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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 December 2006 (07.12.2006)

PCT

(10) International Publication Number
WO 2006/130015 A2

(51) International Patent Classification:
A23K 1/18 (2006.01)

(21) International Application Number:
PCT/NO2006/000199

(22) International Filing Date: 29 May 2006 (29.05.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20052661 3 June 2005 (03.06.2005) NO
20062227 18 May 2006 (18.05.2006) NO

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with declaration under Article 17(2)(a); without abstract; title not checked by the International Searching Authority*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FEED FOR FARMED FISH AND FOR FISH STORED IN A LIVE CONDITION, AND A METHOD OF PRODUCING SUCH FEED

(57) Abstract:

WO 2006/130015 A2

FEED FOR FARMED FISH AND FOR FISH STORED IN A LIVE CONDITION, AND A METHOD OF PRODUCING SUCH FEED

The invention regards a soft feed for fish, e.g. for feeding farmed fish and fish caught alive and kept alive in netpens or closing nets or other suitable devices. More particularly, the invention regards an extruded and pelletized feed which when soaked in water and subjected to a mechanical influence loses its structure, forming a pasty, coherent soft mass. This pasty mass may be formed into desired portions for fish, either manually or by extruding the mass through a suitable orifice.

In several types of fisheries the fish is caught alive, and for many years the practice has been to shut this fish in by means of nets while waiting to take the fish out of the sea or the water. An example of this is the sprat (*Sprattus sprattus)* fishing in Norwegian fjords, where the fish is secured in a net and stored alive in seines while waiting for a receiving vessel to retrieve the fish from the sea. Securing the fish like this, or storing it alive, is

necessary to make the fish empty its bowels, thus improving its keeping quality up to the processing stage.

It has also become customary to store other species of fish in a live condition. The advantage of this may be the ability to regulate the market, providing a more regular supply of wild caught fish, thereby obtaining a better price for the fish. Another advantage is that smaller fish with a lower market value can be fed to obtain bigger fish with a higher market value. This can be combined with delivering the fish out of season, thus achieving an even higher price. This type of practice has been established for live caught cod (*Gadus morhua*), pollock (*Pollachius virens*), southern blue-finned tuna (*Thynnus maccoyii*) and northern blue-finned tuna (*Thynnus thynnus*).

After the fish has been caught alive it may be transferred to seines or netpens of the same type as that used for farming of salmon (*Salmo salar*), rainbow trout (*Oncorhynchus mykiss*), sea bass (*Dicentrarchus labrax*) and axillary seabream (*Sparus auratus*). Thus the technology for this is well known and tested.

Farmed fish, including farmed cod and halibut (*Hippoglossus hippoglossus*), are accustomed to a dry formulated feed from the moment it has used up the nutrition in the yolk sac, or possibly following a short period of being fed algae, rotifers, and possibly brine shrimp (*Artemia*). Such fishes will therefore accept a dry formulated feed as food, and will grow well on this type of feed. The degree of utilization of the feed is high, as very little of the feed introduced will sink through the netpen and go to waste.

A formulated fish feed here means a feed composed of one or more sources of protein, including but not limited to marine proteins such as fish meal and krill meal, vegetable proteins such as soy flour, rapeseed flour, wheat gluten, corn gluten, lupine flour, pea flour, sunflower flour and rice flour, and slaughterhouse waste such as blood meal, bone meal, feather flour and chicken flour. Mixing different sources of protein, each with a separate composition of amino acids, makes it possible to achieve a desired amino acid profile for the feed, suited to the species of fish for which the feed is intended. A formulated feed further includes a source of energy in the form of e.g. fish oil and/or vegetable oils such as rapeseed oil and soybean oil. A formulated feed also contains a binding agent, ordinarily in the form of farinaceous (starchy) ingredients such as wheat or wheat flour, potato starch or tapioca flour, peas or beans, in order to give the feed the required solidity and stability of shape. Furthermore, a formulated feed will contain the minerals and vitamins required to ensure good growth and good health for the fish. Moreover, the feed may contain additional additives such as e.g. colouring agents to achieve certain effects. Thus a formulated fish feed is a composite feed in which the quantitative proportions of proteins, fats, carbohydrates, vitamins, minerals and any other additives are calculated to suit the nutritional needs of the species, based on the age of the fish. Ordinarily, only one type of feed is used, and so each piece of feed is of full nutritional value.

A dry formulated feed here means a feed of a pressed or extruded type. A pressed feed will normally contain less than approximately 10% water after pressing and possibly the application of oil. An extruded feed will contain between 18

and 28% water following extrusion. After being extruded this feed goes through a drying step, and subsequently an oil application step. Like the pressed feed, the final product will contain approximately 10% water or less, and as a result will be highly storable, as the water activity in these feeds is low so as to prevent the growth of mould and fungus, and also avoid bacterial decay.

Dried and pressed or extruded feed may be of different shapes and sizes. A common shape is a cylindrical piece of feed where the length-to-diameter ratio is normally between 1 and 1.5. Such pieces of feed are termed pellets. The size of the pellet is proportionate to the size of the fish, thus the diameter of the pellet can be between 1 and 30 mm. In practice, the fish feed industry has found it difficult to produce feed pellets of a diameter larger than 30 mm. The difficulties associated with drying such pellets in reasonable time are cited as one problem. Another problem is the lack of solidity, which causes a lot of dust and breakage.

A dry pressed or extruded fish feed will retain its shape in water for several hours and up to several days unless subjected to external mechanical influences. This is due to the fact that the pellet contains a binding agent in the form of starch. The binding agent has been added to provide the pellet with sufficient strength to allow it to be stored and transported in e.g. big bags that hold from 500 kg to 1000 kg of feed, or to tolerate storage in feed silos and pneumatic transport through production plants, during loading and unloading, and between the feed plant and the individual netpens. The dimensional stability in water is also partly due to the pellet being covered in fat, leaving an external

oil film, and possibly also oil-filled pores and cavities, to inhibit the ingress of water.

The pellet will disintegrate after a period in the water, forming a loose granular mass. This process can be accelerated by subjecting the pellet to external mechanical loads. On a laboratory scale this may be done by stirring the water or directly squeezing or picking at the pellet. The water and pellet will form a grainy thin paste consisting of large and small particles.

Ordinary pelletized feed that has merely become moist will loose its shape when squeezed, but will still break up into individual pellets when the pressure ceases. When subjected to harsher mechanical treatment it will break up into large and small pieces but will not form a coherent mass.

Live caught fish has fed on various types of prey and is not used to eating a dry formulated feed. The dry formulated feed differs from the prey in shape, colour, consistency, smell, taste and movement, and so it has turned out that live caught fish needs a transitional period or adaptation period before it accepts a dry formulated feed as food. In some cases, the attempt to make the fish adapt to such feed is entirely unsuccessful. An example of this is the southern blue-finned tuna. This fish weighs around 15 kg when caught and is sold at a weight of between 30 and 60 kg. Ordinary feed pellets with a diameter of between 10 and 20mm are too small for the fish to care about, in addition to which such feed pellets do not have an appetizing texture.

In the period before the live caught fish accepts the feed there is no growth, and the fish loses weight. This means a

longer period before slaughtering and will also increase the running costs, as the reduced weight will have to be recovered by use of bought feed resources.

It has proven easier to make live caught fish accept the feed if this has a soft consistency. A soft consistency is achieved by having a significantly higher content of water than the approximately 10 % found in dry feed. A soft feed is basically a paste which can contain all of the required nutrients, and which is formed into pieces of feed, manually or by extruding it through an orifice e.g. in a sieve plate. Presumably it is the soft texture that makes this feed more acceptable to the fish than dry feed. After the fish has become accustomed to a soft feed this feed can continue to be used until the fish has reached the desired size. Alternatively the fish can adapt to a dry formulated feed after accepting the soft feed as food.

Soft feed, also called semi-moist feed, is commonly used in fish farming. In particular, it is common for the farmer to prepare the feed himself during the early development phase of the fish farming. Such feeds typically contain 40 % water or more. Upon changing to a more industrialized form of fish farming the soft feed is replaced by industrial feed of the pressed or extruded type.

Soft feed is normally made from whole fish, chopped fish or fish offal. This is mixed with a binding agent, often in the form of starch, but also alginates, and possibly fish oil or other cooking oils, and possibly also vitamins, minerals and other required additives, in a grinder and shaped into pieces of feed by extruding this through a sieve plate. The size of the feed pieces is generally determined by the diameter of

the orifice. Alternatively the paste may be shaped into feed pieces manually.

The raw fish materials are obtained frozen or fresh. Frozen raw fish materials may be thawed before grinding, but some types of grinders can also grind frozen fish. The dry raw materials such as binding agents, vitamins and minerals can be mixed in advance and come as so-called premixes. It is also possible to mix in dry protein materials such as fishmeal, and wet protein materials such as e.g. fish ensilage.

An alternative to soft feed is to feed the caught live fish with whole fish or bits of fish. This may be fresh fish or frozen fish that is thawed immediately before feeding. Some fish farmers let whole blocks of frozen fish float on the water. As the block thaws, the fish or pieces of fish fall off and become available as food.

In Japan it is known to get live caught yellow tail (*Seriola lalandi*) accustomed to an extruded soft feed. This feed is an extruded feed with a relatively low fat content. Prior to feeding, this feed is soaked in water to allow the pellet to absorb water. The pellets can absorb from 50% to 150% water relative to its own weight. The soaking can take from 5 minutes to an hour. After being soaked, the pellets are soft and flexible but still distinct pellets, and they are fed to the fish as regular pellets.

When producing fish feed by means of an extruder the extrudate contains a maximum of 30% water. Prior to drying, this extrudate is soft and flexible. It is known for this

extrudate to be preserved through freezing instead of drying. The farmer will then thaw the feed prior to feeding.

It is also known to produce fish feed by partly adding various water binding agents and partly various softeners. Glycerol is an example of such an additive.

In the case of a dry formulated feed it is a problem when the caught fish does not accept the feed as food. Getting on with ordinary feeding can take a long time. During this time, there is no growth and the fish may even lose weight. The feed used in order to make the fish adapt to the dry feed is largely lost. This is unprofitable to the farmer and detrimental to the environment, as unconsumed feed can settle on the seabed, causing a deterioration of the environment.

Use of a soft feed, whole fish or pieces of fish does not carry the same disadvantages as use of a dry feed in terms of the time taken for the fish to get accustomed to it. On the other hand, it is more labour intensive, as it must be produced on-site and has a short shelf life. Soft feed requires either a regular supply of fresh raw materials or access to frozen raw materials. A regular supply of fresh raw materials may be made difficult by seasonally conditioned fisheries. Poor weather conditions will also affect the availability. Alternatively use can be made of frozen raw materials, which requires access to cold storage. The same holds for the availability of whole fish or pieces of fish. An additional disadvantage of a soft feed is the fact that it is not formulated. It is especially difficult to control the ratio of proteins to fat, and the amino acid profile is determined by the raw material. The same applies when using whole fish or pieces of fish.

A soft feed is compact, and it is difficult to control the density of the feed. A soft feed will sink quite quickly in water compared with a dry formulated feed of the extruded type. This means that there will be a greater waste of soft feed compared with dry extruded feed in situations where the fish has become accustomed to the respective types of feed.

Frozen extruded feed requires an unbroken chain of refrigerated transportation means from the producer to the farmer. This requires more expensive and more complex logistics than the transportation of a dry feed. The simplest and cheapest way of freezing feed pellets is to package the feed in bags, e.g. 25 kg bags. The bags are then placed in cold store. Fish feed has good insulating properties, and so it takes time for a bag to become frozen through. In some instances the core does not freeze and a lot of fungus, mould and bacteria will develop at the centre of the bag during storage and transport. This will not become apparent until the bag is thawed and opened, when the damaged feed mixes with the rest of the feed. An alternative method of freezing is to freeze the pellets prior to packing, by using e.g. a tunnel freezer. This technology raises the price of the product.

Adding water binding and softening components such as glycerol makes the product more expensive. Known mould inhibitors and bacteria inhibitors such as propionic acid and benzoate can also be added in order to give the pellets better storage stability at room temperature. All such additions make the product more expensive. It is also important to remember that such additives must not reduce the tastefulness of the product. Thus fish is known to react negatively to feed containing propionic acid.

A known method of increasing the storage life of moist products is to package these in a modified atmosphere or vacuum-pack them. This makes certain demands on the packaging and requires dedicated packing equipment.

The object of the invention is to remedy or reduce at least one of the drawbacks of prior art.

The objective is achieved by features described in the description below and in the following claims.

The object of the invention is to arrive at a fish feed which is soft when fed out to fish, especially caught fish, while at the same time retaining the beneficial properties of the extruded dry feed in terms of formulation relative to the specific requirement of the fish in question, and the simple logistics associated with the extruded dry feed, from producer to fish farm.

It is also an object of the invention that the soft feed shall be adaptable to different sizes of fish, and advantageously it is possible to form larger pieces of feed than that which is possible in conventional fish feed production based on extruder technology.

Soft feed refers to a feed containing more than 15 % water. In particular, it refers to a feed containing more than 20 % water, and a water content of more than 30 % is even more beneficial to the soft texture. Feed containing more than 30 % water cannot be produced by use of conventional extruder technology. Such a soft feed has a texture that is beneficial when it comes to making live caught fish adapt to a formulated feed.

Surprisingly, it has turned out that by using known raw protein materials such as e.g. fish meal, krill meal, soy flour, rapeseed flour, wheat gluten, corn gluten, lupine flour, pea flour, sunflower flour, rice flour and slaughterhouse waste such as blood meal, bone meal, feather flour and chicken flour, and by using binding agents containing starch, such as e.g. wheat, peas, beans, potato starch or tapioca flour, and by using fats such as fish oil or rape seed oil, it becomes possible to produce a pelletized fish feed having a new technical property, the feed pellets forming a soft coherent paste after being soaked and subjected to simple mechanical kneading. To this end use is made of an extruder which in terms of pressure and temperature conditions and the ratio between thermal and mechanical energy is set so as to make the starch in the extruded material exhibit the properties required for the feed pellets to exhibit the desired novel property of forming a soft coherent paste. This paste may be shaped into pieces of feed of a desired size by pressing it through a suitable orifice in e.g. a sieve plate or by manual shaping. Such shaping makes it possible to achieve larger pieces of feed than those that can be achieved in the production of dry extruded pellets.

The feed is produced by the dry raw protein materials and binding agents being ground and mixed with vitamins and minerals and any other desired components. This mixture is passed through a known preconditioner in which steam, possibly water, possibly oil and possibly fish silage is added to the mixture before it passes into a known extruder such as a single screw or double screw extruder. Here, the mixture is worked, and any additional steam, water, oil or fish ensilage is added here, so as to impart the intended

property to the starch fraction before the mass is forced out through the die base and the extrudate is cut to the desired length by a rotary blade. The holes in the die base may be between 1 mm and 25 mm. The desired length may be shorter than the diameter of the pellet and up to twice the length of the pellet, or longer if expedient. The water content of the extrudate may be between 18 and 28 %.

After being cut, the extrudate passes through a known dryer, e.g. a vertical drying tower or a horizontal belt dryer, and is dried to a water content of less than 10 %. Following dehydration, more oil may if so desired be applied to the pellets by use of known techniques, e.g. a vacuum coater. Following dehydration and any application of oil, the pellets are cooled in a known manner, sieved free of dust and particles and packaged.

Prior to being fed out, the desired quantity of dry extruded feed in accordance with the invention is placed in a suitable receptacle and liquid is added to the pellet. The term suitable receptacle also refers to e.g. a bag or other packaging such as the packaging in which the feed is delivered.

Preferably the quantity of liquid added to the dry pellet is not more than that which can be absorbed by the pellet, while at the same time being sufficient to give a pasty consistency. Preferably the amount of added liquid constitutes between 20 % by weight and 200 % by weight of the pellet. More preferably the amount of added liquid constitutes between 25 % by weight and 100 % by weight of the pellet. Even more preferably the amount of added liquid constitutes between 30 % by weight and 80 % by weight of the

pellet. Most preferably the amount of added liquid constitutes between 30 % by weight and 60 % by weight of the pellet.

The liquid may be fresh water, seawater, fish ensilage, size water or another protein containing liquid such as a mixture of water and fish entrails, or a mixture of two or more such liquids. The temperature of the liquid may be the same as that of the surroundings or it may deviate from this.

Hereinafter the term "liquid" refers to a liquid composition of one or more of said liquids and materials.

Preferably the soaking time is between 1 minute and 24 hours. More preferably the soaking time is between 1 minute and 12 hours. Even more preferably the soaking time is between 1 minute and 6 hours. Most preferably the soaking time is between 1 minute and 90 minutes.

After soaking, the soaked feed is worked into a coherent soft paste. The working may be done by a rotary arm or screw located in the receptacle, or by lowering a suitable device into the receptacle. When the paste has achieved the desired consistency it may be removed and transferred to a suitable apparatus for shaping the pieces of feed. Such a suitable apparatus may be a simple grinder in which an auger carries the paste through one or more suitably sized and shaped orifices in a sieve plate. The length of the pieces of feed can be decided by means of a rotary blade, or by the string breaking off under its own weight.

Alternatively the soaked but still distinct pellets may be transferred to a suitable device for working the pellets into

a mass. Such a device may be a grinder. Working (kneading) and shaping the feed into pieces will then be carried out in one operation

Alternatively there may be associated with the mixing receptacle an arrangement having one or more suitably sized and shaped orifices. The paste in the mixing receptacle can for instance be pressed against the orifice arrangement by a suitable device such as a rotary arm that presses the paste against the wall of the receptacle. Outside the receptacle the paste may be cut into suitable lengths or the string of paste will break off under its own weight. Still other arrangements can be envisaged, which would achieve the desired mechanical working of the soaked feed in accordance with the invention.

An alternative method involves mixing whole fish or fish offal in with the dry pellets prior to soaking, or mixing in whole fish or fish offal after soaking but prior to working or kneading to form a paste, or mixing fish or fish offal into the prepared paste before shaping pieces of feed through a sieve plate.

A person skilled in the art will know that the preparation of the paste and the shaping of the pieces of feed can take place on shore or on a floating structure, and that the pieces of feed can be transported to the netpens in a known manner and be distributed in the netpen in a known manner. Alternatively a person skilled in the art will know that the preparation of the paste and the shaping of the pieces of feed can take place in direct connection with the netpen, such that the shaped pieces of feed will fall directly into the netpen or is distributed across the surface of a netpen

or in several adjacent netpens by means of simple devices. Alternatively a person skilled in the art will known that the paste may be prepared in one place and the pieces of feed shaped in another place, all depending on what is most expedient.

The following describes non-limiting examples of preferred embodiments.

Example 1

A feed in accordance with the invention was prepared according to the following recipe:

Whole-wheat	19 kg
Fish meal	51 kg
Krill meal	5 kg
Corn gluten	8 kg
Wheat gluten	6 kg
Fish oil	11 kg

Following grinding and mixing of the dry raw materials, these were preconditioned in a Wenger DDC preconditioner and extruded in a double screw extruder (Wenger TX-57) at a feed rate to the preconditioner of 140 kg per hour (dry material). 13.8 kg per hour of steam and 26.1 kg per hour of water were added to the mass in the preconditioner. The mass held a temperature of 87°C upon exiting the preconditioner. 7.7 kg per hour of water and 17.0 kg per hour of fish oil were added to the extruder. The specific mechanical energy was 26.9 kWh/ton and the specific thermal energy was 43.0 kWh/ton. The pellet diameter was 3 mm. The pellet was dried in a belt dryer with three sections, the air temperature in the sections being 80°C, 80°C and 70°C, respectively. The total

drying time was 13 minutes.

The dry feed contained 54 % protein, 17 % fat and 5 % water.

The produced feed was soaked for about 20 minutes at a ratio of 6 kg of water to 10 kg of feed. A web of spaces had formed between the loose pellets, allowing the water to distribute easily and all the pellets to soak. After soaking it was easy to form a soft paste by kneading the feed by hand. The feed paste contained approximately 40 % water, approximately 34 % protein and approximately 11 % fat. Alternatively the produced feed was soaked for about 30 minutes at a ratio of 9 kg of water to 10 kg of feed. The feed paste contained approximately 50 % water, approximately 28 % protein and approximately 9 % fat.

The wet feed pellets were also worked by an ordinary mincer. Soft spaghetti shaped strings were formed after passing through the sieve plate of the mincer. The shaped pieces of feed exhibited a good ability to sink in water and were stable in water for a period exceeding the time it takes for feed to sink through a netpen.

Example 2

A feed in accordance with the invention was prepared according to the following recipe:

Fishmeal	49.1 kg
Hipro Soya	8.3 kg
Wheat	20.3 kg
Wheat gluten	6.0 kg
Fish oil	10.7 kg
Full fat fish ensilage	5.0 kg

Betanin ..... 0.04 kg
Minerals ..... 0.09 kg
Vitamins ..... 0.09 kg

Following grinding and mixing of the dry raw materials, these were preconditioned in a Clextral preconditioner and extruded in a double screw extruder (Wenger TX-144) at a feed rate to the preconditioner of 3 tons per hour (dry material). 6 % steam, 10 % water and 5 % ensilage were added to the mass in the preconditioner. 9 % water was added to the extruder. The pellet diameter was 3 mm. The pellet was dried in a belt dryer. Oil (10,7 %) was added after drying in a vacuum coater.

The dry feed contained 47.6 % protein, 17.7 % fat and 10.6 % water.

After soaking, the feed was worked into a paste and pieces of feed were shaped by rolling the paste by hand, into pieces having the sizes of golf balls and tennis balls. These pieces of feed were given to live stored pollock. The pollock had a weight of between 300 and 400 g. Compared with feeding of ordinary dry extruded feed, the pollock displayed a great appetite. Pieces of feed the size of golf balls were eaten whole, while the pieces of feed the size of tennis balls were eaten piecemeal.

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A soft feed in accordance with the invention can be used for feeding farmed fish that has lived all the stages of its life under controlled conditions.

Another application is recreational fishing, where the pasty feed can be used as bait on a hook. It may further be used as bait to attract wild fish to a baited hook, by throwing small pieces of feed out into the water around the fishing spot.

The pasty feed may further be used by professional fishermen, as bait on hooked fishing equipment and as bait in fishpots, fish traps and other stationary fishing gear.

It is a novel idea to produce an extruded pelletized fish feed consisting of standard feed ingredients in the form of protein, fat, carbohydrates, vitamins and minerals, which feed upon soaking in water exhibits the quality of being able, after simple mechanical working of the pellets, to give a coherent soft paste that can be shaped into pieces of feed having the desired cross section and size. The shaping is achieved by in a known manner pressing the paste through a sieve plate having one or more suitable orifices, alternatively by manual shaping. The produced pieces of feed are suitable for making stored live caught fish adapt to formulated feed.

Claims

1. A soft feed for fish, characterized in that the soft feed is created from a mixture of at least one formulated dry feed and a liquid, the mixture being worked into a pasty coherent mass after the liquid has essentially been absorbed into the dry feed, which mass is shaped into pieces of feed of a size and shape to suit the type and size of fish.

2. A soft feed for fish in accordance with Claim 1, characterized in that whole or chopped-up fish, fish entrails or fish offal is added to the mixture of dry feed and liquid

3. A soft feed for fish in accordance with Claim 1, characterized in that the liquid is made up of fresh water, seawater, size water or another protein containing liquid or a mixture of two or more such liquids.

4. A soft feed for fish in accordance with Claim 1, characterized in that the liquid is made up of fresh water, seawater, size water or another protein containing liquid or a mixture of two or more such liquids, together with fish entrails and/or fish offal.

5. A soft feed for fish in accordance with Claim 1, characterized in that the liquid constitutes between 20 % by weight and 200 % by weight of the dry feed.

6. A soft feed for fish in accordance with Claim 1, characterized in that the liquid constitutes between 25 % by weight and 100 % by weight of the dry feed.

7. A soft feed for fish in accordance with Claim 1, characterized in that the liquid constitutes between 30 % by weight and 80 % by weight of the dry feed.

8. A soft feed for fish in accordance with Claim 1, characterized in that the liquid constitutes between 30 % by weight and 60 % by weight of the dry feed.

9. A soft feed for fish in accordance with Claim 1, characterized in that the dry feed is pelletized.

10. A method of producing a formulated soft fish feed based on a formulated dry feed for fish, characterized in that the method comprises the steps of:

a) preparing the formulated dry feed;

b) delivering the formulated dry feed to a receptacle;

c) introducing to the receptacle a liquid arranged to moisten the dry feed, the dry feed and the liquid becoming mixed;

d) leaving the liquid to be absorbed into the dry feed;

e) working the moistened dry feed into a pasty coherent mass;

f) shaping the pasty mass into pieces of feed; and
g) distributing the pieces of feed at the fish feeding site.

11. A method in accordance with Claim 10, characterized in that raw fish materials in the form of whole or chopped up fish or fish entrails or fish offal are added to and mixed in with the dry feed prior to the mixing of dry feed and liquid.

12. A method in accordance with Claim 10, characterized in that raw fish materials in the form of whole or chopped up fish or fish entrails or fish offal are added to and mixed in with the moistened dry feed.

13. A method in accordance with Claim 10, characterized in that raw fish materials in the form of whole or chopped up fish or fish entrails or fish offal are added to the pasty mass.

14. A method in accordance with one or more of Claims 10 to 13, characterized in that the mixture of moistened dry feed and raw fish materials is worked in a grinding device.

15. A method in accordance with Claim 10, characterized in that the liquid is made up of fresh water, seawater, size water or another protein containing liquid or a mixture of two or more such liquids.

16. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the liquid is made up of fresh water, seawater, size water or another protein containing liquid or a mixture of two or more such liquids, together with fish entrails and/or fish offal.

17. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the liquid constitutes between 20 % by weight and 200 % by weight of the dry feed.

18. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the liquid constitutes between 25 % by weight and 100 % by weight of the dry feed.

19. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the liquid constitutes between 30 % by weight and 80 % by weight of the dry feed.

20. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the liquid constitutes between 30 % by weight and 60 % by weight of the dry feed.

21. A method in accordance with Claim 10, c h a r a c t e r i z e d i n that the soaking time is from 1 minute to 24 hours.

22. A method in accordance with Claim 10, characterized in that the soaking time is from 1 minute to 12 hours.

23. A method in accordance with Claim 10, characterized in that the soaking time is from 1 minute to 6 hours.

24. A method in accordance with Claim 10, characterized in that the soaking time is from 1 minute to 90 minutes.

25. A method in accordance with Claim 10, characterized in that the pieces of feed are shaped by pressing the pasty mass through an orifice or a sieve plate.

PATENT COOPERATION TREATY

PCT

DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT
(PCT Article 17(2)(a), Rule 13*ter*.1(c) and *39*)

Applicant's or agent's file reference p24885PC01	**IMPORTANT DECLARATION**	Date of mailing *(day/month/year)* 13-09-2006
International application No. PCT/NO2006/000199	International filing date *(day/month/year)* 29-05-2006	(Earliest) Priority Date *(day/month/year)* 03-06-2005
International Patent Classification (IPC) or both national classification and IPC See extra sheet		
Applicant Trouw International B.V. et al		

This International Searching Authority hereby declares, according to Article 17(2)(a), that **no international search report will be established** on the international application for the reasons indicated below.

1. ☐ The subject matter of the international application relates to:
   - a. ☐ scientific theories.
   - b. ☐ mathematical theories.
   - c. ☐ plant varieties.
   - d. ☐ animal varieties.
   - e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.
   - f. ☐ schemes, rules or methods of doing business.
   - g. ☐ schemes, rules or methods of performing purely mental acts.
   - h. ☐ schemes, rules or methods of playing games.
   - i. ☐ methods for treatment of the human body by surgery or therapy.
   - j. ☐ methods for treatment of the animal body by surgery or therapy.
   - k. ☐ diagnostic methods practised on the human or animal body.
   - l. ☐ mere presentations of information.
   - m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.

2. ☒ The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:
   ☒ the description ☒ the claims ☐ the drawings

3. ☐ A meaningful search could not be carried out without the sequence listing; the applicant did not, within the prescribed time limit:
   - ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
   - ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
   - ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13*ter*.1(a) or (b).

4. ☐ A meaningful search could not be carried out without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Searching Authority in a form and manner acceptable to it.

5. Further comments:

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Present claims 1-9 relate to an extremely large number of possible compositions. In fact, the claims contain so many options that a lack of clarity and conciseness within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible.

Further, the application fails to comply with the regulations in Article 5 PCT. The description of the compositions is very vague and imprecise. In fact, most of the dried fish feed compositions known, with an addition of liquid, result in a composition described in the application. More, the applicant has not described any problem that is solved by addition of liquid to known dry fish feed compositions. This makes it very difficult, if not impossible, to determine the matter for which protection is sought.

Consequently, the application fails to comply with Article 5 and Article 6 PCT to such an extent that a meaningful search of claims 1-9 is impossible.

Claims 10-25 relate to a method for producing the soft feed composition. The method is characterized in that a formulated dry fish feed is soaked in a liquid and worked into a formulated soft fish feed. As described above, an extremely large number of different dry fish feed compositions can be used as starting materials in the process. The vague description of the starting materials and the few and vague characteristics (soaking, working the moistened dry feed and shaping the pasty mass) of the process makes it difficult to determine the matter for which protection is sought. In fact, the claims contain so many options that a lack of clarity and conciseness within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible.

Further, the applicant has not clearly indicated that the present claims are industrial applicable.

Consequently, no search report has been established for the present application, as it was not possible to carry out a meaningful search into the state of the art (Art. 17(2)(a)(i) and (ii) PCT).

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