

(12) PATENT APPLICATION
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 200051962 A1

(54) Title
Novel meat product comprising a fermented milk product and process for producing the same

(51)⁷ International Patent Classification(s)
A23L 001/318

(21) Application No: **200051962**

(22) Application Date: **2000.08.11**

(30) Priority Data

(31) Number	(32) Date	(33) Country
19938434	1999.08.13	DE

(43) Publication Date : **2001.02.15**

(43) Publication Journal Date : **2001.02.15**

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Abstract

Novel meat product comprising a fermented milk product
and process for producing the same

5

A meat product is provided that comprises a monolithic piece of meat, wherein said piece has been injected with a liquid fermented milk product and then processed mechanically to distribute said fermented milk product substantially uniformly throughout the piece. Also provided is a process for making such a meat product comprising injecting a monolithic piece of meat with a liquid fermented milk product, and thereafter mechanically processing the meat to distribute the fermented milk product substantially uniformly through the meat. Said fermented milk product comprises one or more products selected from buttermilk, soured cream milk, soured milk, fermented whey and kefir. The meat product may be raw, and the fermented milk product may have a pH less than about 5.2, preferably less than about 4.8. Alternatively, the meat product may be cooked, and the fermented milk product may have a pH of not less than 5.0, and preferably at least 5.5 such that the pH of the product as a whole is above the isoelectric point of the meat.

20

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A meat product comprising a monolithic piece of meat, wherein said
5 piece has been injected with a liquid fermented milk product and then
processed mechanically to distribute said fermented milk product substantially
uniformly throughout the piece, wherein said fermented milk product is one or
more selected from buttermilk, soured cream milk, soured milk, fermented
whey and kefir.
10
2. A meat product as claimed in claim 1, comprising 5 to 50% by weight
of injected, fermented milk product.
3. A meat product as claimed in claim 1 or claim 2 which is raw.
15
4. A meat product as claimed in claim 3, wherein the fermented milk
product has a pH of less than 5.2, preferably 3.8 to 3.9.
5. A meat product as claimed in claim 1 or claim 2, wherein said product
20 is cooked.

AUSTRALIA
Patents Act 1990

Bernard Matthews Plc

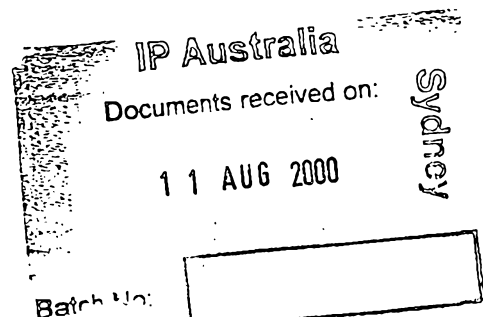
ORIGINAL

COMPLETE SPECIFICATION
STANDARD PATENT

Invention Title:

*Novel meat product comprising a fermented milk product and
process for producing the same*

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



The present invention relates to a novel meat product comprising a fermented
5 milk product. In particular, the present invention relates to a meat product
comprising a monolithic piece of meat that is injected with a non-yoghurt
fermented milk product. The present invention also relates to a process for
producing a meat product injected with a fermented milk product.

10 Yogurt and other fermented milk products are used in many traditional recipes
for marinading and/or pickling meat. For example, it is well known to
marinate venison in sour buttermilk.

Russian patent specification no. 2084184 discloses a fermented meat product
15 obtained by pickling the meat product in the presence of a fermented milk
product.

According to these recipes, the fermented milk product is used to impart a
sharp, tangy flavour to a marinaded, outer zone of the meat product.

20

WO-A-99/21438 discloses a cooked sausage comprising a mixture of meat

emulsion and mild yogurt, wherein the yogurt is substantially homogeneously dispersed through the meat emulsion, and the mixture has a pH of about 5.5 or more. The water retaining capacity of the meat is thus retained, providing a sausage having desirable organoleptic qualities. Said mild yogurt may be prepared from milk mixtures by inoculation by slow working yogurt starter cultures. An advantage of the sausage product of WO-A-99/21438 is that it contains fewer calories per unit weight than conventional meat sausages and is generally easier to digest.

WO-A-99/65338 discloses a novel meat product which comprises a monolithic piece of meat that is injected with yoghurt and processed mechanically to distribute the yoghurt substantially uniformly throughout the piece. The product may comprise 5 to 50% by weight of injected yoghurt. Said yoghurt may have a pH of less than 5.2, preferably about 3.8 to 3.9 to improve the shelf-life of a raw meat product. Alternatively, the meat product may be cooked, and the yoghurt may have a pH of 4.8 to 5.1 to ensure that the overall pH of the meat product does not fall too close to the isoelectric point of the meat, thus preserving the natural moisture and juiciness of the meat during and after cooking.

20

Yoghurt is a relatively expensive ingredient which must be prepared specially

for manufacture of the products of WO-A-99/65338. As a result the products of WO-A-99/65338 are quite expensive to produce. Accordingly there is a need for cooked and uncooked meat products which have the same or similar advantageous properties as those of WO-A-99/65338, and which are yet less expensive to manufacture.

An object of the present invention is to provide novel meat products.

In particular, it is an object of the present invention to provide novel meat products comprising monolithic pieces of meat; that is pieces of meat that retain their natural structure and consistency. The term "monolithic" thus embraces whole muscle pieces of meat, as well as smaller, but nevertheless recognisable pieces such as natural "Butcher's" cuts, slices and strips of meat and cubed or diced meat, and also reformed meat such, for example, as reformed steaks. The term "monolithic" is intended to exclude meat pieces which have been subjected to more severe mechanical processing such as minced or comminuted meat and meat emulsions or doughs of the kind that are formed into sausages, for example.

Another object of the present invention is to provide raw meat products which have a longer shelf life as compared with natural cuts of raw meat.

Yet another object of the present invention is to provide cooked meat products having a novel aroma and/or taste.

5 Yet another object of the present invention is provide such a novel meat product that are generally less expensive to produce as compared with the yoghurt-injected products of WO-A-99/65338

10 According to one aspect of the present invention therefore, there is provided a meat product comprising a monolithic piece of meat, wherein said piece has been injected with one or more liquid fermented milk products selected from buttermilk, soured cream milk, soured milk, fermented whey and kefir and then processed mechanically to distribute said fermented milk product(s) substantially uniformly throughout the piece.

15

According to another aspect of the present invention, there is provided a process for making a meat product, comprising injecting a monolithic piece of meat with a liquid fermented milk product selected from buttermilk, soured cream milk, soured milk, fermented whey and kefir, and thereafter
20 mechanically processing the meat to distribute the fermented milk product substantially uniformly through the meat.

The term "soured cream milk" as used herein includes soured cream, sauerrahm, schmand and creme fraiche.

5 The term "soured milk" includes sauermilch and dichmilch.

The injected fermented milk product may be distributed further throughout the piece of meat by mechanically tenderising and/or tumbling. Said product may comprise 5-50% by weight of injected fermented milk product. It has been

10 found that by injecting liquid fermented milk product into a monolithic piece of meat in accordance with the invention, pores and cavities within the piece may be filled with the fermented milk product and, where higher proportions are used, the piece may become saturated with fermented milk product. The invention thus provides a meat product having attractive, organoleptic

15 properties. By the addition of fermented milk product the calorie-content per unit weight of the product is reduced as compared with natural meat, and the product as a whole may be generally easier to digest. As a further advantage, the mechanical processing of the meat after injection assists in disrupting the structure of the meat, especially proteins, which may thus be opened, and free

20 water within the meat may become incorporated properly within the meat structure. As a result, meat processed in accordance with the invention will

typically be tender and juicy after cooking.

The product of the present invention may be cooked as part of the production process, or alternatively the product may be supplied raw for cooking by a
5 consumer.

Where the product is to be supplied raw, e.g. for cooking at home by a consumer, the fermented milk product may have a pH less than 5.2, preferably less than 4.8, and more preferably less than 4.0. In some embodiments, the
10 fermented milk product may have a pH in the range of 3.6 to 4.0, for example 3.7, 3.8 or 3.9. By using a fermented milk product having such a low pH, the acidity of the product as a whole is increased which tends to suppress the proliferation of unwanted microorganisms within the meat before cooking.

Thus, the product of the present invention may have a longer shelf as compared
15 with natural raw meat.

On the other hand, where the product is to be cooked as part of the production process, e.g. for sale as a cooked cold cut, it is preferable to use a fermented milk product for injection that has a pH which is selected such that, when
20 mixed with the meat, the pH of the product does not fall too close to the isoelectric point of the meat. To this end, the overall pH of the product should

be not less than 5.0, and is preferably at least 5.5. The pH of the fermented milk product which should be used to ensure that the pH of the product falls within these ranges will obviously vary depending on how much fermented milk product is incorporated into the product. However, the fermented milk product will typically have a pH of 4.8 or more, typically 4.8-5.1. By maintaining the pH of the product as a whole above the isoelectric point of the meat, the loss of moisture and water from the product during cooking is minimised. On the other hand, if the pH of the product falls below about pH 5.5 towards the isoelectric point of the meat, then the water-retaining capacity of the meat is reduced, with the result that the juiciness and texture of the final product is impaired.

Said fermented milk product may be prepared by inoculating a milk product with a starter culture, monitoring the pH of the fermented milk product, and quenching fermentation of the fermented milk product when the pH reaches a desired value. Said fermentation of the milk product may be quenched by cooling the fermented milk product to a temperature in the range -2 to 6°C. Said starter culture may comprise a slow working starter culture.

Buttermilk may be made from the residual milk that remains after conventional butter-churning, that is separation of the milk-fat (butter) from the remaining

milk substances. Said residual milk may be soured using suitable starter cultures such, for example, as Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis, Leuconostoc mesenteroides subsp. cremoris and/or Lactococcus lactis subsp. diacetylactis until the desired pH is reached.

5 Alternatively said buttermilk may be made by first souring whole milk or cream to the desired pH with suitable starter cultures, and then quenching fermentation and churning to separate the buttermilk from the milk-fat (butter).

Said soured creamed milk in accordance with the invention may be made by
10 souring whole milk with a high fat content using suitable starter cultures, for example Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis and/or Leuconostoc mesenteroides subsp. cremoris to the desired pH.

Soured milk, including curd milk, may be made by fermenting whole milk
15 having a normal fat content.

Whey is a by-product of cheese manufacture in which whole milk is fermented using suitable cheese starter cultures, such as Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis and/or Leuconostoc mesenteroides
20 subsp. cremoris in the presence of a curdling enzyme such, for example, as rennet. Once the desired pH is reached, the fermentation may be quenched and

the cheese allowed to set. Once the mass has set, the cheese may be crushed mechanically, and the liquid whey extracted from the remaining solid cheese component.

5 In some embodiments, the fermented milk product of the present invention may comprise two or more different components, in which case it is only necessary that the overall pH of the fermented milk product is within the desired range.

10 In some embodiments, the fermented milk product may comprise an edible, alkaline additive to neutralise the acidity of the fermented milk product. Said alkaline additive may comprise, for example carbonated soda and/or ammonium carbonate. Phosphates and/or citrates could also be used to stabilise the mixture.

15 In a further aspect of the present invention, the fermented milk product injected into the meat piece may comprise live cultures, so that the cultures in the product act as protective cultures which hinder the reproduction of undesirable microorganisms in the meat. Said live cultures may be found in fermented milk products having a low pH for injection into meat intended to be supplied
20 raw, as well as in fermented milk products having a relatively high pH for injection into meat intended to be cooked as part of the manufacturing process.

Prior to injection, the fermented milk product may be combined with additional condiments and/or flavourings. Said fermented milk product may comprise 5 to 25% by weight (based on the fermented milk product) of such additional
5 flavourings and condiments. For example, the fermented milk product may be mixed with seasonings such as salt and pepper, additives such as antioxidants (e.g. sodium ascorbate), honey or other flavourings such as smoke flavour or roast flavour.

10 In some embodiments, said liquid fermented milk product may comprise up to 10% by weight of a pre-biotic additive such as a non-digestible carbohydrate. An example of a pre-biotic carbohydrate is inulin. The fermented milk product may comprise 1-10 %wt inulin, which selectively promotes the activity of
some health promoting bacteria in the colon.

15 Said fermented milk product may be injected into the meat piece using a single needle injector or a multi-needle injector. A suitable multi-needle injector is the injector that is commercially available from Schröder Maschinenbau GmbH under the trade name "Pökelinjektor N120". The fermented milk product may
20 be injected at a pressure of about 0.9 to 3.0 bar depending on the type of meat and injection rate. The meat may be injected more than once. In some

embodiments, the meat may be injected using tenderising needles.

After injection and mechanical processing, the product may be directly packaged if it is to be sold raw. Alternatively, the product may be coated with
5 spices and/or marinades and optionally cut prior to packaging. As a further alternative, the product may be cooked and optionally smoked and then packaged. As with the raw product, the meat may be further divided into portions or slices prior to packaging as required. In some embodiments, the product may be shaped into any desired shape. For instance, the meat, after
10 injection and tumbling, may be extruded to form an elongate log of generally circular or oval cross section using apparatus of the kind described in EP-A-0024790 or EP-A-0850566.

The meat piece may comprise meat from any kind of slaughtered animal. For
15 instance, the meat may comprise red meat, such, for example, as beef, venison, lamb or pork; or poultry, such, for example, as turkey or chicken.

Following is a description by way of example only with reference to the accompanying drawings of methods of carrying the present invention into
20 effect.

In the drawings:

Figure 1 is a flow diagram of a process in accordance with the present invention.

5

Figure 2a is a schematic plan view of a meat product in accordance with the present invention.

Figure 2b is a schematic isometric view of a slice of the meat product of

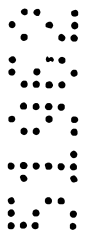
10 Figure 2a.

Figure 3a is a schematic side view of a different product in accordance with the present invention.

15 Figure 3b is a schematic isometric view of a slice of the product of example 3a.

Example 1

20 A turkey breast steak with buttermilk product is made according to the following recipe:



	Turkey breast	75.0 kg
	Buttermilk mix for injection	
	Buttermilk (pH 3.8-3.9)	20.0 kg
	Low fat yoghurt (pH approx. 4.0)	3.0 kg
5	Salt	1.7 kg
	Pepper	0.2 kg
	Flavouring	0.1 kg
		100.0 kg

- 10 Buttermilk is prepared in the known manner from the residual milk that remains after butter churning. Said residual milk is soured using Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis, Leuconostoc mesenteroides subsp. cremoris and/or Lactococcus lactis subsp. diacetylactis as starter cultures until a pH of 3.8-3.9 is reached. As illustrated in Figure 1, said
- 15 fermented buttermilk is then mixed with the yogurt, salt, pepper and other flavourings. Raw turkey breast is provided in the form of monolithic pieces. Said pieces may be whole muscle or reformed pieces or alternatively said meat may be divided to form smaller pieces such as cubes or strips. The meat is weighed into portions of a predetermined weight, and is then combined with

the buttermilk using a multi needle injector, such as the "Pökelinjektor N120" available from Schröder Maschinenbau GmbH. The buttermilk is injected into the meat at a pressure of about 0.9 to 3.0 bar depending on the size of the needles. After injection of the requisite amount of buttermilk, the product is

5 tumbled to distribute the buttermilk substantially uniformly throughout the monolithic meat piece. The injected turkey breaststeak is then sliced into individual steaks and packaged. The resultant product is shown schematically in Figure 2a, and a slice through the product having approximately the weight of an individual portion is shown in Figure 2b.

10 **Example 2**

A pork steak with fermented whey product is made according to the following recipe:

	Boneless pork neck	80 kg
	Whey-brine for injection	
15	Fermented whey	16.1 kg
	Salt	1.6 kg
	Flavourings	0.3 kg
	Whey powder	2.0 kg
		100.0 kg

The whey brine is obtained as a by-product of fresh cheese manufacture in which whole milk is fermented using Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis and/or Leuconostoc mesenteroides subsp. cremoris as cheese starter cultures in the presence of a curdling enzyme such as

5 rennet. Thereafter the cheese is crushed mechanically and the liquid whey extracted from the cheese solids. The sour whey is then mixed with the whey powder, salt and other flavourings and injected into the pork neck as described in Example 1. The pork necks are then tumbled, sliced into individual steaks and packaged.

10

Example 3

A sliceable, cooked, chicken product is manufactured according to the following recipe:

15	Chicken breast	70.0 kg
	Buttermilk - brine for injection	
	Buttermilk	25.0 kg
	Curing salt	2.0 kg
	Sodium ascorbate	0.3 kg

Sugar mix	2.0 kg
Spices	0.5 kg
Tarragon flavour	0.2 kg
	100.0 kg

5

Buttermilk is produced and soured as disclosed in Example 1 above to a mild pH of 5.2 or more, using slow working souring cultures. Said buttermilk is mixed with the curing salt, sodium ascorbate, sugar mix, spices and tarragon flavour, and then injected into the chicken breast as described in Example 1

10 above. Said chicken breast is then tumbled, extruded into a flexible, shirred casing form a product as shown in Figure 3a. Said extruded product is then steam-cooked and chilled. After cooling, the casing is stripped-off and the product is sliced as 'cold cut' sliced meat product, as shown in Figure 3b, and packaged.

15

Example 4

A sliceable roast beef with kefir product is made according to the following recipe:

Beef rump	75.0%
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	Kefir - brine for injection	
	Kefir (pH 4.8 or more)	15.0%
	Water	5.7%
	Salt	1.8%
5	Sugar	2.0%
	Spices	0.5%
		100%

A beef rump trimmed to 95 VL is used as raw material. Fermentation of the
 10 kefir is stopped at pH 4.8. Said kefir is then mixed with the water, salt, sugar
 and other spices and injected into the raw beef rump as described in Example
 1. After injection the beef rumps are tumbled, manually stuffed into fibrous
 casings, cooked and cooled. Prior to slicing they are fried on the outside.

15 **Example 5**

A cooked pork ham with sour cream product is prepared according to the following recipe:

Pork top and silversides	75.0%
--------------------------	-------

	Brine for injection	
	Sour cream (pH 4.8 or more)	10.0%
	Water	10.4%
	Curing salt	1.8%
5	Sodium ascorbate	0.3%
	Sugar mix	2.0%
	Spices	0.5%
		100%

- 10 For this product well trimmed pork topsides and silversides are used as raw material. The fermentation of the sour cream is stopped at pH 4.8. The soured cream is then weighed, mixed with water, curing salt, sodium ascorbate, sugar mix and spices and injected into the raw pork topsides and silversides as disclosed in Example 1. After injection the pork is tumbled, packed into
- 15 moulds, cooked and cooled. After cooling, the meat is removed from the moulds and sliced for use as a cold-cut.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A meat product comprising a monolithic piece of meat, wherein said
5 piece has been injected with a liquid fermented milk product and then
processed mechanically to distribute said fermented milk product substantially
uniformly throughout the piece, wherein said fermented milk product is one or
more selected from buttermilk, soured cream milk, soured milk, fermented
whey and kefir.
10
2. A meat product as claimed in claim 1, comprising 5 to 50% by weight
of injected, fermented milk product.
3. A meat product as claimed in claim 1 or claim 2 which is raw.
15
4. A meat product as claimed in claim 3, wherein the fermented milk
product has a pH of less than 5.2, preferably 3.8 to 3.9.
5. A meat product as claimed in claim 1 or claim 2, wherein said product
20 is cooked.

6. A meat product as claimed in claim 5, wherein the product has a pH of not less than 5.0, preferably at least 5.5.
7. A meat product as claimed in claim 5 or claim 6, wherein said
5 fermented milk product contains an edible alkaline additive for neutralizing the acidity of said fermented milk product.
8. A meat product as claimed in any preceding claim wherein said
10 fermented milk product comprises 5 to 25% by weight of additional flavourings and/or condiments.
9. A meat product as claimed in any preceding claim wherein said
fermented milk product comprises up to 10% by weight of pre-biotic additive.
- 15 10. A process for making a meat product, comprising injecting a monolithic piece of meat with a liquid, fermented milk product, said fermented milk product is one or more selected from buttermilk, soured cream milk, soured milk, fermented whey and kefir, and thereafter mechanically processing the
20 meat to distribute the fermented milk product substantially uniformly throughout the meat.

11. A process as claimed in claim 10, wherein said fermented milk product is distributed further throughout the piece of meat by tenderising and/or tumbling.
- 5 12. A process as claimed in claim 10 or claim 11, comprising 5 to 50% by weight injected fermented milk product.
13. A process as claimed in claim 10, claim 11 or claim 12, wherein said fermented milk product has a pH of less than 5.2, preferably 3.8 to 3.9.
- 10 14. A process as claimed in claim 10, claim 11 or claim 12, further comprising cooking the meat product.
- 15 15. A process as claimed in claim 14, wherein said product has a pH of not less than 5.0, preferably at least 5.5.
16. A process as claimed in claim 15, wherein the monolithic piece of meat is injected with a fermented milk product having a pH of 4.8 to 5.1.
- 20 17. A process as claimed in any of claims 10 to 16, wherein prior to injection the fermented milk product is treated to destroy starter cultures and

any other bacteria present in the fermented milk product.

18. A process as claimed in claim 17, wherein the fermented milk product is treated by chilling to a temperature in the range -2 to 6°C.

5

19. A process as claimed in claim 17, wherein the fermented milk product is treated by heating to a temperature in the range 65 to 70°C.

20. A process as claimed in any of claims 10 to 19, wherein the fermented milk product is made using slow working starter cultures.

10

21. A process as claimed in claim 15 or claim 16, wherein the fermented milk product comprises an edible alkaline additive to neutralise the acidity of the fermented milk product.

15

22. A process as claimed in any of claims 10 to 21, wherein the fermented milk product is injected into the meat piece using a single needle injector or a multi-needle injector.

DATED THIS 11 DAY OF AUGUST 2000

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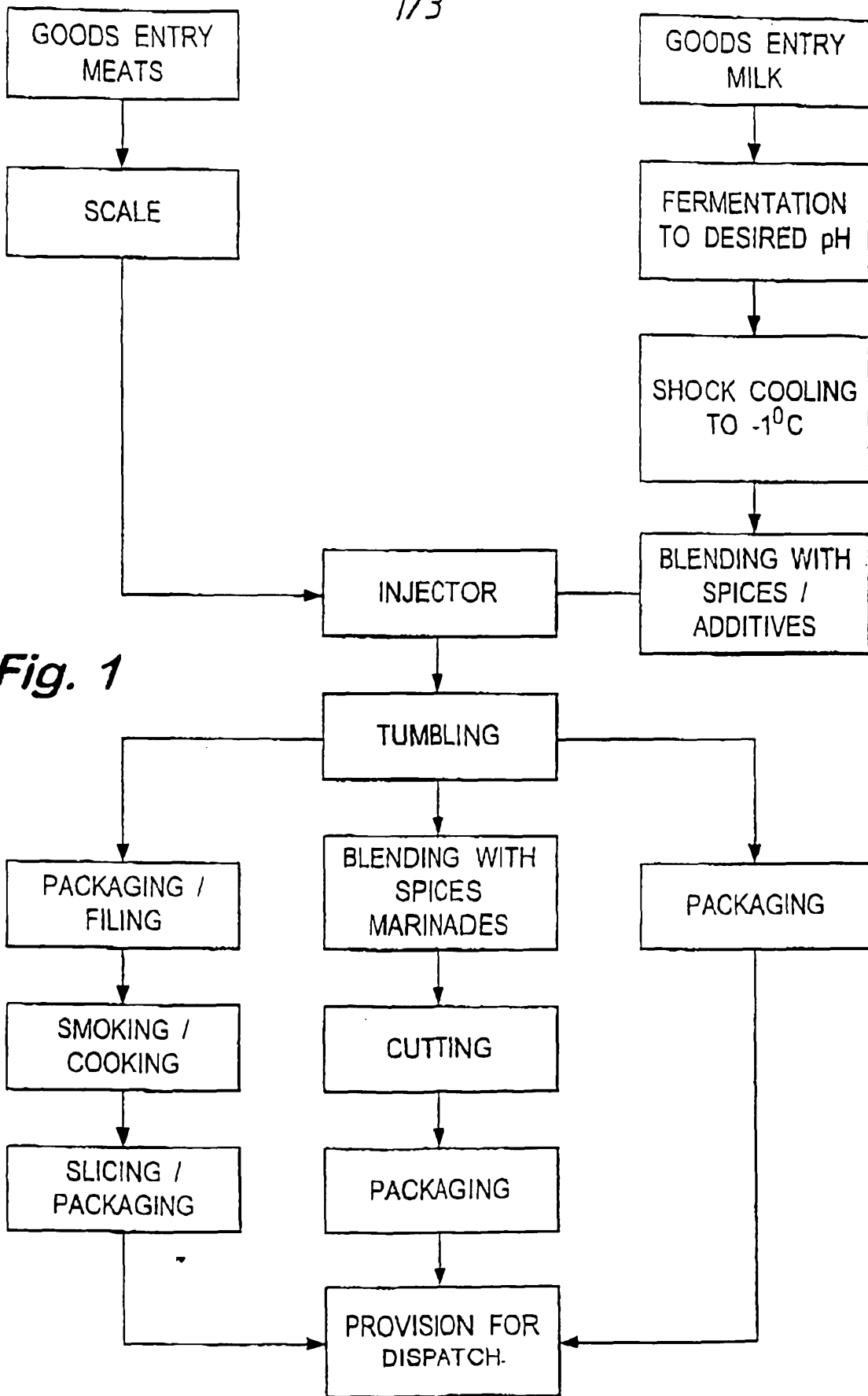


Fig. 1

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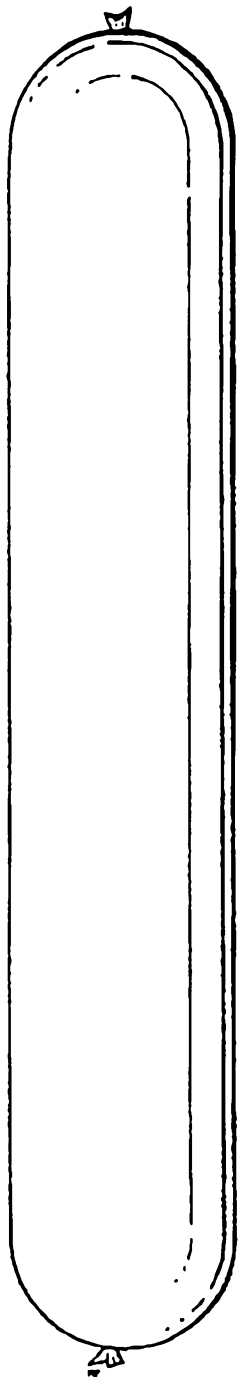


Fig. 3A



Fig. 3B