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(54) Title: WHOLE FISH PRODUCTS AND METHODS OF MAKING AND USING THEM

(57) Abstract: Whole Fish composite Products made from a dry Structural Component and a Fish Meat Powder that has retained most of functional properties and which can both be reconstituted with water and mixed together to produce a range of products.



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(1) A Meat Binder Product made from Fish and other Marine animals which has excellent Functional and Organoleptic properties that can be used in the processing of Meat Products and Methods for Producing, Stabilising, Re-hydrating and Using it comprises in combination;

methods for Producing the Meat Binder Product in which the Process is carried out very quickly after death and which includes, in combination, a Factory Vessel utilising Purse Seining and Trawling Modes that has Means to use both the Hydrostatic pressure and a Syphon system to cause sea water within the capture Nets of both Modes to flow into the vessel by pressure differential that transfers the captured live Fish to a commercial De-Gutting and De-Boning process to produce Fish Flesh in its earliest Pre-Rigor state which is then immediately solubilised by comminuting a mixture of the Flesh and a Brine containing a minimum quantity of Sodium Chloride sufficient to arrest the combining of Actin to Myosin and then to solubilise the Actin and Myosin molecules within minutes by using a very high speed commercial Bowl Chopper or other dispersing means that fully disintegrates the flesh
to effect maximum Solubilisation of the not yet combined Actin and Myosin molecules of the muscle into a liquid fluid state;

methods for Stabilising the Solubilised Fish Flesh by immediately drying it in a easily re-hydratable Powder or Agglomerated Form by using any suitable commercial Spray Drying System under operating conditions and using temperatures that do not denature the Protein that would adversely affect the Functional and Organoleptic properties of the Product and taking into consideration the fact that that the protein

particles become less affected by heat as it dries out and which the Powder has a final moisture content of about 5% resulting in a very long shelf life using commercial packaging procedures;

methods for Re-hydrating the Dry Meat Powder for use as the Binder Product Component in the manufacture of Meat Products by mixing approximately 4 parts of water to 1 part of the Powder Product to re-create the composition of the original fresh meat or any other suitable composition and in which the excellent Functional and Organoleptic properties have been retained; and

methods for Using the Re-hydrated Binder Product to make Analogues and Semi-Analogues of Meat that uses the Emulsifying ability of the Binder Component to create a Hydrophilic environment that enhances the cementing together of the Fibrous Structural Component that comprises any Meat or Non-Meat edible fibrous-like material that simulates the structure of fresh Meat when it is cooked.

(2) A Meat Binder Product as in Claim 1. in which the Meat Binder includes solubilised Myosin that is the most powerful and desirable Functional Protein derived from Meat and contributes such attributes that are useful in the manufacture of Meat Products that comprise Binding, Emulsification, and Water Holding Capacity and the Myosin molecule has to be isolated by solubilising the Myosin from Pre-rigor Meat and furthermore if the Meat has passed through Rigor Mortis it is in the form of Acto-Myosin of Post-Rigor Meat which is also a weak Binder used today by food manufacturers that can only be extracted from commercial Meat using a combination of Salt and Phosphate solutions.

(3) A Meat Binder Product as in Claim 1. in which the Methods for Producing the Product provides for an opening in the Hull of the Vessel at any suitable position below the waterline to which is firmly attached the outer of two rigid telescopically arranged tubes of suitable size that slide into each other using a suitable water sealing means such as O-rings and in which the upper end of the larger diameter tube is long enough to end

just below the waterline and which furthermore has a suitable fail-safe valve such as a Ballcock valve positioned at its base that can prevent sea water from entering when the system is not being used and the inner tube can be extended above the waterline or it can be lowered to the level of the outer tube to control the rate of sea water entering the Vessel and there is further provision for a suitable independent Cap to seal the entrance of the inner tube when Fish are temporarily not required and Further Means is provided for each Mode to direct the flow of water that transports the live Fish effortlessly into the Vessel from the net without stress or damage.

(4) A Meat Binder Product as in Claim 3. in which the Further Means used in the Seining Mode for producing the Product provides for the introduction of a Flexible tube that is rigid enough to keep its shape during the passage of water and is of sufficient length and diameter to be introduced through the inner telescopic tube such that when the vessel comes alongside the Seining Net containing the trapped Fish the leading end of the tube can be placed within the net and the other end within the vessel has means to be attached to the end of the end of the inner telescopic tube and additionally has a means to Cap the entrance to control the flow of sea water in such a way that allows the sea water containing the Fish to enter the vessel only through the Flexible Tube when the inner telescopic tube is lowered below the waterline.

(5) A Meat Binder Product as in Claim 4. in which the Trawling Mode for producing the Product is similar to that for seining except that the Further Means comprising the Flexible tube is of sufficient length to be attached to an opening in a modified Cod End of the Trawl to which is attached a rigid and impermeable Cone attached to prevent compression of the animals as the Trawl is pulled by a Fishing Trawler that travels ahead and kept at a fixed and sufficient distance apart by the latest navigation techniques such that the net and the following vessel is thus umbilically connected.

(6) A Meat Binder Product as in Claim 1. in which the Methods for Producing it provides means for solubilising the Pre-Rigor Meat that comprises mixing together one

part of a Brine solution that is cooled to compensate for the heat generated by the equipment and which contains 8% w/w. Sodium Chloride, to two parts by weight of the Pre-rigor Fish meat and immediately comminuting in a very high speed commercial multi blade Bowl Chopper operating at over 5000 rpm or other dispersing means that fully and quickly disintegrates the flesh such that the very finely dispersed particles and the Brine are in intimate contact to effect maximum Solubilisation and the particles is always in motion due to the shearing action to expose new untreated surfaces of the not yet combined Actin and Myosin molecules of the muscle and the mixture that is initially thick becomes more fluid and sticky when solubilisation is complete.

(7) A Meat Binder Product as in Claim 1. in which the Methods for stabilising the Solubilised Fish Flesh Product to prevent re-combination of the Actin and Myosin provides means for immediately drying it in Powder or Agglomerated Form by any suitable commercial Drying System such as a Spray Drier combined with a Fluidised bed Dryer operating at an inlet temperature of around 200deg C and in which the Meat Protein within the early atomised droplets is cooled by the evaporating water and does not reach a temperature of around 45-50 deg C above which the product starts to gel and denature that results in loss of some of its functional properties and in which the product produced has a final moisture content of around 5% w/w and resulting in a very long shelf life using commercial packaging procedures.

(8) A Meat Binder Product as in Claim 1. in which the methods for Using the Product provides for using the Binder Product in the manufacture of Meat Products such as Analogues and Semi-Analogues of Meat that utilises its Emulsifying power to firstly neutralise the Hydrophobic properties of free or exposed Fat by coating it with the initially fluid Myosin to create a Hydrophilic environment in which the Actin and Myosin of the Re-hydrated Product can freely associate with the Hydrophilic state of the Structural Component that simulates the Meat muscle and furthermore the Actin and Myosin slowly recombines to form Acto-Myosin that then exists in the form of a structured Gel which when fully formed comprises the bonding element in the finished

products when cooked and as a result this bond must not be disrupted as it cannot be reformed to its original condition and the bonding will be weak on cooking and furthermore because of this fact most Meat Products made using the Meat Binder Product must be made into its final shape and stabilised by Moulding, Pre-cooking or Freezing

(9) A Meat Binder Product as in Claim 8. in which the Structural Component in making Analogues of Meat comprises fresh or re-hydrated dried meat and animal connective tissue such that the Structural Component when hydrated has a fibre-like structure that can be structurally oriented to modify the bite, texture and the Water holding capacity and the emulsified fat imparts additional juiciness and mouthfeel in manufactured Meat Products. and furthermore the Meat Binder Product can be used to bind large pieces of Meat in any combination of Fat to Fat to Muscle Meat;

(10). A Meat Binder Product as in Claim (9.) in which the Structural Component in making Semi-Analogues of Meat is a Non- Meat Protein Product that include products of vegetable origin such as plant fibres and the Mycelia of Myco-Protein that are of suitable length to mimic Meat Fibres and which is derived preferably from any edible higher Fungus such as Polyporous Squamosus in its re-hydrated form to make Semi Analogues of Meat.