

# PATENT SPECIFICATION

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## (54) ANIMAL FEED

(71) We, SANDOZ LTD., of 35 Lichtstrasse, 400 Basle, Switzerland, a Swiss Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a ready-to-use soft-moist animal diet feed which is especially suitable for dogs, but may also be used for cats.

The invention provides a soft-moist nutritional animal diet feed which comprises 3 to 20% fat; 20 to 55, preferably to 45% carbohydrates; 10 to 27, preferably to 25% water; 5, preferably 14, to 35% of protein in which protein the ratio of animal protein to plant protein is from 3:5 to 5:9 and in which protein the following amino acids are present in the following amounts as expressed in parts by weight

|               |            |
|---------------|------------|
| isoleucine    | 3.5 to 6.5 |
| leucine       | 6.5 to 9   |
| valine        | 4.5 to 6.5 |
| methionine    | 2.3 to 4   |
| cystine       | 0.5 to 3   |
| phenylalanine | 3 to 7.5   |
| tyrosine      | 3 to 5     |
| threonine     | 2.5 to 5.5 |
| tryptophane   | 0.6 to 1.5 |
| lysine        | 3.5 to 9   |
| histidine     | 1.5 to 3.5 |
| arginine      | 3.5 to 7   |

additional methionine being included in the protein in an amount of from 0.005 to 0.25% of the diet feed weight.

Preferably the sum of the amounts of the above-mentioned twelve amino acids is below about 71%, more preferably below about 57%, of the total protein weight.

Preferably the sum of the amounts of the above-mentioned twelve amino acids is above

about 35%, more preferably about 42%, of the total protein weight.

As will be appreciated, the major preserving and water-retaining property may be ascribed to the low molecular carbohydrates in the carbohydrates present. It will be appreciated that the specific amino acid values may be determined by actual analysis of the manufactured diet feed itself, or by calculation of the theoretical values for the manufactured diet feed should contain based on values known for the various constituents of the diet feed. The values will naturally be subject to error conventionally expected for such determinations.

It will be appreciated that as the sum of values of water, protein, fat and carbohydrate found by analysis may not amount to 100%, the remainder may be attributed to fibrous material and material forming ash.

When such a diet feed is the only food for the animal, it will be appreciated that it should contain sufficient amounts of all nutrients required.

In another aspect the present invention provides a soft-moist nutritional animal diet feed which comprises 3 to 20% fat; 20 to 55% carbohydrates; 10 to 27% water; 5 to 35% or protein in which the ratio of animal protein is from 3:5 to 5:9 and in which the following amino acids are present in the following amounts as expressed as % of the total protein weight.

isoleucine 3.5 to 6.5%; leucine 6.5 to 9%; valine 4.5 to 6.5%; methionine 2.3 to 4%; cystine 0.5 to 3%; phenylalanine 3 to 7.5%; tyrosine 3 to 5%; threonine 2.5 to 5.5%; tryptophane 0.6 to 1.5%; lysine 3.5 to 9%; histidine 1.5 to 3.5% and arginine 3.5 to 7%, the diet feed containing from 0.005 to 0.25% of additional methionine.

It has been found that an optimal amino acid supply is obtained with protein in which the ratio of animal protein to plant protein is approximately from 3:5 to 5:9, especially

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approximately 4:7. The correct supply of methionine is difficult to obtain by just adjusting the supply of protein source, and if it is so obtained tends to lead to an imbalance in the other essential amino acids. The methionine may, if desired, be added in the form of N - acetyl - methionine. Conveniently 0.05 to 0.25% of the total feed weight of methionine is added in free form.

For such preferred diet feeds, analysis of available protein sources may indicate the necessity of further amino acid supplements to yield the desired amino acid balance.

Suitable suppliers of animal protein are, for example: egg products, such as fresh or dried eggs, meat products, especially meat with little cartilage and connective tissue, such as muscle meat in the form of fresh or dried meat, and milk products, e.g. casein. Suitable suppliers of plant protein are, for example: soya, oat or wheat germ products, yeast and the like, but the major part of the plant protein is conveniently derived from soya products.

Preferred upper and/or lower values of the amino acids in % or parts by weight may be as follows:—especially 4 to 5.5 of isoleucine; especially 7 to 8 of leucine, especially 4.5 to 5.5 of valine, especially 2.5 to 3.3 of methionine, especially 0.5 to 1.5 of cystine, especially 5 to 6 of phenylalanine, especially 4 to 5 of tyrosine, especially 3.5 to 4.5 of threonine, especially 0.65 to 1.2 of tryptophane, especially 3.8 to 6.5 of lysine, 2 to 3 of histidine, and especially 4.5 to 6.5 of arginine.

Preferred diet feeds have a protein content of high biological value (a protein mixture has a biological value of 100 for an animal when 1 g of body protein is formed from 1 g of supplied protein), normally between 60 and 100, and especially preferred feeds have a value over 80. It is, of course, preferred that the treatment of the ingredients be such that the diet feed retains a maximum biological value.

After consumption of nitrogen-containing food, the bloods urea content and nitrogen elimination usually increase to an extent depending on the utilizability of the provided substances for the body's own protein synthesis. Feeding with a protein mixture having an optimum composition and which may be used to a great extent for the building up the body's own protein, is not expected to lead to substantial increase of the blood's urea level values and of nitrogen elimination.

Thus the diet feeds of the invention are particularly suitable for animals prone to kidney diseases in which the maintenance of low urea levels in the blood is particularly important. While low blood urea levels may also be obtained by the supply of feed containing very small amounts of protein, it has been found that when the correct amino acid

balance is given, substantially more protein may be eaten and thus the protein requirements of the animal are met. Diets which are merely low in protein do not meet the protein requirements of the animal and may cause further health problems.

The desired amount of fat may be added either as animal fat, e.g. in the form of fat-rich milk products, suet or lard, or as vegetable fat, e.g. in the form of fat-rich soya products or oil-containing legumes, e.g. peanut flour.

The carbohydrates added are preferably substances which lower the water activity of the final product and which are therefore suitable as preserving and water-retaining agents, e.g. monosaccharides such as glucose, and especially those products which likewise have binding properties, e.g. glucose syrup of different D.E. values<sup>+</sup>). It is preferred to add a natural softener to the diet feed, which will permit the obtention of a sufficiently soft, but not sticky consistency of the ready feed with a relatively low content of water. Especially suited as softener is, for example, molasses, which also contains valuable mineral elements and trace elements. The mixture may also, for example, contain propylene glycol, sorbitol or other polyvalent alcohols suitable for consumption, as further humidifying and stabilizing agents.

The diet feed preferably also contains vitamin and mineral substance supplements, as well as flavouring, colouring and preserving agents. Suitable preserving agents which are especially capable of stopping the growth of yeast and mold fungi are, for example, potassium sorbate or lower alkyl esters of 4 - hydroxybenzoic acid. Examples of preserving agents which are antioxidants are: 2- and 3 - tert.butyl - 4 - hydroxy - anisole or mixtures thereof, gallic acid ester, nordehydro - guaiaretic acid or ascorbyl palmitate. These antioxidants are conveniently used in combination with e.g. disodium ethylenediamine tetraacetic acid or sodium citrate, which also have a colour-stabilizing effect.

It will be appreciated that from a knowledge of the composition of e.g. fat, carbohydrate, and protein, of the various raw materials available, a recipe can be devised calculated to produce a diet feed of the desired composition. The actual composition may be checked by analysis in conventional manner.

The invention also provides a method of manufacturing soft-moist animal diet feeds such as herein described, which includes the steps of cooking protein and mixing the protein with fat, and thereafter adding and mix-

<sup>+</sup>) The D.E. value (dextrose equivalent) indicates the % content of reducing sugars, calculated as D-glucose in dry substance.

ing in the carbohydrates to the mixture when at a substantially lower temperature than the cooling temperature as well as the step of mixing in additional methionine in an amount to give from 0.005% to 0.25% total methionine in the final diet food weight.

The production of the diet feed of the invention is preferably effected by blending a mixture which has been precooked in order to kill bacteria, comprising fresh meat or dried meat reduced to small pieces and other products which are readily perishable or which may have been contaminated with bacteria owing to the way of their obtention, first with the fat, and the remaining additives subsequently added and, if desired, the resulting mixture is extruded in the cold and divided into morsels of desired size and, if desired, the morsels are subsequently sprayed with a liquid bactericide which is physiologically inert.

In order to maintain the high biological quality of all the ingredients, the use of heat in the production of the diet feed of the invention should be reduced to a minimum. Furthermore, the possibility of a reaction of the proteins with the carbohydrates during the production process should be minimized. It has been found that the quality reduction of the protein mixture, occurring in the case of the hitherto known production processes, can be avoided to a great extent if the protein-containing ingredients are blended with the fats before the addition of the substances mainly consisting of low-molecular carbohydrates, thus the damage to lysine, caused by the reaction known as the Maillard reaction between lysine and the lower carbohydrates, may be reduced.

The production may, for example, be effected as follows:

Fresh or dried meat, reduced to coarse pieces, is heated in an autoclave to a temperature of approx. 100—110°C, optionally with stirring, for a time sufficient to sterilize the mixture and to deactivate the enzymes, together with the other readily perishable protein-containing products, e.g. eggs, soya products, casein, wheat germ products, etc., and those ingredients which may have been contaminated with bacteria owing to the way of their obtention, e.g. natural potassium carbonate or other natural minerals. The cooking time preferably ranges between 15 and 30 minutes. If desired, the plant protein-containing substances may be added to the meat which has been precooked for 10 to 15 minutes. The fats are subsequently admixed, preferably while the mass is still hot, or are added in melted state to the cooled mass. Colouring and preserving agents may be added as such or, for example, dissolved or suspended in propylene glycol. The further ingredients, which may have likewise been previously heated, may

then be added individually to the resulting cooled elementary mass, or may be first mixed together and then added jointly. If desired, the mixture may again be heated to approx. 80—100°C. The vitamins are preferably added to the cooled mixture lastly, if desired, together with a colouring solution. In the resulting feed mixture all the ingredients are mixed homogeneously. It has a consistency which permits the extrusion of the mixture at a temperature between room temperature and approx. 50°C, preferably at room temperature, and division into pieces of desired size.

Bactericidal liquids which are suitable for spraying the resulting molded pieces are, for example lactic acid or propylene glycol or mixtures thereof, optionally with the addition of a physiologically inert, readily volatile diluent.

A preferred form of the invention is a diet feed for dogs suffering from renal diseases. In the case of nephritis, the increased amounts of urea in the blood after normal food consumption cannot be sufficiently eliminated and, therefore, cumulative and chronic urea poisoning sets in.

The renal disease diet feed according to the invention comprises approx. 5 to 17% of protein containing the amino acid content set out as especially preferred above. In order to avoid an excess of individual, unnecessary amino acids, it is preferred to use meat which is devoid of connective tissue or its equivalent, e.g. egg and casein either singly or in combination, as suppliers of animal protein.

Animals suffering from renal diseases are usually bad eaters. In order to insure the daily caloric requirement of the animal with only a small total amount of feed, the renal disease diet feed has a high fat content. Animal or vegetable fat may be used. For example, non-defatted grain products such as fat-rich soya meal or rape or linseed products, fat-containing legumes, e.g. peanut flour, or milk products enriched with fat, are suitable. In order to obtain a complete incorporation of the fat and to avoid a subsequent fat exudation to the surface of the individual pieces of feed, it is convenient when very high fat contents, e.g. of over 15%, are desired, to add part of the fat to the cooled mass in the form of a solidified emulsion of the type of oil in water emulsion and in powder form, in which the individual fat particles are surrounded by a stable external covering which is also maintained during the further treatment. Such a solidified fat-rich emulsion is, for example, a dry milk powder prepared from milk enriched with fat. Non-defatted grain products such as fat-rich soya meal also contain part of the fat bound in the form of a solidified emulsion. The renal disease diet feed furthermore preferably contains an excess of water-soluble B vitamins and has a

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high mineral substance content, in order to compensate for the increased requirement of such substances in the case of renal diseases.

The renal disease diet feed according to the invention comprises 5 to 17% of protein in which the ratio of animal protein to plant protein is approx. from 3:5 to 5:9, and in which at most half of the animal protein is derived from meat, and which has an amino acid balance as specified above, 30 to 55% of carbohydrates, 10 to 18% of fat, and 10 to 27% of water.

A further preferred form of the invention is a diet feed low in calories, which has a content of 10 to 20% of an edible filler having low nutritive value.

When animals are supplied with a sufficient quantity of all the essential amino acids in their feed, this reduces the sensation of hunger, even with a reduced total calorie supply. In accordance with the invention the calorie content of the diet feed is reduced in that the amount of fat usually contained in the feed is replaced by a filler having a low nutritive value and the fat content is conveniently reduced to less than 5%. However, the feed should preferably still contain an amount of fat of at least approx. 3%, which is sufficient to cause a slowing down of stomach evacuation. Suitable fillers having a low nutritive value are those edible substances which are stable to moisture, do not swell during production and storage of the product, and are scarcely broken down by the animal, e.g. edible cellulose products or grain products. Such specially suitable products are, for example, corn cob meal, wheat bran, or cellulose prepared from wheat bran or dried beet chips. The diet feed low in calories preferably has a relatively high water content, e.g. between 15 and 27%, and preferably contains a sufficient quantity, e.g. between approx. 10 and 25%, to stabilize and maintain the moisture of the product, of low-molecular weight carbohydrates, especially monosaccharides. In order to avoid the final product becoming too brittle by the addition of the above mentioned fillers, it is preferred to add further ingredients having good binding properties, to the mixture. It has been found that especially suitable stabilizing and humidifying agents, which likewise have a sufficient binding agent effect in order to obtain the desired consistency, are a mixture of glucose with a glucose syrup having a low D.E. value, e.g. a D.E. value of approx. 30, preferably at a mixture ratio of approx. 2:1 to 3:1, and molasses.

The low calorie diet feed according to the invention preferably comprises 5 to 35% of protein in which the ratio of animal protein to plant protein is approx. from 3:5 to 5:9, and which has an amino acid balance as specified above, 3 to 8% of fat, 10 to 25% of low molecular weight carbohydrates, 10 to

27% of water, and 10 to 20% of an edible filler having low nutritive value.

As will be appreciated, when the edible filler is a carbohydrate then the total carbohydrate content including the preserving low molecular weight carbohydrate, will be from 20 to 45%. In another aspect further low molecular weight carbohydrates, or edible filler may be present to bring the total carbohydrate content up to 55%.

A further preferred form of the invention is a diet feed which comprises a high calorie content relative to feed quantity, preferably in the form of readily digestible foodstuffs, and preferably comprises a large portion of proteins of high biologically quality. This feed is especially indicated for use in the feeding of animals which are in a stress situation, e.g. growth, convalescence, lactation, performance stress, etc. The stress diet feed is preferably devoid of fiber elements which are hard to digest. Aside from proteins and fat, the feed contains as readily digestible calorie-rich substances e.g. low-molecular weight carbohydrates, especially monosaccharides, e.g. glucose. In order to obtain a sufficiently solid consistency, the diet feed preferably contains approx. 15 to 20% of defatted soya products which have a texture-forming effect. Suitable readily digested proteins, aside from egg and soya products, are preferably milk products, especially sodium caseinate, which is likewise capable of binding part of the sugarlike substances.

The stress diet feed of the invention may, for example, contain 30 to 45% of low-molecular weight carbohydrates, preferably the major portion in the form of glucose or sucrose, and 20 to 35% of proteins in the balance specified above, preferably the major portion in the form of egg, milk and soya products, especially sodium caseinate and defatted soya meal, approx. 8 to 18% of fat, and 10 to 27% of water, aside from further ingredients.

The following non-limitative Examples illustrate the invention.

"Ribotid" as used hereafter is a registered Trade Mark.

#### Examples 1—8:

The diet feed formulations Examples 1—8, having the composition indicated in the following Table 1, are produced in accordance with the following process:

Mixture I is cooked in a mixer, while stirring, for at least 15 minutes, in the presence of fresh meat up to 35 minutes.

The fats indicated in section II and the stabilizing agents dissolved therein are then successively added, optionally after cooling the mixture, and the mass is thoroughly mixed for 5 minutes.

A mixture of the ingredients indicated in section III is then added, the colouring matter

preferably in the form of a solution.

5 The ingredients indicated in section IV are then successively added and subsequently the ingredients indicated in section V are added, and the feed is thoroughly kneaded for 15 minutes while cooling.

The resulting feed mass is extruded in cold state to a strand having a diameter of 1 cm, and upon leaving the extruder this strand is divided into pieces having any desired length, which are then sprayed with a bactericidal agent. 10

TABLE 1

| Ingredient in % by weight         | Recipes for diet feed Example No. |        |        |        |        |        |        |        |
|-----------------------------------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|
|                                   | 1                                 | 2      | 3      | 4      | 5      | 6      | 7      | 8      |
| Horse meat                        | 20                                | 15     | 15     | 15     | 15     | 15     | 15     | 15     |
| Amaranth red                      | 0,015                             | 0,015  | 0,015  | 0,015  | 0,015  | 0,015  | 0,015  | 0,015  |
| Tartrazine yellow                 | 0,005                             | 0,005  | 0,005  | 0,005  | 0,005  | 0,005  | 0,005  | 0,005  |
| Calcium hydrogen phosphate        | 0,5                               | 0,5    | 0,5    | 0,5    | 0,5    | 0,5    | 0,5    | 0,5    |
| Calcium carbonate                 | —                                 | —      | —      | —      | 0,5    | 0,5    | 0,5    | 0,5    |
| Corn cob meal                     | —                                 | —      | —      | —      | —      | 10     | —      | —      |
| Cellulose                         | —                                 | —      | —      | —      | 15     | 4      | —      | —      |
| Torula dry yeast                  | 0,9                               | 4      | 4      | 4      | 4      | 4      | 4      | 4      |
| Defatted soya flour               | —                                 | 8      | 8      | 8      | 12     | 25     | 22     | 25     |
| Full-fatty soya flour             | 10                                | —      | —      | —      | —      | —      | —      | —      |
| Wheat germ flour                  | 5                                 | 3      | 3      | 3      | 3      | 3      | 3      | 3      |
| Egg                               | —                                 | 6      | 3      | 6      | 3      | 4      | 2      | 4      |
| Sodium caseinate, casein          | —                                 | 2      | 2      | 2      | 2      | 2      | 5,5    | 4      |
| Stabilized fat                    | 10                                | 10     | 10     | 10     | 1      | 1      | 9      | 10     |
| <i>Tert.</i> butyl-hydroxyanisole | 0,0002                            | 0,0002 | 0,0002 | 0,0002 | 0,0002 | 0,0001 | 0,0002 | 0,0002 |
| Sunflower oil                     | —                                 | 2      | 2      | 2      | 2      | 1      | 2      | 2      |

TABLE 1 (Continued)

| Ingredient in % by weight | Recipes for diet feed Example No. |      |     |      |     |      |     |      |
|---------------------------|-----------------------------------|------|-----|------|-----|------|-----|------|
|                           | 1                                 | 2    | 3   | 4    | 5   | 6    | 7   | 8    |
| Vitamin mixture           | 4                                 | 4,85 | 4,2 | 4,8  | 4,2 | 4,8  | 4,2 | 4,8  |
| Potassium sorbate         | 0,5                               | 0,5  |     | 0,5  |     | 0,5  |     | 0,5  |
| Flavourings               | 0,1                               | 0,1  | 0,1 | 0,1  | 0,1 | 0,1  | 0,1 | 0,1  |
| Choline citrate           | 0,04                              | 0,04 |     | 0,04 |     | 0,04 |     | 0,04 |
| Sodium glutamate          | —                                 | 0,1  |     | 0,1  |     | 0,1  |     | 0,1  |
| Ribotid (Takeda)          |                                   | 0,01 |     | 0,01 |     | 0,01 |     | 0,01 |
| Methionine                | 0,005                             | 0,1  | 0,2 | 0,1  | 0,2 | 0,2  | 0,2 | 0,2  |
| Glucose                   | 12,4                              | 10   | 15  | 10,3 | 15  | 10,2 | 15  | 10,2 |
| Glucose syrup             | 6                                 | 6    | 6   | 6    | 6   | 6    | 6   | 6    |
| Molasses                  | —                                 | 6    | 5   | 6    | 5   | 4    | 5   | 6    |
| Oatmeal                   | 15                                | 15   | 15  | 15   | 5   | 5    | 5   | 5    |
| Maize starch              | —                                 | 10   | 4,5 | 10   | 4,5 | 4,5  | —   | —    |
| Propylene glycol          | 2,5                               | —    | 2,5 | —    | 2,5 | —    | 2,5 | —    |
| Corn meal                 | 15                                | —    | —   | —    | —   | —    | —   | —    |

IV

V

**Examples 9—14:**

The diet feed formulations Examples 9—14, having the composition indicated in the following Table 2, are produced in accordance with the following process:

The meat which has been reduced to small pieces is heated in a closed kettle to approximately 100°C for 10 to 20 minutes, and after the addition of the further ingredients of mixture I, it is again cooked for approx. 15 minutes while stirring.

After the addition of calcium carbonate and calcium phosphate, the mixture is heated in an open vessel for a further 15 minutes, the remaining ingredients indicated in section II are added and the mixture is again heated for approx. 10 minutes.

The fats and stabilizing agents dissolved

therein, indicated in section III, are then successively added while cooling the mixture, and the mass is thoroughly kneaded for approx. 10 minutes.

A mixture of the ingredients indicated in section IV is subsequently added.

A mixture of the ingredients indicated in section V is then added and the feed is thoroughly kneaded while cooling for 15 minutes.

The vitamin mixture and the dyes, preferably in solution, indicated in section VI are finally added, and the mixture is thoroughly kneaded until a uniform colouration is obtained (approx. 15 minutes).

The resulting feed mass, when cold, is extruded to a strand having a diameter of 1 cm which, upon leaving the extruder, is divided into pieces of desired length.

TABLE 2

| Ingredient in % by weight               | Recipes for diet feed Example No. |        |        |        |        |        |  |  |
|-----------------------------------------|-----------------------------------|--------|--------|--------|--------|--------|--|--|
|                                         | 9                                 | 10     | 11     | 12     | 13     | 14     |  |  |
| Horse meat                              | 15                                | 15     | 15     | —      | —      | —      |  |  |
| Cellulose from beet chips or wheat bran | —                                 | 15     | —      | —      | —      | 25     |  |  |
| Water                                   | —                                 | —      | —      | 6,5    | 5,5    | 11     |  |  |
| Meat meal                               | —                                 | —      | —      | 10     | 5      | 5      |  |  |
| Torula dry yeast                        | 4                                 | 4      | 4      | 4      | 4      | 4      |  |  |
| Wheat germ flour                        | 3                                 | 3      | 3      | 3      | 3      | 3      |  |  |
| Egg                                     | 3                                 | 3      | 2      | —      | —      | —      |  |  |
| Sodium caseinate, casein                | 2                                 | 2      | 5,5    | 4      | —      | —      |  |  |
| Calcium hydrogen phosphate              | 0,5                               | 0,5    | 0,5    | 0,5    | 0,5    | 0,5    |  |  |
| Calcium carbonate                       | —                                 | 0,5    | —      | —      | 0,5    | 0,5    |  |  |
| Oatmeal (precooked)                     | 15                                | 5      | 5      | 5      | 10     | 5      |  |  |
| Maize starch (precooked)                | 4,5                               | —      | —      | —      | 15     | 4,5    |  |  |
| Defatted soya flour                     | 8                                 | 12     | 30     | 30     | 10     | 12     |  |  |
| Stabilized fat                          | 10                                | 1      | 10     | 12     | 12     | 1      |  |  |
| Tert. butyl-hydroxyanisole              | 0,0002                            | 0,0002 | 0,0002 | 0,0002 | 0,0002 | 0,0002 |  |  |
| Sunflower oil                           | 2                                 | 2      | 2      | 2      | 2      | 2      |  |  |

TABLE 2 (Continued)

| Ingredient in % by weight        | Recipes for diet feed Example No. |       |       |       |       |       |  |  |
|----------------------------------|-----------------------------------|-------|-------|-------|-------|-------|--|--|
|                                  | 9                                 | 10    | 11    | 12    | 13    | 14    |  |  |
| Glucose syrup                    | 6                                 | 6     | 6     | 6     | 6     | 6     |  |  |
| Molasses                         | 5                                 | 6     | 5     | 5     | 5     | 5     |  |  |
| Propylene glycol                 | 2,5                               | 2,5   | 2,5   | 2,5   | 2,5   | 2,5   |  |  |
| Potassium sorbate                | 0,5                               | 0,5   | 0,5   | 0,5   | 0,5   | 0,5   |  |  |
| Flavourings                      | 0,1                               | 0,1   | 0,1   | 0,1   | 0,1   | 0,1   |  |  |
| Chlorine citrate                 | 0,04                              | 0,04  | 0,04  | 0,04  | 0,04  | 0,04  |  |  |
| Sodium glutamate                 | 0,1                               | 0,1   | 0,1   | 0,1   | 0,1   | 0,1   |  |  |
| Ribotid (Takeda)                 | 0,01                              | 0,01  | 0,01  | 0,01  | 0,01  | 0,01  |  |  |
| Methionine                       | 0,2                               | 0,2   | 0,2   | 0,2   | 0,2   | 0,2   |  |  |
| Glucose                          | 15                                | 15    | 15    | 15    | 15    | 15    |  |  |
| Vitamin and mineral salt mixture | 4,2                               | 4,85  | 4,2   | 4,2   | 4,2   | 4,2   |  |  |
| Amaranth red                     | 0,015                             | 0,015 | 0,015 | 0,015 | 0,015 | 0,015 |  |  |
| Tartrazine yellow                | 0,005                             | 0,005 | 0,005 | 0,005 | 0,005 | 0,005 |  |  |

IV

V

VI

Examples 5, 6, 10 and 14 may be used as low calorie slimming diets. Examples 7, 8, 11 and 12 may be used as stress diets. The remaining examples may be used as renal disease diets.

The diet feeds Example 1 and Example 2 were compared with a commercially available can feed in a 4-week feeding test with 16 month old Beagle dogs having a body weight of 9—12 kg. The following feed quantities were given:

Comparison feed: 680 g  $\triangle$  165 g dry substance  
 Feed Example 1: 200 g  $\triangle$  165 g " "  
 Feed Example 2: 200 g  $\triangle$  165 g " "

- 15 Feeding was effected in equal portions at 9 a.m. and 3 p.m. Water was available *ad libitum*. The dog always ate the offered feed quantities completely. During the test period

the blood's urea level values were measured. The following Table 3 indicates the relative values:

TABLE 3

| Time of blood extraction in empty stomach animals | Comparison feed | Feed Example 1 | Feed Example 2 |
|---------------------------------------------------|-----------------|----------------|----------------|
| Immediately before commencement of test           | 100             | 109            | 104            |
| After 2 weeks                                     | 100             | 70             | 63             |
| After 4 weeks                                     | 100             | 71             | 76             |

This clearly shows that both diets produce a substantial reduction of urea in the blood.

- 25 Towards the end of the fourth test week the postprandial urea values were measured in two dogs of each feed group. The blood samples were taken one hour before feeding (empty stomach value) as well as two and  
 30 five hours after feeding. This showed that the initial value of the empty stomach urea level of the dogs increases approx. 85% in the case of the comparison feed (see Figure I of the

accompanying drawings), whereas for the diet feed of Example 1 there is only a 9% increase, and for the diet feed of Example 2 a 20% increase. Therefore, the two diet feeds are indicated for use as diets for dogs suffering from renal diseases.

A one-week "ad libitum" supplementary test was conducted following the 4-week main test, in which an excessive amount of feed was given the animals, i.e. on the

- 45 1st day of the test a total of 198 g of dry substance  
 2nd " " " " " " " " 231 g " " "  
 3rd " " " " " " " " 264 g " " "  
 4th " " " " " " " " 297 g " " "  
 5th " " " " " " " " 330 g " " "  
 50 6th " " " " " " " " 363 g " " "  
 7th " " " " " " " " 396 g " " "

The blood's urea values were determined in the dogs with empty stomach on the 1st, 4th and 8th day (compare Figure II of the accompanying drawings).

- 55 In the case of the comparison feed there was a 48% increase of the blood's urea values in this week. In the case of the diet feeds the values even decreased.

Therefore, both diet feeds produce a substantial reduction of blood urea in the healthy dog as compared with the usual feeds, this reduction being independent of the quantity of feed given.

The contents of the comparison feed is approximately as follows:—

|                         | Comparison Feed* |
|-------------------------|------------------|
| total protein content   | 9.4%             |
| amino acid content of:- |                  |
| isoleucine              | 3.7%             |
| leucine                 | 6.9%             |
| Valine                  | 4.6%             |
| methionine              | 1.8%             |
| cystine                 | 0.8%             |
| phenylalanine           | 3.8%             |
| tyrosine                | 2.8%             |
| threonine               | 3.8%             |
| tryptophane             | 1.0%             |
| lysine                  | 6.6%             |
| histidine               | 2.3%             |
| arginine                | 6.4%             |
| fat content             | 6.0%             |
| carbohydrate content    | 6.0%             |
| water content           | 75.7%            |

\* Chappi (registered trade mark) as sold in 1971 in Austria (Importer for Austria, Master Foods, Austria GmbH Reg. Nr. 3680).

The following Table III gives compositions of various of the above-mentioned Examples according to the present invention, the amino acids being expressed as % of the total protein weight.

The content analyses are determined in

conventional manner and will be subject to the usual error. Similar errors can occur when the content analyses are calculated.

The contents in the following Table III give an indication independently of the contemplated ranges of each respective constituent.

TABLE III

| Example No.<br>Composition  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| % Water                     | 18,4 | 16,8 | 17,6 | 20,5 | 17,6 | 26,1 | 15,6 | 20,7 | 18,0 | 18,8 | 16,4 | 14,5 | 12,1 | 16,1 |
| % Fat                       | 17,0 | 16,7 | 16,6 | 17,0 | 7,5  | 6,6  | 14,7 | 15,6 | 15,0 | 7,6  | 15,0 | 14,4 | 16,8 | 5,2  |
| % Carbohydrate              | 44,8 | 45,3 | 44,5 | 41,0 | 47,7 | 40,6 | 37,9 | 32,0 | 44,4 | 47,4 | 36,9 | 42,8 | 50,6 | 54,2 |
| % Protein                   | 14,1 | 15,3 | 15,8 | 14,9 | 18,8 | 19,8 | 25,1 | 23,4 | 17,0 | 19,3 | 25,2 | 20,3 | 14,1 | 16,7 |
| % Ash & Fibrous<br>Material | 5,7  | 5,9  | 5,5  | 6,6  | 8,4  | 7,1  | 6,7  | 8,3  | 5,6  | 6,9  | 6,5  | 8,0  | 6,4  | 7,8  |
| Isoleucine                  | 4,4  | 4,5  | 4,0  | 6,7  | 4,6  | A C  | 4,9  | 5,5  | 4,1  | 4,8  | 4,9  | 3,8  | 5,0  | 3,7  |
| Leucine                     | 7,8  | 7,5  | 7,5  | 9,5  | 7,4  | N A  | 7,8  | 9,8  | 7,5  | 7,4  | 7,9  | 7,1  | 6,8  | 7,0  |
| Valine                      | 5,0  | 5,0  | 5,0  | 7,4  | 5,1  | A R  | 5,5  | 5,0  | 5,3  | 5,0  | 5,6  | 5,0  | 4,6  | 4,8  |
| Methionine                  | 2,2  | 2,5  | 2,5  | 2,7  | 2,8  | L R  | 1,6  | 3,1  | 2,5  | 2,8  | 2,0  | 2,1  | 3,5  | 2,7  |
| Cystine                     | 1,6  | 1,0  | 0,5  | 1,3  | 0,5  | Y I  | 1,0  | 1,5  | 0,6  | 0,9  | 1,0  | 0,4  | 0,7  | 1,1  |
| Phenylalanine               | 4,7  | 5,5  | 5,5  | 7,4  | 6,0  | S E  | 5,2  | 6,4  | 5,5  | 5,5  | 5,2  | 4,6  | 5,2  | 4,8  |
| Tyrosine                    | 3,9  | 5,0  | 4,5  | 5,3  | 4,1  | I D  | 4,9  | 4,7  | 4,5  | 4,2  | 4,9  | 3,8  | 3,9  | 3,7  |
| Threonine                   | 3,9  | 4,0  | 3,5  | 6,0  | 3,7  | S    | 3,9  | 4,7  | 4,1  | 3,9  | 3,9  | 3,8  | 3,9  | 3,7  |
| Tryptophane                 | 1,0  | 1,0  | 1,0  | 1,3  | 0,9  | O    | 1,0  | 1,3  | 1,2  | 0,9  | 1,0  | 0,8  | 0,7  | 1,1  |
| Histidine                   | 2,9  | 3,0  | 2,5  | 3,4  | 2,8  | N U  | 2,6  | 3,0  | 2,9  | 3,0  | 2,6  | 2,5  | 2,0  | 2,1  |
| Lysine                      | 5,9  | 5,5  | 4,5  | 6,0  | 4,6  | O T  | 4,6  | 6,4  | 5,8  | 5,2  | 5,9  | 4,6  | 3,9  | 4,3  |
| Arginine                    | 6,4  | 6,0  | 4,3  | 8,1  | 6,0  | T    | 5,5  | 7,3  | 5,9  | 6,1  | 6,2  | 6,3  | 6,5  | 7,5  |

## WHAT WE CLAIM IS:—

1. A soft-moist nutritional animal fat feed which comprises 3 to 20% fat; 20 to 55% carbohydrates; 10 to 27% water; 5 to 35% of protein in which protein the ratio of animal protein to plant protein is from 3:5 to 5:9 and in which protein the following amino acids are present in the following amounts as expressed in parts by weight:—
  - isoleucine 3.5 to 6.5; leucine 6.5 to 9; valine 4.5 to 6.5; methionine 2.3 to 4; cystine 0.5 to 3; phenylalanine 3 to 7.5; tyrosine 3 to 5; threonine 2.5 to 5.5; tryptophane 0.6 to 1.5; lysine 3.5 to 9; histidine 1.5 to 3.5 and arginine 3.5 to 7, additional methionine being included in the protein in an amount of from 0.005 to 0.25% of the diet feed weight.
2. A feed according to claim 1, wherein the ratio of animal to plant protein is approximately 4:7.
3. A feed according to claim 1 or 2, wherein the isoleucine is present in an amount of up to 5.5 parts by weight.
4. A feed according to claim 1, 2 or 3, wherein the isoleucine is present in an amount above 4 parts by weight.
5. A feed according to any one of claims 1 to 4, wherein the leucine is present in an amount of up to 8 parts by weight.
6. A feed according to any one of claims 1 to 5, wherein the leucine is present in an amount above 7 parts by weight.
7. A feed according to any one of claims 1 to 6, wherein the valine is present in an amount of up to 5.5 parts by weight.
8. A feed according to any one of claims 1 to 7, wherein the valine is present in an amount above 4.5 parts by weight.
9. A feed according to any one of claims 1 to 8, wherein the methionine is present in an amount of up to 3.3 parts by weight.
10. A feed according to any one of claims 1 to 9, wherein the methionine is present in an amount above 2.5 parts by weight.
11. A feed according to any one of claims 1 to 10, wherein the cystine is present in an amount of up to 1.5 parts by weight.
12. A feed according to any one of claims 1 to 11, wherein the phenylalanine is present in an amount of up to 6 parts by weight.
13. A feed according to any one of claims 1 to 12, wherein the phenylalanine is present in an amount above 5 parts by weight.
14. A feed according to any one of claims 1 to 13, wherein the tyrosine is present in an amount above 4 parts by weight.
15. A feed according to any one of claims 1 to 14, wherein the threonine is present in an amount of up to 4.5 parts by weight.
16. A feed according to any one of claims 1 to 15, wherein the threonine is present in an amount above 3.5 parts by weight.
17. A feed according to any one of claims 1 to 16, wherein the tryptophane is present in an amount of up to 1.2 parts by weight.
18. A feed according to any one of claims 1 to 17, wherein the tryptophane is present in an amount above 0.65 parts by weight.
19. A feed according to any one of claims 1 to 18, wherein the lysine is present in an amount of up to 6.5 parts by weight.
20. A feed according to any one of claims 1 to 19, wherein the lysine is present in an amount above 3.8 parts by weight.
21. A feed according to any one of claims 1 to 20, wherein the histidine is present in an amount of up to 3 parts by weight.
22. A feed according to any one of claims 1 to 21, wherein the histidine is present in an amount above 2 parts by weight.
23. A feed according to any one of claims 1 to 22 wherein the arginine is present in an amount of up to 6.5 parts by weight.
24. A feed according to any one of claims 1 to 23, wherein the arginine is present in an amount above 4.5 parts by weight.
25. A feed according to any one preceding claim wherein the values in parts by weight of specific amino acids are values in per cent by weight of the respective specific amino acids in the total protein weight.
26. A diet feed as claimed in any preceding claim wherein the sum of the amounts of the said twelve amino acids present is below 57% and above 42% of the total protein weight.
27. A feed according to any one of claims 1 to 26 which comprises 5 to 17% of protein in which at most half of the animal protein is derived from meat, 30 to 55% carbohydrates, 10 to 18% fat and 10 to 27% water.
28. A feed according to any one of claims 1 to 26 which comprises 5 to 35% protein, 3 to 8% fat, 10 to 25% low molecular weight carbohydrates, 10 to 27% water and 10 to 20% of an edible filler having low nutritive value.
29. A feed according to any one of claims 1 to 26 which comprises 30 to 45% low molecular weight carbohydrates, 20 to 35% of total protein, 8 to 18% fat and 10 to 27% water.
30. A feed according to claim 1, wherein the amounts of said amino acids are as follows:—
 

|                  |                 |                    |
|------------------|-----------------|--------------------|
| isoleucine 4.4%; | leucine 7.8%;   | valine 5.0%;       |
| methionine 2.2%; | cystine 1.6%    | phenylalanine 4.7% |
| tyrosine 3.9%;   | threonine 3.9%; | tryptophane 1%     |
| lysine 5.9%;     | histidine 2.9%  | and arginine 6.4%. |
31. A feed according to claim 30, wherein the water content is 18.4%, the protein content is 14.1%, the fat content is 17% and the carbohydrate content is 44.8%.
32. A feed according to claim 1, wherein the said amino acid content is as follows:—
 

|                  |               |                     |
|------------------|---------------|---------------------|
| isoleucine 4.5%; | leucine 7.5%; | valine 5%;          |
| methionine 2.5%; | cystine 1.0%; | phenylalanine 5.5%; |
| tyrosine 5.0%;   | threonine     |                     |

4.0%; tryptophane 1.0%; lysine 5.5%; histidine 3.0% and arginine 6.0%.

5 33. A feed according to claim 32, wherein the water content is 16.8%, the protein content is 15.3%, the fat content is 16.7% and the carbohydrate content is substantially 45.3%.

10 34. A feed according to any preceding claim, wherein 0.05 to 0.25% of the total feed weight is free methionine.

35. A feed according to claim 34, wherein the free methionine is present as N-acetyl methionine.

15 36. A feed according to any one of claims 1 to 35 containing molasses as softener.

37. A diet feed substantially as hereinbefore described with reference to any one of Examples 1 to 8.

20 38. A diet feed substantially as hereinbefore described with reference to any one of Examples 9 to 14.

39. A renal disease diet feed according to claim 1, substantially as hereinbefore described.

25 40. A low-calorie diet feed according to claim 1, substantially as hereinbefore described.

41. A stress diet feed according to claim 1, substantially as hereinbefore described.

42. A method of manufacturing a diet feed 30 according to claim 1, which includes the steps of cooking protein and mixing the protein with fat, and thereafter adding and mixing in carbohydrates to the mixture when at a substantially lower temperature than the 35 cooking temperature, as well as the step of mixing in an additional methionine in an amount to give from 0.005 to 0.25% total methionine in the final diet feed weight.

43. A diet feed whenever manufactured by 40 a method according to claim 42.

44. A diet feed as claimed in any one of claims 1 to 41 or 43 in physical relation to instructions for feeding an animal suffering 45 from nephritis.

45. A method of treating chronic interstitial nephritis in dogs, which comprises feeding the dog ad libitum with a diet feed of any one of claims 1 to 41 or 43.

46. A diet feed as claimed in any one of 50 claims 1 to 41 or 43 having a protein content of 14% or above.

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