596801

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Patents Act 1952

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30 SEP 1985
Sydney

Form 1
Regulation 9

59353/86

APPLICATION FOR A STANDARD PATENT OR A STANDARD PATENT OF ADDITION

I, DALLAS VARNEY CHAPMAN

of 2 Takari Close, Merewether Heights, New South Wales, Australia.

hereby apply for the grant of a standard patent ~~patent of addition~~ for an invention entitled

METHOD FOR PROCESSING MEAT.

which is described in the accompanying provisional ~~complete~~ specification.

~~*(To be included in the case of a Convention application)~~

Details of basic application(s) –

Number of basic application 28-2-90

Name of Convention country in which basic application was filed

Date of basic application

*(To be included in the case of an application made by virtue of section 51)

Number of original application

Person by whom made

*(To be included in the case of an application for a patent of addition)

I request that the patent may be granted as a patent of addition to the patent applied for on Application No. Patent No.

In the name of

I request that the term of the patent of addition be the same as that for the main invention or so much of ~~the patent for the main invention as is unexpired.~~

ADDRESS FOR SERVICE ALTERED

AUSTRALIAN PATENT OFFICE Reg 88(2)

My address for service is ~~ARTHUR S. CAVE & CO.~~ ~~HALLIDAYS 44 ASHLEY STREET, HORNSBY N.S.W. 2077, AUSTRALIA~~

Dated this 27th day of September 19 85

DALLAS VARNEY CHAPMAN
By his Patent Attorneys,
HALLIDAYS

R.G. Halliday

PATENT OFFICE LODGED AT SUB-OFFICE SEP 19 AUSTRALIA TEN DOLLARS

FEE STAMP TO VALUE OF $ 50 ATTACHED
MAIL OFFICER

Form 7

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of the Application made by .....
DALLAS VARNEY CHAPMAN
for a patent for an invention entitled .....
METHOD FOR PROCESSING MEAT AND PRODUCTS MADE THEREFROM

I, Dallas Varney Chapman
of 2 Takari Close, Merewether Heights, N.S.W., Australia
do solemnly and sincerely declare as follows:–

1. I am the applicant for the patent.

~~*(or, in the case of an application by a body corporate)*~~

~~1. I am authorized by ..... the applicant for the patent to make this declaration on its behalf~~

2. I am the actual inventor of the invention.

~~*(or, where a person other than the inventor is the applicant)*~~

~~2. ..... of ..... is the actual inventor of the invention and the facts upon which I am the ..... is entitled to make the application are as follows:–~~

.....

.....

.....

TO: .....

Declared at HORNSBY this 24th day of June 1985

.....
Dallas Varney Chapman

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(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 596801

(54) Title
METHOD OF PROCESSING MEAT AND PRODUCTS MADE THEREFROM

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(60) Related to Provisional(s) : PH1263 PH2677

(71) Applicant(s)
DALLAS VARNEY CHAPMAN

(72) Inventor(s)
DALLAS VARNEY CHAPMAN

(56) Prior Art Documents
EP 052078
GB 1576813

(57) Claim

1. A method for extracting a substantial portion of ~~the~~ fat and cholesterol components from meat comprising the steps of:

(a) exposing a thin layer of meat to ultraviolet light, and

(b) comminuting said meat in a chilled bowl with the addition of a quantity of iced water, edible acid, salt and food phosphates until the substantial portion of fat and cholesterol separates from the meat mass and adheres to the inner surface of the chilled bowl.

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Form 10
Regulation
13(2)

PATENTS ACT, 1952

596801

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number: 59353/86

Lodged:

Complete Specification-Lodged:
Accepted:
Lapsed:
Published:

Priority:

Related Art:

This document contains the amendments made under Section 49 and is correct for printing.

TO BE COMPLETED BY APPLICANT

Name of Applicant: DALLAS CHAPMAN

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Complete Specification for the invention entitled: "METHOD OF PROCESSING MEAT AND PRODUCTS MADE THEREFROM"

The following statement is a full description of this invention, including the best method of performing it known to me:-

ASC-49

The present invention relates to a commercially viable method for extracting a substantial portion of the fat and cholesterol components from meat, and to a meat product which has substantially reduced fat and cholesterol components.

Medical research has shown that a heavy consumption of fats and cholesterol in the diet can contribute to heart disease, obesity and other ailments. In response, the public has to an extent turned away from the consumption of red meat to alternative sources of protein such as those found in white meats or vegetables.

Not only has red meat lost popularity as set out above, but also meat products, such as sausages and hamburger meat, have become regarded as undesirable in certain diets, because such products are traditionally high in fat and cholesterol and are generally not recommended for persons suffering from heart disease, obesity and other ailments.

The present invention seeks to substantially overcome the problems now associated with a diet high in fats and cholesterol by providing a meat product having substantially reduced portions of fat and cholesterol compared with prior meat products and a method of making such a meat product.

Essentially, the invention is based on the discovery that treatment of meat with ultraviolet light and comminution with acid, salt, iced water and food phosphates results in separation of a substantial portion of fat and cholesterol

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from the protein, resulting in a product which can still have the appearance of raw meat.

This discovery is surprising in the light of the prior art. It has been common practice for about forty years to expose meat to ultraviolet light in order to permit aging of freshly-killed meat while inhibiting bacterial growth. See, for example, the discussion in US Patent No. 4,233,323 (Sway).

At the same time, there have been disclosed a number of processes in which meat is comminuted with all or some of acid, salt, iced water and food phosphates, for various purposes. For example, in US Patent No. 3,565,637 (Artar), lean meat muscle is mixed with fat, salt and iced water and abraded to produce a stable emulsion in which the fat is coated with protein and spread throughout the product, resulting in a high fat product.

In US Patent No. 3,740,235 (Weiner), large lean uncooked beef muscle chunks are mixed with salt, water, binder and, optionally, phosphates and cooked. In this process, it is preferred to add the water in the form of ice to eliminate all evidence of fat separation. In addition, it is apparently necessary to heat the mixture to around 100 degrees F. to bind the product together.

Similarly, US Patent No. 3,033,687 (Harper) mixes comminuted meat with water (optionally as ice with salt and food acid as further options) to result in a product in which the fat

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is retained. US Patent No. 3,447,932 (Olsen) mixes meat with potassium chloride, water, phosphates and, optionally, ascorbic acid, and chills the mixture to produce a product similar to that of Artar in that there is no fat separation.

It was unexpected that prior exposure of the meat to UV light, followed by comminution in the presence of food acid, salt, phosphates and iced water, would result in separation of a substantial portion of the fat and cholesterol, as in the present invention.

Moreover, the product of the present invention, in one embodiment, remains essentially a raw meat product. It has the appearance of clean, wholesome meat in a finely minced condition, but lacks the characteristic flecks of white fat and gristle normally encountered in hamburger mince, for example.

The raw meat product of the invention has the advantage of being self-binding and so there is no need to add carbohydrates traditionally used for binding, in order to form hamburger patties, for example. It has an attractive colour and consequently there is no need to add artificial colouring. It has a surprisingly long shelf life. For example, some samples of the raw product can last three months or longer under normal refrigeration.

Any variety or combination of spices can be added and mixed with the meat to suit consumer taste.

The meat product of the invention is ideally suited to

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encasing in skins and, as it is self-binding, needs no additional binding agents. Encased meat products are commonly called "smallgoods" and prior art smallgoods have been notoriously high in fat and cholesterol. It is in the area of manufacturing low fat and low cholesterol smallgoods that the present invention has particular relevance.

In addition, it has been found that when mutton is treated in accordance with the method of the present invention its characteristic flavour and odour is removed to give a relatively bland product which may be spiced or flavoured as required.

In one broad aspect of the present invention there is provided a method for extracting a substantial portion of fat and cholesterol components from meat, comprising the steps of:

(a) exposing a thin layer of meat to ultraviolet light; and

(b) comminuting the meat in a chilled bowl with the addition of a quantity of iced water, edible acid , salt and food phosphates until the substantial portion of fat and cholesterol separates from the meat mass and adheres to the inner surface of the chilled bowl.

Preferably, the meat is minced and loosely packed on a tray, to a maximum thickness of 25 mm, before exposure to the ultraviolet light.

Preferably, the bowl is kept at a temperature of -10° to

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+10° and between 1 and 5 litres of iced water, 50 - 100 gm acetic acid in the form of food grade vinegar, 100 - 200 gm salt (NaCl) and 20 - 50 g EMULKUT (Trade Name) (edible phosphates) are added during the comminution step for every 10 kg of trimmed meat.

In a further aspect of the present invention, there is provided a raw meat product free of added carbohydrates, artificial colourings and artificial preservatives wherein the fat portion is reduced to 1 - 2% and the cholesterol portion is reduced by 10 - 60% from the levels present in the trimmed meat.

Examples of an edible acid are acetic acid and citric acid.

The present invention will be further described by reference to the following non-limiting examples.

Three 10 kg samples of fresh raw minced mutton were taken

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after boning and trimming but before any further processing took place.

Sample 1 was left as a standard

Sample 2 was then treated as in Example 1

Sample 3 was then treated as in Example 2

Example 1

A single low intensity ultraviolet germicidal lamp of 2220 microwatts/cm2 at 25mm rating, catalogue number G24T7H was used and a tray of loosely packed meat of maximum thickness 25mm, spread out on a metal tray 28cm x 50cm, was placed 75mm below the lamp. The long axis of the tray was under the lamp and the meat was exposed to the ultraviolet lamp for 12 hours.

The meat sample 2 was placed in a rotating bowl ("silent cutter") previously chilled to 3°C. 3.5 litres of iced water (in the form of food grade vinegar containing 4-5% acetic acid) and 50 gm of acetic acid were added to solubilize the globulin and the meat mass was comminuted for about 2 minutes. A 100gm of salt and 25 gm of a food phosphate EMELKUT (Trade name) (a mixture of sodium tripolyphosphate, tetra sodium pyro phosphate and meta phosphate) were then added to solubilize the meat protein and to enhance the self binding properties of the meat mass and the mixture comminuted for a further three minutes.

Fat and water insoluble vitamin D3 adhered to the inner surface of the bowl and the meat mass was removed.

Example 2

Three high intensity ultraviolet germicidal lamps of 8350 microwatts/cm2 at 25mm rating, catalogue number G36T15N were spaced, at 150mm centres, 60mm above a loosely packed layer of meat of maximum thickness 25mm spread out on a metal tray. The

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ultraviolet lamps were enclosed in a reflective metal shield (60cm x 110cm x 10cm) and formed an enclosed metal chamber with the meat tray. The meat was exposed to the ultraviolet lamps for six minutes. The meat sample (3) was placed in a rotating bowl ("silent cutter") and comminuted with the same addition of iced water, acetic acid, salt and EMELKUT as set out in Example 1 above.

It was found that the temperature of the meat rose 4-5°C during the commminuting step and partly for this reason the bowl is kept cold. Later tests showed that when meat was treated at ambient temperature (25°C) it failed to self-bind and the meat juices ran out during cooking.

The extracted fats and converted cholesterol products can be scraped from the inner surface of the container and discarded.

Samples 2 and 3 were taken from the meat mass following the comminuting step and their fat and cholesterol levels were analysed and compared with the levels of fat and cholesterol in the untreated Sample 1 as set out below in Table 1.

TABLE I

	Moisture % m/m	Fat % m/m	Ash % m/m	Protein % m/m	Cholesterol mg/100	Total Energy Kilojoules/100gm
Leg Lamb *	64.0	18.0	-	18.0	70	-
Sample 1	74.5	5.1	1.0	19.3	66	380
Sample 2	81.5	0.8	2.0	15.4	46	291
Sample 3	75.1	1.5	1.1	22.2	45	311

Total energy = % FAT X 37 + % PROTEIN X 17
Kilojoules/100gm

* Taken from Geigy Scientific Tables

The method of the present invention was then tested on Smallgoods:- Bologna, English sausages and Round Steak (hamburger meat) and the results are set out in Table 2.

TABLE 2 (Geigy Scientific Tables)

	% crude fat	K cal	K joule	% Cholesterol
Bologna (standard)	27.50	304	1270	
Treated by the method of the present invention	1.19	71	297	
English Sausage (standard)	32.10	372	1560	
Treated by the method of the present invention	1.00	82	340	
Round Steak (Standard)	19.50	196	820	0.12
Treated by the method of the present invention	0.40	73	309	0.021

It can be seen from Tables 1 and 2 that the method of the present invention is effective in substantially reducing the

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portions of fat and cholesterol in meat and in addition lowering the level. It has been found over a number of tests on different kinds of meat that the fat level in meats after trimming can be reduced to 1-2% and the cholesterol level reduced by a further 10-60% from the levels present in the trimmed meat.

The meat product of the present invention requires no added starch binder to hold it together and can be formed into smallgoods hamburger steaks, rib eye, cutlets and schnitzels. Additional flavourings in the form of spices can be added during the comminuting step so that the meat product can be directly formed into smallgoods.

~~The ultraviolet rays act to convert the cholesterol to a~~ precursor 7 dehydrocalciferol by a balanced reversible reaction, and then by a balanced reversible heat reaction to a vitamin D3 cholecalciferol component into insoluble vitamin D3.

Whilst the process is not fully understood, scientific opinion suggests that the binding and smooth texture of meat products formed by exposure of the meat to ultraviolet light is due to polymerisation of the unsaturated fats and fatty acids caused by free radicles generated by the ultraviolet light which is similar to polymerisation of acrylics and vinyl compounds.

The creation of free radicles stops immediately the ultraviolet light is switched off. Free radicles have an incredibly short life, (about a nanosecond), and recombine to form normal valencies or rearrange to form a more stable ~~molecule the route of which is regulated by stability of~~

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~~intermediates, and the smallest energy steps possible.~~

It will be understood that modifications to the method can be made for example the intensity of the ultraviolet rays, their height above the layer of meat, the period of time of exposure of the meat to ultraviolet rays, the thickness of the meat, whether the meat is minced or thinly sliced, the type of edible acid used and the quantity of water, edible acid, salt and edible phosphates used can all be varied, without departing from the scope of the present invention.

The method of the present invention is applicable to the processing of meats of ovine, bovine and swine as well as poultry and sea food. In addition it has been calculated that mass processing of meat on a moveable conveyor would be possible using a bank of high intensity ultraviolet lamps of 8350 microwatts/cm^2 at 25mm rating, catalogue number G48T15N, positioned at 60mm centres in individual reflectors so as to fully cover a layer of loosely packed meat of maximum thickness 25mm spread out on a tray. The lamps would be ~~being~~ placed 25mm above the layer of meat and the meat exposed to the lamps for three minutes.

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The claims defining the invention are as follows:

1. A method for extracting a substantial portion of ~~the~~ fat and cholesterol components from meat comprising the steps of:

(a) exposing a thin layer of meat to ultraviolet light, and

(b) comminuting said meat in a chilled bowl with the addition of a quantity of iced water, edible acid, salt and food phosphates until the substantial portion of fat and cholesterol separates from the meat mass and adheres to the inner surface of the chilled bowl.

2. A method as claimed in claim 1 wherein the said bowl is kept at a temperature of -10°C to +10°C; between 1 and 5 litres of iced water; 50-100gm of edible acid; 100-200gm salt and 20-50gm edible phosphates are added during the comminuting step for every 10kg of trimmed meat used.

3. A method as claimed in claim 1 or 2 wherein the layer of meat is of 25mm maximum thickness.

4. A method as claimed in claim 3 wherein the ultraviolet light is of low intensity.

5. A method as claimed in claim 3 wherein the ultraviolet light is of high intensity.

6. A method as claimed in claim 3 wherein the edible acid is acetic acid.

~~7. A meat product produced by the method of claims 1 or 2.~~

8. A meat product free of added carbohydrates, artificial colourings and artificial preservatives wherein the fat portion is reduced to 1-2% and the cholesterol portion is reduced by 10-60% from the levels present in the trimmed meat.

~~9. A method for extracting a substantial portion of the fat~~

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7. A method as claimed in any one of claims 1 to 6, wherein the meat is minced before exposure to the ultraviolet light.

8. A method as claimed in any one of claims 1 to 7, wherein the meat is derived from the group comprising ovine meat, bovine meat, swine, poultry and seafood.

9. A meat product produced by the method claimed in any one of claims 1 to 8.

10. A raw meat product free of added carbohydrates, artificial colourings and artificial preservatives wherein the fat portion is reduced to 1 - 2% and the cholesterol portion is reduced by 10 - 60% from the levels present in the trimmed meat.

11. A meat product as claimed in claim 10, wherein the meat is derived from the group comprising ovine meat, bovine meat, swine, poultry and seafood.

12. A cooked meat product prepared from the raw meat product as claimed in claim 10 or 11.

13. A method as claimed in claim 1, substantially as herein described with reference to Example 1 or Example 2.

Dated this 23rd day of February, 1990

DALLAS VARNEY CHAPMAN

By his Patent Attorney

KERRY MOORE CHRYSILIOU

of

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