

Examples of proteins which can be used are the assimilable and water dispersible caseinates, particularly the metal caseinates such as calcium and potassium caseinates; other proteins which can be used include soluble egg albumin. It will of course be appreciated that in fact the only restrictions which are placed on the nature of protein is that it should be obtainable in the physical form specified for the purpose of the invention, as well as being palatable and assimilable.

Calcium caseinate is particularly valuable for the purpose of the invention in that it can be readily prepared in a pulverulent flaky form having low bulk density by simple roller drying. Such a roller dried product may be obtained with a bulk density of about 5.5 ccs./gram, and is able to absorb up to twice its weight of a fat suitable for use according to the invention; calcium caseinate of this nature is further available on the market in many countries, being sold in Great Britain under the registered trademark "CASILAN."

In general we prefer to employ a proportion of fat to protein somewhat less than the maximum proportion of fat which the protein will absorb, so as to ensure that there is no substantial tendency for any of the fat to be exuded. Thus whilst calcium caseinate will absorb up to twice its weight of a suitable fat, in fact with this protein we prefer to employ a proportion of fat to calcium caseinate of 1.25:1.

In view of the fact the proteins of the stated type are relatively costly as compared with the other ingredients, we prefer to use only so much of such proteins as is required to absorb the fat used, and to provide the balance of the protein requirement by a cheaper source of protein, which should, of course, be stable, readily assimilated and dispersible in aqueous media. A suitable additional protein source is, for example, a vegetable protein or milk protein e.g. in the form of dried whole cream milk or dried skim milk.

The dietary preparations according to the invention preferably also includes a sugar, such as sucrose or glucose; the whole of the calorific requirement of the patient can be supplied by the fat and the sugar but we prefer to replace a part of the sugar by a water soluble dextrin as this reduces the sweetness of the product thus improving its palatability.

The composition also desirably includes vitamins (preferably all those necessary for human nutrition) and also trace elements; the vitamins required in general include vitamins A, the B group, C, D and E; the trace elements should include sodium, iron, manganese, copper and molybdenum.

We further found that it is preferable that certain of the trace minerals which should be included in the comprehensive diet should be present as salts which are not soluble in water but are soluble in the digestive juices. Thus copper, iron and manganese in the form of their water-soluble salts would tend to inactivate certain of the vitamins during storage of the preparation, which defect appears to be reduced if insoluble salts are used.

Thus we prefer to include iron, copper and manganese in the form of salts thereof which are insoluble in water but soluble in the digestive juices; such salts are for example the carbonates. It will be appreciated that such salts are included in such small proportions in the food that their insolubility does not prejudice ready dispersion in aqueous media and they are, of course, readily solubilized in the intestine.

The absorption of the fat in the pulverulent protein should be carried out under careful conditions; thus if too vigorous conditions of mixing are used only a small proportion of the fat is absorbed and the remainder separates to give a greasy dough as it becomes squeezed out of the protein particles. When the proportions are correctly chosen, for instance less than 2 parts of fat are used per part of roller-dried calcium caseinate, and the mixing is carried out gently, the product remains dry and the mixing

should be carried out in such a way that a dry powder is obtained.

The comprehensive diet is preferably prepared by adding the oil soluble vitamins to the fat and carefully mixing the fortified fat with the pulverulent protein derivative; this mix is then added to an intimate mixture of the other constituents and the whole thoroughly blended.

We now describe in greater particularity the detailed preparation of a comprehensive diet according to this invention.

The following procedure is used for the preparation of a 2000 lb. batch of comprehensive diet, and for this procedure three stock mixtures are required, namely (1) vitamin mixture, (2) mineral mixture and (3) oil-soluble vitamins-arachis oil mixture; the preparation of these stock mixtures (in each case sufficient for 10,000 lbs. comprehensive diet) is first described.

| Vitamin mixture: | | G. |
|---|-------|--------|
| Ascorbic acid | ----- | 500.00 |
| Nicotinic acid | ----- | 320.00 |
| Calcium D-pantothenate (Ca content between 8.2 and 8.6% Ca) | ----- | 50.00 |
| Aneurine hydrochloride | ----- | 45.00 |
| Pyridoxine hydrochloride | ----- | 10.00 |
| Vitamin B ₁₂ | ----- | 0.04 |
| Calcium caseinate (Casilan brand) | ----- | 777.5 |

After blending the whole mix is micro-pulverised and stored until required.

| Mineral mixture: | | G. |
|---|-------|--------|
| Potassium dihydrogen phosphate | ----- | 29,750 |
| Sodium chloride | ----- | 13,100 |
| Ferrous carbonate, saccharated ² | ----- | 740 |
| Manganous carbonate ¹ | ----- | 420 |
| Copper carbonate puriss ³ | ----- | 100 |
| Sodium molybdate | ----- | 4.0 |
| Cobalt oxide | ----- | 2.0 |
| Icing sugar | ----- | 1,284 |

¹ Manganese content to be not less than 42% manganese.
² Iron content to be not less than 33% total iron and 26% ferrous iron.
³ Copper content to be not less than 52% copper.

The above ingredients are roughly mixed e.g. in a Hobart or Peerless mixer, then micro-pulverised to effect final mixing and stored until required.

| Oil-soluble—vitamins—arachis oil mixture: | | |
|---|-----------|---------------------|
| Vitamin A palm'tate | -----i.u. | 120×10 ⁶ |
| Vitamin D ₂ | -----i.u. | 15×10 ⁶ |
| a-tocopherol acetate | -----g | 240 |
| Menaphthone | -----g | 50 |
| Arachis oil | -----lbs | 30 |

The Menaphthone is dissolved, with the aid of a little heat, in the arachis oil and then the vitamin A palmitate, vitamin D₂ and a-tocopherol acetate added. The whole is then thoroughly mixed using a slow speed stirrer and stored away from direct sunlight at a temperature not below 15° C. This stock solution is used for fortifying the arachis oil and care should be taken to see that no separation has taken place during storage.

The 2000 lb. batch of comprehensive diet was prepared in the following stages:

Stage 1

Vitamin mixture
Castor sugar

10 lbs. of castor sugar are mixed for 10 minutes e.g. in a small Hobart mixer with 340 g. (¾ lb.) of vitamin mixture.

Stage 2

| | Lbs. |
|------------------------------------|------|
| Soluble dextrin | 220 |
| Castor sugar | 100 |
| Mineral mixture | 20 |
| Sugar-Vitamin mixture from Stage 1 | 10¾ |