ± 0.2
Day 14	Log CFU/g	5.7	2.5
		5.5	2.7
		6.2	3.0
	Mean value	5.9 ± 0.4	2.7 ± 0.2
Day 30	Log CFU/g	7.1	4.0
		6.8	3.8
		7.7	3.5
	Mean value	7.4 ± 0.5	3.8 ± 0.3

CFU: Colonies Forming Units

Control samples had a contamination around 6.0 log CFU/g at day 14 while at the end of the study those samples treated with LAE do not reach this concentration. Thus, spraying a composition of LAE during the slicing extends the shelf-life of cured cooked ham by at least 15 days.

Example 2:

A sample of cooked turkey was treated with two different antimicrobial solutions.

Solution A was constituted by: a mixture of LAE with potassium lactate, lactic acid and acetic acid. This mixture was solved in water

Solution B was constituted by: a mixture of diacetate, acetic acid, lactic acid, glycerine and water. All this mixture was dissolved in water.

The microbiological results, expressed as log CFU/g, were as follows:

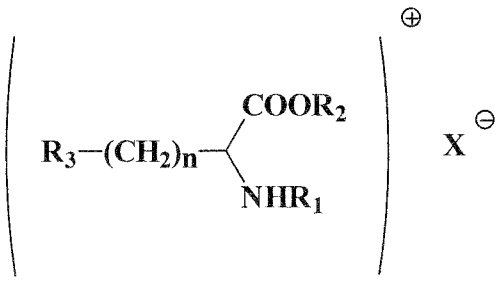
Table 2.

	Day 2		Day 9		Day 24		Day 39	
	Sol. A	Sol. B	Sol. A	Sol. B	Sol. A	Sol. B	Sol. A	Sol. B
Total Aerobes	2	2	2	2	5.7	7.4	5.9	8.4
Lactobacillus	1	1	1	1.7	4.5	7.1	5.7	8.3
Listeria monocytogenes	<2	<2	<2	<2	<2	<2	2	2.0

The results proved that spraying an antimicrobial solution that contains LAE (solution A) the efficacy results were surprisingly better than when the antimicrobial solution was constituted by the same substances but without LAE.

CLAIMS

1. A method for the treatment of food products, wherein the food product is cut in slices or in cubes, and the slices or cubes are treated with an antimicrobial solution in the form of a cloud of droplets, characterized in that the treatment with the antimicrobial solution is conducted during the cutting of the slices or the cubes.
2. The method according to claim 1 in which the sliced or cut food product is treated by the cloud of droplets of the antimicrobial and the slice of food passes through the cloud of droplets being homogenously treated with the antimicrobial.
3. The method of claim 1 and 2 wherein the antimicrobial solution is constituted by one antimicrobials or a mixture of antimicrobials along with other excipients.
4. The method according to claims 1 to 3 wherein the cloud of droplets of antimicrobial can be expelled continuously or discontinuously.
5. The method according to claims 1 to 4 in which the antimicrobial solution is furthermore applied by spraying it onto the whole food product before slicing it.
6. The method according to claims 1 to 5 in which the antimicrobial solution is furthermore applied by spraying it after the food product is sliced.
7. The method according to claims 1 to 6, wherein the food product sliced or cut in cubes is a piece of meat, poultry, cold meat products, cheese, fish, fruit or confectionery products.
8. The method according to claims 1 to 6, wherein the preferred antimicrobial is a cationic preservative derived from the condensation of fatty acids and esterified dibasic amino acids, according to the following formula:



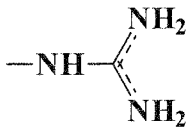
where:

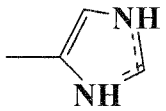
X^- is Br^-, Cl^-, or HSO_4^-

R_1: is linear alkyl chain from a saturated fatty acid, or hydroxyacid from 8 to 14 atoms of carbon bonded to the α- amino acid group through amidic bond.

R_2: is a lineal or branched alkyl chain from 1 to 18 carbon atoms or aromatic.

R_3: is:





and n can be from 0 to 4.

9. The method according to claim 1 to 8, wherein the cationic preservative is at a concentration of from 1 to 5000 ppm in relation to the weight of the treated food product sliced or 0.001 to 1 mg/cm^2.

10. The method according to claim 1 to 9, wherein the cationic preservative is the ethyl ester of the lauramide of arginine hydrochloride (LAE).

11. Cutting device for conducting the method of claim 1 containing a cutting blade for cutting food products in slices or in cubes, wherein the cutting device contains at least one nozzle or system of spray dosage for the simultaneous treatment of the slices of the food product and the cutting blade.

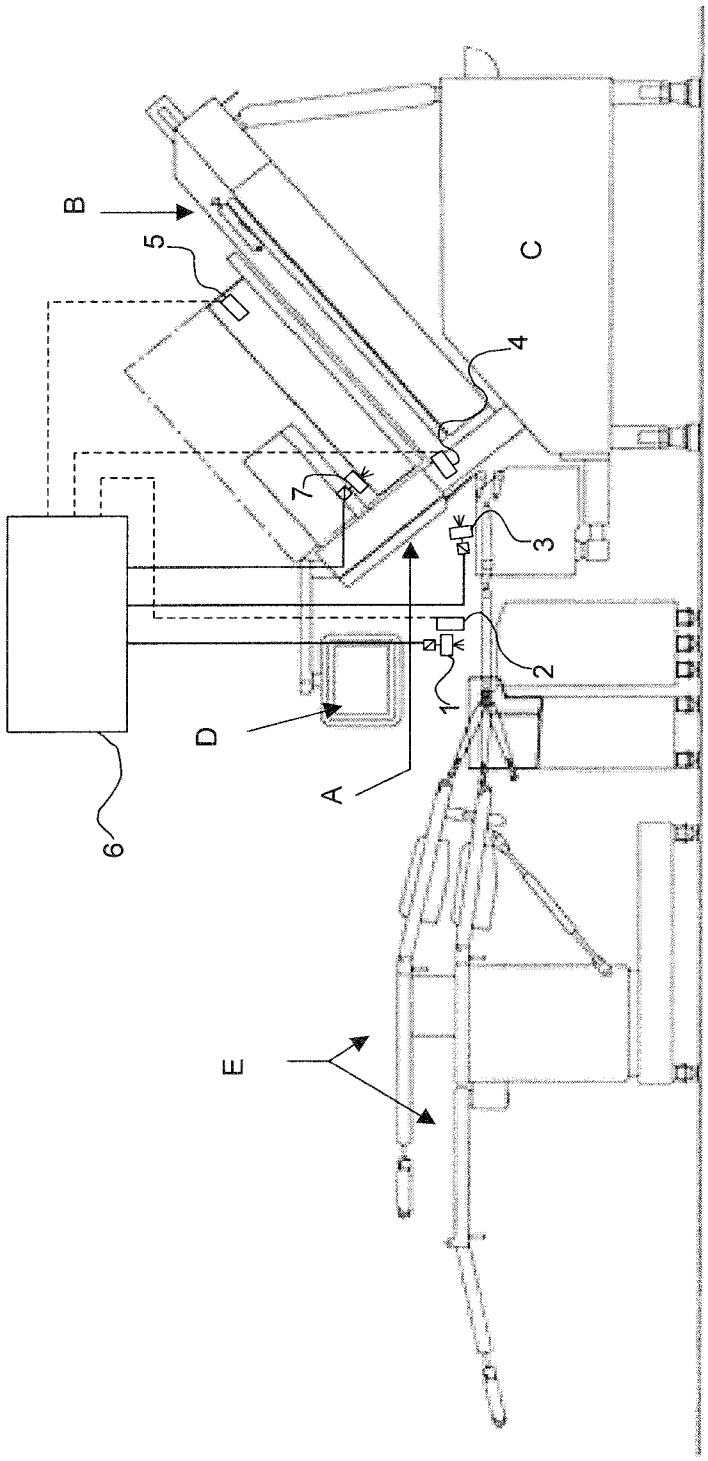
12. The device according to claim 11 wherein the cloud of droplets of antimicrobial solution can be sprayed in liquid form or in aerosol form.

13. The device according to claim 11 wherein the cloud of droplets of antimicrobial can be expelled continuously or discontinuously.

14. The device according to claim 11 to 13 in which the antimicrobial solution is applied by spraying it onto the whole piece before slicing it.

15. The device according to claims 11 to 14 in which the antimicrobial solution is applied by spraying it after the piece of food is sliced.

Figure 1



1: Final system of spray dosage

2: Element of activation for the final system of spray dosage

3: Slice dosage system

4: Element of detection of the Slicer Speed

5: Element of detection of the Slicing machine activation

6: Spraying machine: Recipe mode available depending on the type of meat to slice

7: initial covering dosage system

A: Blade

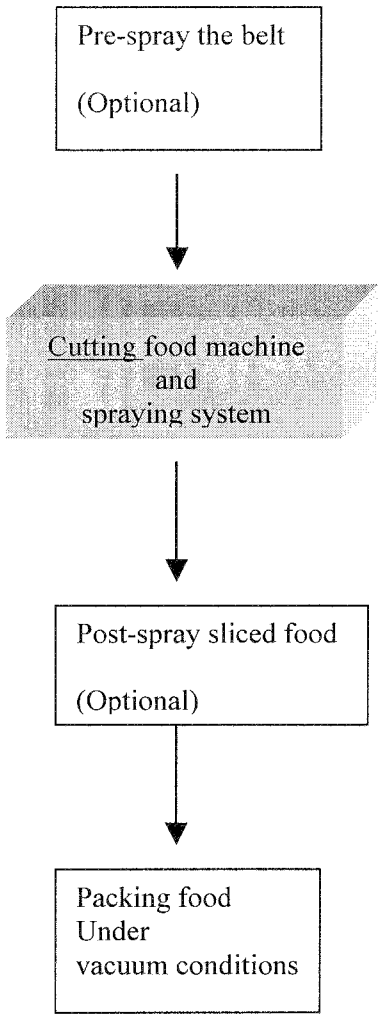
B: Place where the piece of food is located for being sliced

C: Hardware of the slicing machine

D: Display

E: Conveyor belt

Figure 2:


Pre-spray the belt
(Optional)
Cutting food machine
and
spraying system
Post-spray sliced food
(Optional)
Packing food
Under
vacuum conditions

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/057059

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23B4/20 A23B4/30 A23B5/12 A23B5/20 A23B7/158
A23B7/16 A23B9/26 A23B9/32 A23L3/3454 A23L3/3526
A23L3/3589

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23B A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/056694 A1 (CHR HANSEN AS [DK]; GRANLY KOCH ANETTE [DK]; LAMMERT LOTTE [DK]; JACOB) 25 July 2002 (2002-07-25) claims; examples	1-15
X	US 2008/279996 A1 (NACE GARY L [US] ET AL) 13 November 2008 (2008-11-13) claims; examples	1-15
X	US 2004/175473 A1 (NAUTH KAISER RAJINDER [US] ET AL) 9 September 2004 (2004-09-09) paragraph [0028]; claims; examples	1-15
X,P	WO 2010/053595 A1 (SPRAYING SYSTEMS CO [US]; RAMABADRAN ARUN [US]) 14 May 2010 (2010-05-14) paragraph [0020]; claims	1-15

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 September 2010	09/09/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016	Vernier, Frédéric

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/057059

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03/034842 A1 (LAMIRSA S A [ES]; URGELL BELTRAN JOAN BAPTISTA [ES]; SEGUER BONAVENTUR) 1 May 2003 (2003-05-01) cited in the application the whole document	1-15
A	CA 2 700 633 A1 (MIRET LAB [ES]) 1 May 2003 (2003-05-01) the whole document	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/057059

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02056694 A1	25-07-2002	AT 334596 T	15-08-2006
		BR 0206577 A	16-12-2003
		CA 2432435 A1	25-07-2002
		CN 1486139 A	31-03-2004
		DE 60213558 T2	09-08-2007
		DK 200100094 A	19-07-2002
		EP 1353562 A1	22-10-2003
		ES 2272688 T3	01-05-2007
		JP 2004522436 T	29-07-2004
		JP 2009065983 A	02-04-2009
		MX PA03006293 A	14-02-2005
		NO 20033248 A	16-09-2003
		NZ 527562 A	25-02-2005
		PL 361658 A1	04-10-2004
		RU 2287937 C2	27-11-2006
		UA 73642 C2	15-09-2003
		US 2004101604 A1	27-05-2004
US 2008279996 A1	13-11-2008	US 2008279997 A1	13-11-2008
		WO 2008141153 A1	20-11-2008
		WO 2008141157 A1	20-11-2008
US 2004175473 A1	09-09-2004	CA 2459284 A1	03-09-2004
WO 2010053595 A1	14-05-2010	NONE	
WO 03034842 A1	01-05-2003	BR 0116522 A	03-02-2004
		CA 2464388 A1	01-05-2003
		EP 1437946 A1	21-07-2004
		MX PA04003855 A	08-07-2004
		US 2008286427 A1	20-11-2008
		US 2004265443 A1	30-12-2004
CA 2700633 A1	01-05-2003	NONE	