NANOCAL

Unique and Novel Calcium Fortifier

IONIZED NANOMETER SIZED CALCIUM EMBEDDED IN A MATRIX OF AMINOACID AND BIOENCAPSULATED EMPLOYING BIOPOLYMERS AS A COLLOIDAL MICRO EMULSION

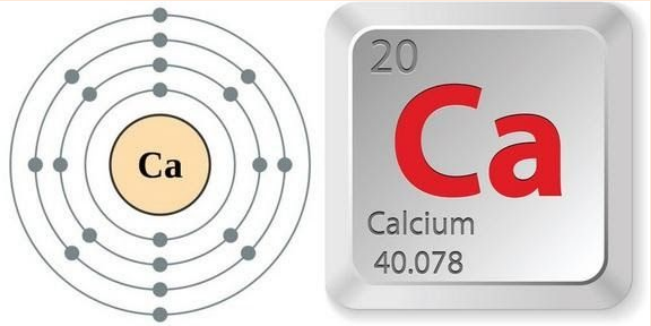
For better absorption of Calcium
For better Lactation in Cattle
For better quality & quantity Eggs in Layers / Breeders
For better Skeleton to house better muscle in Broilers
For regular molting in Shell Fish

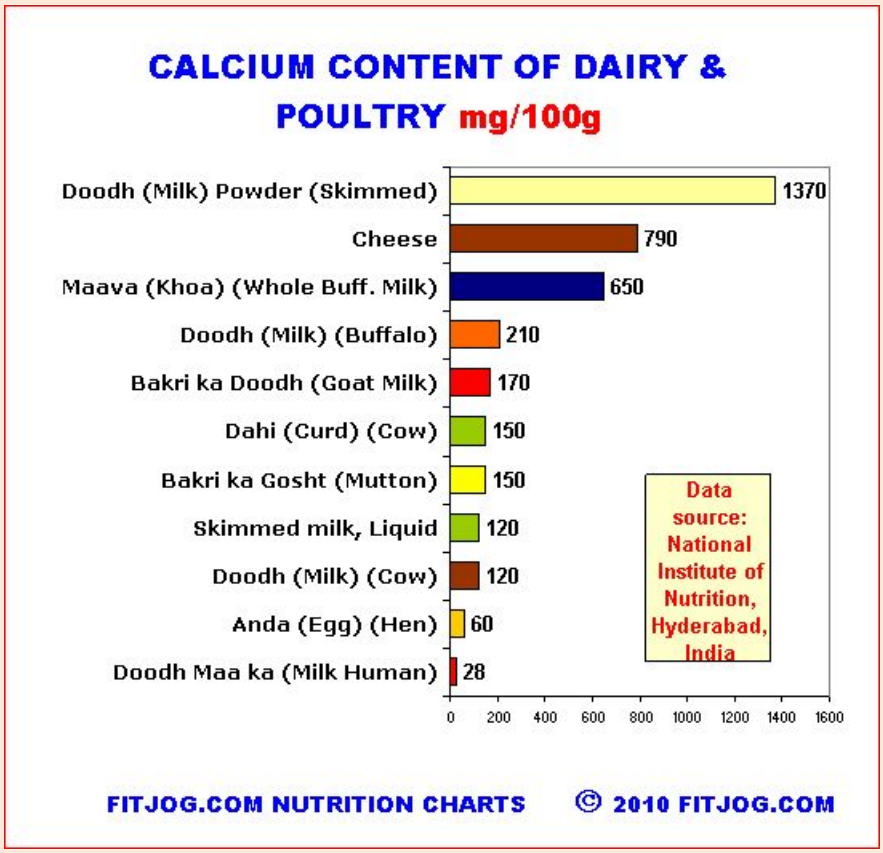
Animal Feed Supplement/ **FUNCTIONAL FOOD AS GEL**
This is not a medicine/Therapeutic





PROLOGUE





NDB_No Description Weight (g) Common Measure Content per Measure

USDA National Nutrient Database for Standard Reference, Release 24

Content of Selected Foods per Common Measure, Calcium, Ca (mg sorted by nutrient content

08247 Cereals ready-to-eat, GENERAL MILLS, TOTAL Raisin Bran 55 1 cup 1038
08077 Cereals ready-to-eat, GENERAL MILLS, Whole Grain TOTAL 30 3/4 cup 1000
08246 Cereals ready-to-eat, GENERAL MILLS, TOTAL Corn Flakes 30 1-1/3 cup 1000
01095 Milk, canned, condensed, sweetened 306 1 cup 869
01164 Cheese sauce, prepared from recipe 243 1 cup 756
01097 Milk, canned, evaporated, nonfat, with added vitamin A and vitamin D 256 1 cup 742
01037 Cheese, ricotta, part skim milk 246 1 cup 669
01096 Milk, canned, evaporated, with added vitamin D and without added vitamin A 252 1 cup 658
01036 Cheese, ricotta, whole milk 246 1 cup 509
20025 Cornmeal, self-rising, degermed, enriched, yellow 138 1 cup 483
01111 Milk shakes, thick vanilla 313 11 fl oz 457
08274 Cereals ready-to-eat, GENERAL MILLS, BERRY BERRY KIX 30 3/4 cup 455
01118 Yogurt, plain, skim milk, 13 grams protein per 8 ounce 227 8-oz container 452
20082 Wheat flour, white, all-purpose, self-rising, enriched 125 1 cup 423
01117 Yogurt, plain, low fat, 12 grams protein per 8 ounce 227 8-oz container 415

01110 Milk shakes, thick chocolate 300 10.6 fl oz 396
14347 Shake, fast food, vanilla 333 16 fl oz 383
14346 Shake, fast food, chocolate 333 16 fl oz 376
14316 Malted drink mix, chocolate, with added nutrients, powder, prepared with whole milk 265 1 cup 368
11164 Collards, frozen, chopped, cooked, boiled, drained, without salt 170 1 cup 357
09310 Rhubarb, frozen, cooked, with sugar 240 1 cup 348
01121 Yogurt, fruit, low fat, 10 grams protein per 8 ounce 227 8-oz container 345
18370 Leavening agents, baking powder, double-acting, straight phosphate 4.6 1 tsp 339
19087 Candies, white chocolate 170 1 cup 338
01057 Eggnog 254 1 cup 330
14310 Malted drink mix, natural, with added nutrients, powder,prepared with whole milk 265 1 cup 326
15088 Fish, sardine, Atlantic, canned in oil, drained solids with bone 85.05 3 oz 325
21074 Fast foods, enchilada, with cheese 163 1 enchilada 324
22970 Macaroni and cheese, frozen entree 283 1 package 323
21094 Fast foods, cheeseburger, double, regular patty and bun, plain 160 1 sandwich 306
01082 Milk, lowfat, fluid, 1% milkfat, with added vitamin A and vitamin D 244 1 cup 305
01085 Milk, nonfat, fluid, with added vitamin A and vitamin D (fat free or skim) 245 1 cup 299
01042 Cheese, pasteurized process, American, fortified with vitamin D 28.35 1 oz 296
06166 Sauce, homemade, white, medium 250 1 cup 295
01079 Milk, reduced fat, fluid, 2% milkfat, with added vitamin A and vitamin D 244 1 cup 293
11373 Potatoes, au gratin, home-prepared from recipe using butter 245 1 cup 292
11464 Spinach, frozen, chopped or leaf, cooked, boiled, drained, without salt 190 1 cup 291
01104 Milk, chocolate, fluid, commercial, lowfat, with added vitamin A and vitamin D 250 1 cup 290
01088 Milk, buttermilk, fluid, cultured, lowfat 245 1 cup 284
14639 Rice drink, unsweetened, with added calcium, vitamins A and D 240 8 fl oz 283
01092 Milk, dry, nonfat, instant, with added vitamin A and vitamin D 23 1/3 cup 283
01102 Milk, chocolate, fluid, commercial, whole, with added vitamin A and vitamin D 250 1 cup 280
21092 Fast foods, cheeseburger; double, regular patty; plain 155 1 sandwich 279
01077 Milk, whole, 3.25% milkfat, with added vitamin D 244 1 cup 276
01116 Yogurt, plain, whole milk, 8 grams protein per 8 ounce 227 8-oz container 275
01103 Milk, chocolate, fluid, commercial, reduced fat, with added vitamin A and vitamin D 250 1 cup 273
21078 Fast foods, nachos, with cheese 113 6-8 nachos 272
11461 Spinach, canned, regular pack, drained solids 214 1 cup 272
18369 Leavening agents, baking powder, double-acting, sodium aluminum sulfate 4.6 1 tsp 270
21097 Fast foods, cheeseburger; single, large patty; with condiments and bacon 195 1 sandwich 267
11162 Collards, cooked, boiled, drained, without salt 190 1 cup 266
21021 Fast foods, english muffin, with egg, cheese, and Canadian bacon 137 1 muffin 264
11451 Soybeans, green, cooked, boiled, drained, without salt 180 1 cup 261
14177 Chocolate-flavor beverage mix, powder, prepared with whole milk 266 1 cup 253
08262 Cereals ready-to-eat, GENERAL MILLS, BASIC 4 55 1 cup 250
11575 Turnip greens, frozen, cooked, boiled, drained, without salt 164 1 cup 249
11458 Spinach, cooked, boiled, drained, without salt 180 1 cup 245
18016 Biscuits, plain or buttermilk, prepared from recipe 101 4" biscuit 237
21082 Fast foods, taco with beef, cheese and lettuce, hard shell 263 1 large 234
08105 Cereals, farina, enriched, assorted brands including CREAM OF WHEAT, quick (1-3 minutes), cooked with water, without salt 239 1 cup 232
11658 Spinach souffle 136 1 cup 224
01040 Cheese, swiss 28.35 1 oz 224
01044 Cheese, pasteurized process, swiss 28.35 1 oz 219
18376 Bread crumbs, dry, grated, seasoned 120 1 cup 218
08103 Cereals, CREAM OF WHEAT, regular (10 minute), cooked with water, without salt 251 1 cup 218
18371 Leavening agents, baking powder, low-sodium 5 1 tsp 217
01035 Cheese, provolone 28.35 1 oz 214
21088 Tostada with guacamole 130.5 1 tostada 211
11192 Cowpeas (blackeyes), immature seeds, cooked, boiled, drained, without salt 165 1 cup 211
21098 Fast foods, cheeseburger; single, large patty; with condiments and vegetables 219 1 sandwich 208
01029 Cheese, mozzarella, part skim milk, low moisture 28.35 1 oz 207
21033 Fast foods, sundae, hot fudge 158 1 sundae 207
01015 Cheese, cottage, lowfat, 2% milkfat 226 1 cup 206
01009 Cheese, cheddar 28.35 1 oz 204
11385 Potatoes, au gratin, dry mix, prepared with water, whole milk and butter 245 1 cup 203
01030 Cheese, muenster 28.35 1 oz 203
19441 Snacks, KELLOGG'S, NUTRI-GRAIN Cereal Bars, fruit 37 1 bar 200
11569 Turnip greens, cooked, boiled, drained, without salt 144 1 cup 197
21089 Fast foods, cheeseburger; single, regular patty; plain 102 1 sandwich 195
08143 Cereals, WHEATENA, cooked with water 243 1 cup 194
01046 Cheese food, pasteurized process, American, vitamin D fortified 28.35 1 oz 193
21083 Fast foods, taco salad 198 1-1/2 cups 192
16051 Beans, white, mature seeds, canned 262 1 cup 191
18367 Waffles, plain, prepared from recipe 75 1 waffle 191
21124 Fast foods, submarine sandwich, with cold cuts 228 1 sandwich, 6" roll 189

21086 Fast foods, tostada, with beans, beef, and cheese 225 1 tostada 189
21077 Fast foods, frijoles with cheese 167 1 cup 189
21106 Fast foods, fish sandwich, with tartar sauce and cheese 183 1 sandwich 185
15084 Fish, salmon, pink, canned, total can contents 85 3 oz 183
06216 Soup, cream of chicken, canned, prepared with equal volume milk 248 1 cup 181
11236 Kale, frozen, cooked, boiled, drained, without salt 130 1 cup 179
16109 Soybeans, mature cooked, boiled, without salt 172 1 cup 175
01012 Cheese, cottage, creamed, large or small curd 210 1 cup 174
06230 Soup, clam chowder, new england, canned, prepared with equal volume low fat (2%) milk 248 1 cup 174
06359 Soup, tomato, canned, prepared with equal volume low fat (2%) milk 248 1 cup 171
08048 Cereals ready-to-eat, GENERAL MILLS, KIX 30 1-1/3 cup 171
21093 Fast foods, cheeseburger; double, regular patty, with condiments and vegetables 166 1 sandwich 171
06243 Soup, cream of mushroom, canned, prepared with equal volume low fat (2%) milk 248 1 cup 169
08219 Cereals ready-to-eat, QUAKER, QUAKER toasted Oatmeal Cereal, Honey Nut 49 1 cup 165
11087 Beet greens, cooked, boiled, drained, without salt 144 1 cup 164
08511 Cereals, Malt-o-Meal, plain, prepared with water, without salt 268 1serving (3 T dry cereal p 163
16126 Tofu, firm, prepared with calcium sulfate and magnesium chloride (nigari) 81 1/4 block 163
21302 Fast Food, Pizza Chain, 14" pizza, pepperoni topping, regular crust 106 1 slice 162
18024 Bread, cornbread, prepared from recipe, made with low fat (2%) milk 65 1 piece 162
01048 Cheese spread, pasteurized process, American 28.35 1 oz 159
19062 Snacks, trail mix, regular, with chocolate chips, salted nuts and seeds 146 1 cup 159
19190 Puddings, chocolate, dry mix, regular, prepared with 2% milk 142 1/2 cup 159
11117 Cabbage, chinese (pak-choi), cooked, boiled, drained, without salt 170 1 cup 158
19123 Puddings, chocolate, dry mix, instant, prepared with 2% milk 147 1/2 cup 153
21082 Fast foods, taco with beef, cheese and lettuce, hard shell 171 1 small 152
19212 Puddings, vanilla, dry mix, regular, prepared with 2% milk 140 1/2 cup 151
21012 Fast foods, croissant, with egg, cheese, and bacon 129 1 croissant 151
01004 Cheese, blue 28.35 1 oz 150
16010 Beans, baked, canned, with pork and sweet sauce 253 1 cup 149
01007 Cheese, camembert 38 1 wedge 147
11208 Dandelion greens, cooked, boiled, drained, without salt 105 1 cup 147
18327 Pie, pumpkin, prepared from recipe 155 1 piece 146
01026 Cheese, mozzarella, whole milk 28.35 1 oz 143
16011 Beans, baked, canned, with pork and tomato sauce 253 1 cup 142
08123 Cereals, oats, instant, fortified, plain, prepared with water (boiling water added or microwaved) 177 1 packet 142
18016 Biscuits, plain or buttermilk, prepared from recipe 60 2-1/2" biscuit 141
01019 Cheese, feta 28.35 1 oz 140
11372 Potatoes, scalloped, home-prepared with butter 245 1 cup 140
21090 Fast foods, cheeseburger; single, regular patty, with condiments 113 1 sandwich 139
18119 Cake, pineapple upside-down, prepared from recipe 115 1 piece 138
01016 Cheese, cottage, lowfat, 1% milkfat 226 1 cup 138
11281 Okra, frozen, cooked, boiled, drained, without salt 184 1 cup 136
08272 Cereals ready-to-eat, GENERAL MILLS, CINNAMON TOAST CRUNCH 30 3/4 cup 135
18126 Cake, shortcake, biscuit-type, prepared from recipe 65 1 shortcake 133
16127 Tofu, soft, prepared with calcium sulfate and magnesium chloride (nigari) 120 1 piece 133
21028 Fast foods, vanilla, light, soft-serve ice cream, with cone 103 1 cone 133
20046 Rice, white, long-grain, parboiled, enriched, dry 185 1 cup 131
14277 Grape drink, canned 250 8 fl oz 130
21025 Fast foods, pancakes with butter and syrup 232 2 pancakes 128
16038 Beans, navy, mature seeds, cooked, boiled, without salt 182 1 cup 126
01014 Cheese, cottage, nonfat, uncreamed, dry, large or small curd 145 1 cup 125
16008 Beans, baked, canned, with franks 259 1 cup 124
15152 Crustaceans, shrimp, mixed species, canned 85.05 3 oz 123
11279 Okra, cooked, boiled, drained, without salt 160 1 cup 123
15141 Crustaceans, crab, blue, canned 135 1 cup 123
08013 Cereals ready-to-eat, GENERAL MILLS, CHEERIOS 30 1 cup 122
16025 Beans, great northern, mature seeds, cooked, boiled, without salt 177 1 cup 120
21226 Pizza, meat and vegetable topping, regular crust, frozen, cooked 79 1 serving 120
01013 Cheese, cottage, creamed, with fruit 226 1 cup 120
01168 Cheese, low fat, cheddar or colby 28.35 1 oz 118
18069 Bread, white, commercially prepared (includes soft bread crumbs) 45 1 cup 117
08001 Cereals ready-to-eat, KELLOGG, KELLOGG'S ALL-BRAN Original 30 1/2 cup 117
06930 Sauce, cheese, ready-to-serve 63 1/4 cup 116
21061 Fast foods, burrito, with beans and cheese 93 1 burrito 115
08064 Cereals ready-to-eat, GENERAL MILLS, Rice CHEX 31 1-1/4 cup 115
21224 Pizza, cheese topping, regular crust, frozen, cooked 63 1 serving 113
19090 Ice creams, french vanilla, soft-serve 86 1/2 cup 113
08210 Cereals ready-to-eat, QUAKER, QUAKER OAT CINNAMON LIFE 32 3/4 cup 111
08271 Cereals ready-to-eat, GENERAL MILLS, COCOA PUFFS 30 1 cup 111
08050 Cereals ready-to-eat, GENERAL MILLS, LUCKY CHARMS 30 1 cup 111
18278 Muffins, blueberry, prepared from recipe, made with low fat (2%) milk 57 1 muffin 108

08045 Cereals ready-to-eat, GENERAL MILLS, HONEY NUT CHEERIOS 30 1 cup 107
19088 Ice creams, vanilla, light 66 1/2 cup 106
19393 Frozen yogurts, chocolate, soft-serve 72 1/2 cup 106
21063 Fast foods, burrito, with beans and beef 115.5 1 burrito 104
11271 Mustard greens, cooked, boiled, drained, without salt 140 1 cup 104
08194 Cereals ready-to-eat, GENERAL MILLS, REESE'S PUFFS 30 3/4 cup 104
19293 Frozen yogurts, vanilla, soft-serve 72 1/2 cup 103
18259 English muffins, plain, toasted, enriched, with calcium propionate (includes sourdough) 52 1 muffin 102
08049 Cereals ready-to-eat, QUAKER, QUAKER OAT LIFE, plain 32 3/4 cup 102
21114 Fast foods, hamburger; double, large patty; with condiments and vegetables 226 1 sandwich 102
21120 Fast foods, hotdog, with corn flour coating (corndog) 175 1 corn dog 102
18403 Waffles, plain, frozen, ready -to-heat, toasted 33 1 waffle 101
18102 Cake, white, prepared from recipe with coconut frosting 112 1 piece 101
08263 Cereals ready-to-eat, GENERAL MILLS, APPLE CINNAMON CHEERIOS 30 3/4 cup 100
21053 Fast foods, salad, vegetable, tossed, without dressing, with cheese and egg 217 1-1/2 cups 100
11252 Lettuce, iceberg (includes crisphead types), raw 539 1 head 97
08019 Cereals ready-to-eat, GENERAL MILLS Corn CHEX 30 1 cup 97
08035 Cereals ready-to-eat, GENERAL MILLS, GOLDEN GRAHAMS 30 3/4 cup 97
18139 Cake, white, prepared from recipe without frosting 74 1 piece 96
21113 Fast foods, hamburger; single, large patty; with condiments and vegetables 218 1 sandwich 96
11303 Peas, edible-podded, frozen, cooked, boiled, drained, without salt 160 1 cup 94
11546 Tomato products, canned, paste, without salt added 262 1 cup 94
08078 Cereals ready-to-eat, GENERAL MILLS, TRIX 30 1 cup 94
08057 Cereals ready-to-eat, GENERAL MILLS, Honey Nut CHEX 30 3/4 cup 94
11234 Kale, cooked, boiled, drained, without salt 130 1 cup 94
14315 Malted drink mix, chocolate, with added nutrients, powder 21 3 heaping tsp 93
18258 English muffins, plain, enriched, with ca prop (includes sourdough) 57 1 muffin 93
21111 Fast foods, hamburger; double, regular patty; with condiments 215 1 sandwich 92
14390 Cocoa mix, with aspartame, powder, prepared with water 192 1 serving 92
19132 Candies, milk chocolate, with almonds 41 1 bar (1.45 oz) 92
21005 Fast Foods, biscuit, with egg and sausage 180 1 biscuit 92
35142 Frybread, made with lard (Navajo) 160 10-1/2" bread 91
22247 Macaroni and Cheese, canned entree 252 1 cup 88
11387 Potatoes, scalloped, dry mix, prepared with water, whole milk and butter 245 1 cup 88
08093 Cereals, QUAKER, corn grits, instant, plain, prepared (microwaved or boiling water added), without salt 137 1 packet 88
11533 Tomatoes, red, ripe, canned, stewed 255 1 cup 87
19089 Ice creams, vanilla, rich 74 1/2 cup 87
14196 Cocoa mix, no sugar added, powder 15 1/2 oz envelope 86
16006 Beans, baked, canned, plain or vegetarian 254 1 cup 86
19071 Candies, carob, unsweetened 28.35 1 oz 86
19095 Ice creams, vanilla 66 1/2 cup 84
18316 Pie, coconut custard, commercially prepared 104 1 piece 84
16058 Chickpeas (garbanzo beans, bengal gram), mature seeds, canned, solids and liquids 240 1 cup 84
16103 Refried beans, canned, traditional style (includes USDA commodity) 252 1 cup 83
19120 Candies, milk chocolate 44 1 bar (1.55 oz) 83
18292 Pancakes, plain, dry mix, incomplete, prepared 38 1 pancake 82
15148 Crustaceans, lobster, northern, cooked, moist heat 85 3 oz 82
11436 Rutabagas, cooked, boiled, drained, without salt 170 1 cup 82
16057 Chickpeas (garbanzo beans, bengal gram), mature seeds, cooked, boiled, without salt 164 1 cup 80
19218 Puddings, tapioca, ready-to-eat 113 4 oz 80
19061 Snacks, trail mix, tropical 140 1 cup 80
18001 Bagels, plain, enriched, with calcium propionate (includes onion, poppy, sesame) 89 4" bagel 79
14309 Malted drink mix, natural, with added nutrients, powder 21 4-5 heaping tsp 79
16043 Beans, pinto, mature seeds, cooked, boiled, without salt 171 1 cup 79
21108 Fast foods, hamburger; single, regular patty; with condiments 106 1 sandwich 78
06404 Soup, bean with pork, canned, prepared with equal volume water 253 1 cup 78
21129 Fast foods, hush puppies 78 5 pieces 78
06007 Soup, bean with ham, canned, chunky, ready-to-serve 243 1 cup 78
15140 Crustaceans, crab, blue, cooked, moist heat 85 3 oz 77
01094 Milk, buttermilk, dried 6.5 1 tbsp 77
12061 Nuts, almonds 28.35 1 oz (24 nuts) 75
21024 Fast foods, french toast sticks 141 5 sticks 75
11531 Tomatoes, red, ripe, canned, packed in tomato juice 240 1 cup 74
18350 Rolls, hamburger or hotdog, plain 43 1 roll 74
16034 Beans, kidney, red, mature seeds, canned, solids and liquids 256 1 cup 74
21126 Fast foods, submarine sandwich, with tuna salad 256 1 sandwich, 6" roll 74
22904 Chili con carne with beans, canned entree 222 1 cup 73
21130 Fast foods, onion rings, breaded and fried 83 8-9 rings 73
21023 Fast foods, french toast with butter 135 2 slices 73
09298 Raisins, seedless 145 1 cup 73
11110 Cabbage, cooked, boiled, drained, without salt 150 1 cup 72

11291 Onions, spring or scallions (includes tops and bulb), raw 100 1 cup 72
09200 Oranges, raw, all commercial varieties 180 1 cup 72
19270 Ice creams, chocolate 66 1/2 cup 72
11439 Sauerkraut, canned, solids and liquids 236 1 cup 71
19135 Candies, MARS SNACKFOOD US, MILKY WAY Bar 61 1 bar (2.15 oz) 70
21015 Fast foods, danish pastry, cheese 91 1 pastry 70
18326 Pie, pumpkin, commercially prepared 109 1 piece 70
09087 Dates, deglet noor 178 1 cup 69
21042 Fast foods, chili con carne 253 1 cup 68
09214 Orange juice, frozen concentrate, unsweetened, undiluted 213 6-fl-oz can 68
06931 Sauce, pasta, spaghetti/marinara, ready-to-serve 250 1 cup 68
11379 Potatoes, mashed, dehydrated, prepared from flakes without milk, whole milk and butter added 210 1 cup 67
11301 Peas, edible-podded, boiled, drained, without salt 160 1 cup 67
14290 Lemonade, low calorie, with aspartame, powder, prepared with water 237 8 fl oz 66
11732 Beans, snap, yellow, frozen, cooked, boiled, drained, without salt 135 1 cup 66
15041 Fish, herring, Atlantic, pickled 85.05 3 oz 65
18269 French toast, prepared from recipe, made with low fat (2%) milk 65 1 slice 65
18069 Bread, white, commercially prepared (includes soft bread crumbs) 25 1 slice 65
08082 Cereals ready-to-eat, GENERAL MILLS, Wheat CHEX 30 1 cup 64
12166 Seeds, sesame butter, tahini, from roasted and toasted kernels (most common type) 15 1 tbsp 64
11424 Pumpkin, canned, without salt 245 1 cup 64
18320 Pie, lemon meringue, commercially prepared 113 1 piece 63
18001 Bagels, plain, enriched, with calcium propionate (includes onion, poppy, sesame) 71 3-1/2" bagel 63
18268 French toast, frozen, ready-to-heat 59 1 slice 63
18257 Eclairs, custard-filled with chocolate glaze, prepared from recipe 100 1 eclair 63
11144 Celery, cooked, boiled, drained, without salt 150 1 cup 63
15142 Crustaceans, crab, blue, crab cakes 60 1 cake 63
22906 Chicken pot pie, frozen entree, prepared 217 1 small pie 63
21070 Fast foods, chimichanga, with beef 174 1 chimichanga 63
11091 Broccoli, cooked, boiled, drained, without salt 156 1 cup 62
09094 Figs, dried, uncooked 38 2 figs 62
16120 Soymilk, original and vanilla, unfortified 245 1 cup 61
15067 Fish, pollock, walleye, cooked, dry heat 85 3 oz 61
09226 Papayas, raw 304 1 papaya 61
11093 Broccoli, frozen, chopped, cooked, boiled, drained, without salt 184 1 cup 61
21102 Fast foods, chicken fillet sandwich, plain 182 1 sandwich 60
19193 Puddings, rice, ready-to-eat 113.4 4 oz 59
18127 Cake, snack cakes, creme-filled, chocolate with frosting 50 1 cupcake 58
20005 Barley, pearled, raw 200 1 cup 58
11299 Parsnips, cooked, boiled, drained, without salt 156 1 cup 58
19183 Puddings, chocolate, ready-to-eat 113 4 oz 58
11724 Beans, snap, yellow, cooked, boiled, drained, without salt 125 1 cup 58
11250 Lettuce, butterhead (includes boston and bibb types), raw 163 1 head 57
18101 Cake, chocolate, prepared from recipe without frosting 95 1 piece 57
15150 Crustaceans, shrimp, mixed species, cooked, breaded and fried 85 3 oz 57
11061 Beans, snap, green, frozen, cooked, boiled, drained without salt 135 1 cup 57
11655 Carrot juice, canned 236 1 cup 57
05180 Turkey, all classes, neck, meat only, cooked, simmered 152 1 neck 56
11099 Brussels sprouts, cooked, boiled, drained, without salt 156 1 cup 56
11512 Sweet potato, canned, vacuum pack 255 1 cup 56
09125 Grapefruit juice, white, frozen concentrate, unsweetened, undiluted 207 6-fl-oz can 56
06094 Soup, onion, dry, mix 39 1 packet 56
11508 Sweet potato, cooked, baked in skin, without salt 146 1 potato 55
01032 Cheese, parmesan, grated 5 1 tbsp 55
19201 Puddings, vanilla, ready-to-eat 113 4 oz 55
15160 Mollusks, clam, mixed species, canned, drained solids 85 3 oz 55
06067 Soup, chunky vegetable, canned, ready-to-serve 240 1 cup 55
11053 Beans, snap, green, cooked, boiled, drained, without salt 125 1 cup 55
01186 Cheese, cream, fat free 15.6 1 tbsp 55
20033 Oat bran, raw 94 1 cup 55
21121 Fast foods, roast beef sandwich, plain 139 1 sandwich 54
18353 Rolls, hard (includes kaiser) 57 1 roll 54
11159 Coleslaw, home-prepared 120 1 cup 54
19143 Candies, MR. GOODBAR Chocolate Bar 49 1 bar (1.75 oz) 54
19080 Candies, semisweet chocolate 168 1 cup 54
19155 Candies, MARS SNACKFOOD US, SNICKERS Bar 57 1 bar (2 oz) 53
15168 Mollusks, oyster, eastern, cooked, breaded and fried 85 3 oz 53
18116 Cake, gingerbread, prepared from recipe 74 1 piece 53
19109 Candies, KIT KAT Wafer Bar 42 1 bar (1.5 oz) 53
09200 Oranges, raw, all commercial varieties 131 1 orange 52
18079 Bread crumbs, dry, grated, plain 28.35 1 oz 52

20044 Rice, white, long-grain, regular, raw, enriched 185 1 cup 52
18041 Bread, pita, white, enriched 60 6-1/2" pita 52
08218 Cereals ready-to-eat, QUAKER, QUAKER 100% Natural Granola with Oats, Wheat, Honey, and Raisins 51 1/2 cup 52
11565 Turnips, cooked, boiled, drained, without salt 156 1 cup 51
11056 Beans, snap, green, canned, regular pack, drained solids 135 1 cup 51
35142 Frybread, made with lard (Navajo) 90 5" bread 51
11131 Carrots, frozen, cooked, boiled, drained, without salt 146 1 cup 51
11038 Lima beans, immature seeds, frozen, fordhook, cooked, boiled, drained, without salt 170 1 cup 51
22401 Spaghetti with meat sauce, frozen entree 283 1 package 51
16073 Lima beans, large, mature seeds, canned 241 1 cup 51
11040 Lima beans, immature seeds, frozen, baby, cooked, boiled, drained, without salt 180 1 cup 50
11657 Potatoes, mashed, home-prepared, whole milk added 210 1 cup 50
18330 Pie crust, cookie-type, prepared from recipe, graham cracker, baked 239 1 pie shell 50
15137 Crustaceans, crab, alaska king, cooked, moist heat 85 3 oz 50
18342 Rolls, dinner, plain, commercially prepared (includes brown-andserve) 28 1 roll 50
15167 Mollusks, oyster, eastern, wild, raw 84 6 medium 50
16033 Beans, kidney, red, mature seeds, cooked, boiled, without salt 177 1 cup 50
19056 Snacks, tortilla chips, plain, white corn 28.35 1 oz 49
20011 Buckwheat flour, whole-groat 120 1 cup 49
20012 Bulgur, dry 140 1 cup 49
11642 Squash, summer, all varieties, cooked, boiled, drained, without salt 180 1 cup 49
06177 Soup, minestrone, canned, reduced sodium, ready-to-serve 241 1 cup 48
07008 Bologna, beef and pork 56.7 2 slices 48
11205 Cucumber, with peel, raw 301 1 large 48
11143 Celery, raw 120 1 cup 48
16064 Cowpeas, common (blackeyes, crowder, southern), mature seeds, canned, plain 240 1 cup 48
18290 Pancakes, plain, dry mix, complete, prepared 38 1 pancake 48
21059 Fast foods, shrimp, breaded and fried 164 6-8 shrimp 48
11414 Potato salad, home-prepared 250 1 cup 48
09292 Plums, dried (prunes), stewed, without added sugar 248 1 cup 47
11125 Carrots, cooked, boiled, drained, without salt 156 1 cup 47
19003 Snacks, corn-based, extruded, chips, plain 28.35 1 oz 46
16015 Beans, black, mature seeds, cooked, boiled, without salt 172 1 cup 46
11283 Onions, cooked, boiled, drained, without salt 210 1 cup 46
11488 Squash, winter, butternut, frozen, cooked, boiled, without salt 240 1 cup 46
11584 Vegetables, mixed, frozen, cooked, boiled, drained, without salt 182 1 cup 46
12078 Nuts, brazilnuts, dried, unblanched 28.35 1 oz (6-8 nuts) 45
11644 Squash, winter, all varieties, cooked, baked, without salt 205 1 cup 45
19424 Snacks, tortilla chips, nacho-flavor, reduced fat 28.35 1 oz 45
10179 Pork, fresh, loin, center loin (chops), bone-in, separable lean and fat, cooked, pan-fried 85 3 oz 45
11547 Tomato products, canned, puree, without salt added 250 1 cup 45
09223 Tangerine juice, canned, sweetened 249 1 cup 45
11371 Potatoes, mashed, home-prepared, whole milk and margarine added 210 1 cup 44
11581 Vegetables, mixed, canned, drained solids 163 1 cup 44
19145 Candies, NESTLE, CRUNCH Bar and Dessert Topping 44 1 bar (1.55 oz) 44
18023 Bread, cornbread, dry mix, prepared 60 1 piece 44
10176 Pork, fresh, loin, center loin (chops), bone-in, separable lean only, cooked, pan-fried 85 3 oz 43
14194 Cocoa mix, powder, prepared with water 206 1 serving 43
15067 Fish, pollock, walleye, cooked, dry heat 60 1 fillet 43
18356 Sweet rolls, cinnamon, commercially prepared with raisins 60 1 roll 43
18279 Muffins, corn, commercially prepared 57 1 muffin 42
11510 Sweet potato, cooked, boiled, without skin 156 1 potato 42
18088 Cake, angelfood, dry mix, prepared 50 1 piece 42
19057 Snacks, tortilla chips, nacho cheese 28.35 1 oz 42
09042 Blackberries, raw 144 1 cup 42
19126 Candies, milk chocolate coated peanuts 40 10 pieces 42
20028 Couscous, dry 173 1 cup 42
12167 Nuts, chestnuts, european, roasted 143 1 cup 41
11090 Broccoli, raw 88 1 cup 41
16063 Cowpeas, common (blackeyes, crowder, southern), mature seeds, cooked, boiled, without salt 172 1 cup 41
11242 Kohlrabi, cooked, boiled, drained, without salt 165 1 cup 41
21125 Fast foods, submarine sandwich, with roast beef 216 1 sandwich, 6" roll 41
20080 Wheat flour, whole-grain 120 1 cup 41
18147 Cheesecake commercially prepared 80 1 piece 41
18310 Pie, chocolate creme, commercially prepared 113 1 piece 41
11101 Brussels sprouts, frozen, cooked, boiled, drained, without salt 155 1 cup 40
08014 Cereals ready-to-eat, KELLOGG, KELLOGG'S COCOA KRISPIES 31 3/4 cup 40
01132 Egg, whole, cooked, scrambled 61 1 large 40
19097 Sherbet, orange 74 1/2 cup 40
10089 Pork, fresh, spareribs, separable lean and fat, cooked, braised 85 3 oz 40
18141 Cake, yellow, commercially prepared, with vanilla frosting 64 1 piece 40

11206 Cucumber, peeled, raw 280 1 large 39
18086 Cake, angelfood, commercially prepared 28 1 piece 39
16112 Miso 68.75 1 cup 39
11308 Peas, green (includes baby and lesuer types), canned, drained solids, unprepared 170 1 cup 39
11196 Cowpeas (blackeyes), immature seeds, frozen, cooked, boiled, drained, without salt 170 1 cup 39
10193 Pork, fresh, backribs, separable lean and fat, cooked, roasted 85 3 oz 39
15173 Mollusks, scallop, mixed species, cooked, breaded and fried 93 6 large 39
18325 Pie, pecan, prepared from recipe 122 1 piece 39
18243 Croutons, seasoned 40 1 cup 38
11313 Peas, green, frozen, cooked, boiled, drained, without salt 160 1 cup 38
27042 Soup, clam chowder, new england, canned, ready-to-serve 254 1 cup 38
11120 Cabbage, chinese (pe-tsai), cooked, boiled, drained, without salt 119 1 cup 38
18065 Bread, wheat, toasted 23 1 slice 38
14192 Cocoa mix, powder 28.35 3 heaping tsp 38
16070 Lentils, mature seeds, cooked, boiled, without salt 198 1 cup 38
09306 Raspberries, frozen, red, sweetened 250 1 cup 38
18280 Muffins, corn, dry mix, prepared 50 1 muffin 38
18055 Bread, reduced-calorie, wheat 23 1 slice 37
15011 Fish, catfish, channel, cooked, breaded and fried 85 3 oz 37
18027 Bread, egg 40 1/2" slice 37
19004 Snacks, corn-based, extruded, chips, barbecue-flavor 28.35 1 oz 37
21054 Fast foods, salad, vegetable, tossed, without dressing, with chicken 218 1-1/2 cups 37
11282 Onions, raw 160 1 cup 37
11423 Pumpkin, cooked, boiled, drained, without salt 245 1 cup 37
11128 Carrots, canned, regular pack, drained solids 146 1 cup 37
11124 Carrots, raw 110 1 cup 36
22120 MORNINGSTAR FARMS Grillers Burger Style Recipe Crumbles, frozen, unprepared 110 1 cup 36
18283 Muffins, oat bran 57 1 muffin 36
09121 Grapefruit, sections, canned, light syrup pack, solids and liquids 254 1 cup 36
09270 Pineapple, canned, heavy syrup pack, solids and liquids 254 1 cup 36
02007 Spices, celery seed 2 1 tsp 35
11008 Artichokes, (globe or french), cooked, boiled, drained, without salt 168 1 cup 35
11932 Beans, snap, yellow, canned, regular pack, drained solids 135 1 cup 35
19150 Candies, REESE'S Peanut Butter Cups 45 1 package (contains 2) 35
05168 Turkey, all classes, meat only, cooked, roasted 140 1 cup 35
09268 Pineapple, canned, juice pack, solids and liquids 249 1 cup 35
15128 Fish, tuna salad 205 1 cup 35
18064 Bread, wheat 25 1 slice 35
06416 Soup, cream of chicken, canned, prepared with equal volume water 244 1 cup 34
18104 Coffeecake, cinnamon with crumb topping, commercially prepared, enriched 63 1 piece 34
18364 Tortillas, ready-to-bake or -fry, flour, refrigerated 32 1 tortilla 34
06440 Soup, minestrone, canned, prepared with equal volume water 241 1 cup 34
11647 Sweet potato, canned, syrup pack, drained solids 196 1 cup 33
07024 Frankfurter, chicken 45 1 frank 33
20047 Rice, white, long-grain, parboiled, enriched, cooked 175 1 cup 33
01031 Cheese, neufchatel 28.35 1 oz 33
12637 Nuts, mixed nuts, oil roasted, with peanuts, with salt added 28.35 1 oz 33
15157 Mollusks, clam, mixed species, raw 85 3 oz 33
18246 Danish pastry, fruit, enriched (includes apple, cinnamon, raisin, lemon, raspberry, strawberry) 71 1 danish 33
08220 Cereals ready-to-eat, QUAKER, Low Fat 100% Natural Granola with Raisins 50 1/2 cup 33
18076 Bread, whole-wheat, commercially prepared, toasted 25 1 slice 33
09273 Pineapple juice, canned, unsweetened, without added ascorbic acid 250 1 cup 33
01123 Egg, whole, raw, fresh 58 1 extra large 32
11019 Asparagus, frozen, cooked, boiled, drained, without salt 180 1 cup 32
12120 Nuts, hazelnuts or filberts 28.35 1 oz 32
18082 Bread stuffing, bread, dry mix, prepared 100 1/2 cup 32
16072 Lima beans, large, mature seeds, cooked, boiled, without salt 188 1 cup 32
11549 Tomato products, canned, sauce 245 1 cup 32
15029 Fish, flatfish (flounder and sole species), cooked, dry heat 127 1 fillet 32
11112 Cabbage, red, raw 70 1 cup 32
22121 MORNINGSTAR FARMS Grillers Vegan, frozen, unprepared 85 1 patty 31
11247 Leeks, (bulb and lower leaf-portion), cooked, boiled, drained, without salt 104 1 cup 31
09218 Tangerines, (mandarin oranges), raw 84 1 tangerine 31
09302 Raspberries, raw 123 1 cup 31
09294 Prune juice, canned 256 1 cup 31
19026 Snacks, granola bars, soft, coated, milk chocolate coating, peanut butter 28.35 1 bar 31
11138 Cauliflower, frozen, cooked, boiled, drained, without salt 180 1 cup 31
20068 Tapioca, pearl, dry 152 1 cup 30
20112 Noodles, egg, spinach, cooked, enriched 160 1 cup 30
12652 Nuts, pistachio nuts, dry roasted, with salt added 28.35 1 oz (47 nuts) 30
11674 Potato, baked, flesh and skin, without salt 202 1 potato 30

22907 Pasta with meatballs in tomato sauce, canned entree 252 1 cup 30
15150 Crustaceans, shrimp, mixed species, cooked, breaded and fried 45 6 large 30
06449 Soup, pea, green, canned, prepared with equal volume water 250 1 cup 30
18075 Bread, whole-wheat, commercially prepared 28 1 slice 30
11457 Spinach, raw 30 1 cup 30
21127 Fast foods, coleslaw 99 3/4 cup 30
09161 Lime juice, canned or bottled, unsweetened 246 1 cup 30
09024 Apricots, canned, juice pack, with skin, solids and liquids 244 1 cup 29
15058 Fish, ocean perch, Atlantic, cooked, dry heat 85 3 oz 29
10205 Pork, fresh, loin, country-style ribs, separable lean and fat, cooked, braised 85 3 oz 29
08060 Cereals ready-to-eat, KELLOGG, KELLOGG'S RAISIN BRAN 61 1 cup 29
19078 Baking chocolate, unsweetened, squares 28.35 1 square 29
19022 Snacks, granola bars, soft, uncoated, raisin 28.35 1 bar 29
01128 Egg, whole, cooked, fried 46 1 large 29
18319 Pie, fried pies, fruit 128 1 pie 28
18444 Pie, fried pies, cherry 128 1 pie 28
09136 Grape juice cocktail, frozen concentrate, undiluted, with added ascorbic acid 216 6-fl-oz can 28
09320 Strawberries, frozen, sweetened, sliced 255 1 cup 28
11109 Cabbage, raw 70 1 cup 28
01131 Egg, whole, cooked, poached 50 1 large 28
01123 Egg, whole, raw, fresh 50 1 large 28
05058 Chicken, broilers or fryers, breast, meat and skin, cooked, fried, batter 140 1/2 breast 28
09226 Papayas, raw 140 1 cup 28
16055 Carob flour 8 1 tbsp 28
22905 Beef stew, canned entree 232 1 cup 28
09135 Grape juice, canned or bottled, unsweetened, without added ascorbic acid 253 1 cup 28
12155 Nuts, walnuts, english 28.35 1 oz (14 halves) 28
19038 Snacks, popcorn, caramel-coated, with peanuts 42 1 cup 28
18255 Doughnuts, yeast-leavened, glazed, enriched (includes honey buns) 60 1 medium 28
16086 Peas, split, mature seeds, cooked, boiled, without salt 196 1 cup 27
09209 Orange juice, chilled, includes from concentrate 249 1 cup 27
11937 Pickles, cucumber, dill or kosher dill 65 1 pickle 27
11659 Sweet potato, cooked, candied, home-prepared 105 1 piece 27
09206 Orange juice, raw 248 1 cup 27
11081 Beets, cooked, boiled, drained 170 1 cup 27
09112 Grapefruit, raw, pink and red, all areas 123 1/2 grapefruit 27
05188 Turkey, all classes, dark meat, cooked, roasted 84 3 oz 27
09064 Cherries, sour, red, canned, water pack, solids and liquids (includes USDA commodity red tart cherries, canned) 244 1 cup 27
06428 Soup, clam chowder, manhattan, canned, prepared with equal volume water 244 1 cup 27
09153 Lemon juice, canned or bottled 244 1 cup 27
18035 Bread, Multi-Grain (includes whole-grain) 26 1 slice 27
18036 Bread, Multi-Grain, toasted (includes whole-grain) 24 1 slice 27
11578 Vegetable juice cocktail, canned 242 1 cup 27
09316 Strawberries, raw 166 1 cup 27
05142 Duck, domesticated, meat only, cooked, roasted 221 1/2 duck 27
18335 Pie crust, standard-type, frozen, ready-to-bake, enriched, baked 126 1 pie shell 26
18134 Cake, sponge, prepared from recipe 63 1 piece 26
06018 Soup, chunky chicken noodle, canned, ready-to-serve 240 1 cup 26
06024 Soup, chicken vegetable, chunky, canned, ready-to-serve 240 1 cup 26
18070 Bread, white, commercially prepared, toasted 22 1 slice 26
11213 Endive, raw 50 1 cup 26
09148 Kiwifruit, green, raw 76 1 medium 26
18288 Pancakes plain, frozen, ready-to-heat (includes buttermilk) 36 1 pancake 26
23578 Beef, ground, 75% lean meat / 25% fat, patty, cooked, broiled 85 3 oz 26
15241 Fish, trout, rainbow, farmed, cooked, dry heat 85 3 oz 26
11084 Beets, canned, drained solids 170 1 cup 26
15071 Fish, rockfish, Pacific, mixed species, cooked, dry heat 149 1 fillet 25
11282 Onions, raw 110 1 whole 25
09282 Plums, canned, purple, juice pack, solids and liquids 252 1 cup 25
11008 Artichokes, (globe or french), cooked, boiled, drained, without salt 120 1 medium 25
01129 Egg, whole, cooked, hard-boiled 50 1 large 25
09207 Orange juice, canned, unsweetened 249 1 cup 25
18324 Pie, pecan, commercially prepared 113 1 piece 25
18245 Danish pastry, cheese 71 1 danish 25
01123 Egg, whole, raw, fresh 44 1 medium 25
11114 Cabbage, savoy, raw 70 1 cup 25
11672 Potato pancakes 76 1 pancake 24
11540 Tomato juice, canned, with salt added 243 1 cup 24
06468 Soup, vegetarian vegetable, canned, prepared with equal volume water 241 1 cup 24
18041 Bread, pita, white, enriched 28 4" pita 24

02027 Spices, oregano, dried 1.5 1 tsp 24
11124 Carrots, raw 72 1 carrot 24
18177 Cookies, molasses 32 1 cookie, large (3-1/2" to 24
21118 Fast foods, hotdog, plain 98 1 sandwich 24
18060 Bread, rye 32 1 slice 23
09284 Plums, canned, purple, heavy syrup pack, solids and liquids 258 1 cup 23
09027 Apricots, canned, heavy syrup pack, with skin, solids and liquids 258 1 cup 23
02010 Spices, cinnamon, ground 2.3 1 tsp 23
08147 Cereals ready-to-eat, wheat, shredded, plain, sugar and salt free 46 2 biscuits 23
05306 Poultry food products, ground turkey, cooked 82 1 patty 23
09176 Mangos, raw 207 1 mango 23
08261 Cereals ready-to-eat, GENERAL MILLS, RAISIN NUT BRAN 55 1 cup 23
09215 Orange juice, frozen concentrate, unsweetened, diluted with 3 volume water 249 1 cup 22
12537 Seeds, sunflower seed kernels, dry roasted, with salt added 32 1/4 cup 22
09254 Pears, canned, juice pack, solids and liquids 248 1 cup 22
09128 Grapefruit juice, white, raw 247 1 cup 22
09404 Grapefruit juice, pink, raw 247 1 cup 22
08089 Cereals ready-to-eat, GENERAL MILLS, WHEATIES 30 1 cup 22
06494 Soup, onion, dry, mix, prepared with water 246 1 cup 22
17048 Lamb, domestic, shoulder, arm, separable lean only, trimmed to 1/4" fat, choice, cooked, braised 85 3 oz 22
11135 Cauliflower, raw 100 1 cup 22
21138 Fast foods, potato, french fried in vegetable oil 169 1 large 22
20034 Oat bran, cooked 219 1 cup 22
11370 Potatoes, hashed brown, home-prepared 156 1 cup 22
18044 Bread, pumpernickel 32 1 slice 22
06423 Soup, chicken with rice, canned, prepared with equal volume water 241 1 cup 22
18057 Bread, reduced-calorie, white 23 1 slice 22
21017 Fast foods, danish pastry, fruit 94 1 pastry 22
18045 Bread, pumpernickel, toasted 29 1 slice 21
01125 Egg, yolk, raw, fresh 16.6 1 large 21
17044 Lamb, domestic, shoulder, arm, separable lean and fat, trimmed to 1/4" fat, choice, cooked, braised 85 3 oz 21
15029 Fish, flatfish (flounder and sole species), cooked, dry heat 85 3 oz 21
18090 Cake, boston cream pie, commercially prepared 92 1 piece 21
18239 Croissants, butter 57 1 croissant 21
18363 Tortillas, ready-to-bake or -fry, corn 26 1 tortilla 21
08121 Cereals, oats, regular and quick, unenriched, cooked with water (includes boiling and microwaving), without salt 234 1 cup 21
20125 Spaghetti, whole-wheat, cooked 140 1 cup 21
18133 Cake, sponge, commercially prepared 30 1 shortcake 21
15034 Fish, haddock, cooked, dry heat 150 1 fillet 21
11226 Jerusalem-artichokes, raw 150 1 cup 21
21043 Fast foods, clams, breaded and fried 115 3/4 cup 21
19135 Candies, MARS SNACKFOOD US, MILKY WAY Bar 18 1 fun size bar 21
11283 Onions, cooked, boiled, drained, without salt 94 1 medium 21
20083 Wheat flour, white, bread, enriched 137 1 cup 21
18140 Cake, yellow, commercially prepared, with chocolate frosting, instore bakery 64 1 piece 20
19043 Snacks, potato chips, sour-cream-and-onion-flavor 28.35 1 oz 20
19353 Syrups, maple 20 1 tbsp 20
19140 Candies, MARS SNACKFOOD US, M&M's Peanut Chocolate Candies 20 10 pieces 20
23573 Beef, ground, 80% lean meat / 20% fat, patty, cooked, broiled 85 3 oz 20
10038 Pork, fresh, loin, center loin (chops), bone-in, separable lean and fat, cooked, broiled 85 3 oz 20
05022 Chicken, broilers or fryers, giblets, cooked, simmered 145 1 cup 20
18505 KELLOGG'S Eggo Lowfat Homestyle Waffles 35 1 waffle 20
18173 Cookies, graham crackers, plain or honey (includes cinnamon) 84 1 cup 20
11253 Lettuce, green leaf, raw 56 1 cup 20
09266 Pineapple, raw, all varieties 155 1 cup 20
09326 Watermelon, raw 286 1 wedge 20
09124 Grapefruit juice, white, canned, sweetened 250 1 cup 20
18274 Muffins, blueberry, commercially prepared (Includes minimuffins) 57 1 muffin 20
05277 Chicken, canned, meat only, with broth 142 5 oz 20
05286 Turkey and gravy, frozen 142 5-oz package 20
08109 Cereals, CREAM OF WHEAT, mix'n eat, plain, prepared with water 142 1 packet 20
12632 Nuts, macadamia nuts, dry roasted, with salt added 28.35 1 oz (10-12 nuts) 20
12142 Nuts, pecans 28.35 1 oz (20 halves) 20
12635 Nuts, mixed nuts, dry roasted, with peanuts, with salt added 28.35 1 oz 20
12537 Seeds, sunflower seed kernels, dry roasted, with salt added 28.35 1 oz 20
14267 Fruit punch drink, with added nutrients, canned 248 8 fl oz 20
09016 Apple juice, canned or bottled, unsweetened, without added ascorbic acid 248 1 cup 20
11136 Cauliflower, cooked, boiled, drained, without salt 124 1 cup 20
18482 Toaster Pastries, KELLOGG, KELLOGG'S POP TARTS, Frosted chocolate fudge 52 1 pastry 20
09126 Grapefruit juice, white, frozen concentrate, unsweetened, diluted with 3 volume water 247 1 cup 20

11364 Potatoes, baked, skin, without salt 58 1 skin 20
10042 Pork, fresh, loin, center loin (chops), bone-in, separable lean only, cooked, broiled 85 3 oz 20
06409 Soup, beef noodle, canned, prepared with equal volume water 244 1 cup 20
06559 Soup, tomato, canned, prepared with equal volume water, commercial 244 1 cup 20
06471 Soup, vegetable beef, canned, prepared with equal volume water 244 1 cup 20
20037 Rice, brown, long-grain, cooked 195 1 cup 20
21119 Fast foods, hotdog, with chili 114 1 sandwich 19
09193 Olives, ripe, canned (small-extra large) 22 5 large 19
09032 Apricots, dried, sulfured, uncooked 35 10 halves 19
20110 Noodles, egg, cooked, enriched 160 1 cup 19
18061 Bread, rye, toasted 24 1 slice 19
18096 Cake, chocolate, commercially prepared with chocolate frosting, in-store bakery 64 1 piece 19
20084 Wheat flour, white, cake, enriched 137 1 cup 19
11961 Hearts of palm, canned 33 1 piece 19
09097 Fruit cocktail, (peach and pineapple and pear and grape and cherry), canned, juice pack, solids and liquids 237 1 cup 19
20081 Wheat flour, white, all-purpose, enriched, bleached 125 1 cup 19
17031 Lamb, domestic, rib, separable lean and fat, trimmed to 1/4" fat, choice, cooked, roasted 85 3 oz 19
14150 Carbonated beverage, orange 372 12 fl oz 19
15086 Fish, salmon, sockeye, cooked, dry heat 155 1/2 fillet 19
18220 Crackers, melba toast, plain 20 4 pieces 19
11296 Onion rings, breaded, par fried, frozen, prepared, heated in oven 60 10 rings 19
14157 Carbonated beverage, root beer 370 12 fl oz 19
11251 Lettuce, cos or romaine, raw 56 1 cup 18
05126 Chicken, stewing, meat only, cooked, stewed 140 1 cup 18
20013 Bulgur, cooked 182 1 cup 18
09176 Mangos, raw 165 1 cup 18
19046 Snacks, potato chips, made from dried potatoes, sour-cream and onion-flavor 28.35 1 oz 18
09291 Plums, dried (prunes), uncooked 42 5 prunes 18
18336 Pie crust, standard-type, prepared from recipe, baked 180 1 pie shell 18
18040 Bread, oatmeal, toasted 25 1 slice 18
18309 Pie, cherry, prepared from recipe 180 1 piece 18
11529 Tomatoes, red, ripe, raw, year round average 180 1 cup 18
18230 Crackers, standard snack-type, sandwich, with cheese filling 7 1 sandwich 18
17034 Lamb, domestic, rib, separable lean only, trimmed to 1/4" fat, choice, cooked, roasted 85 3 oz 18
15017 Fish, cod, Atlantic, canned, solids and liquid 85 3 oz 18
18039 Bread, oatmeal 27 1 slice 18
14121 Carbonated beverage, club soda 355 12 fl oz 18
09220 Tangerines, (mandarin oranges), canned, light syrup pack 252 1 cup 18
09403 Apricot nectar, canned, with added ascorbic acid 251 1 cup 18
09189 Fruit, mixed, (peach and cherry-sweet and -sour and raspberry and grape and boysenberry), frozen, sweetened 250 1 cup 18
14334 Pineapple and grapefruit juice drink, canned 250 8 fl oz 18
18053 Bread, reduced-calorie, rye 23 1 slice 17
21138 Fast foods, potato, french fried in vegetable oil 134 1 medium 17
19015 Snacks, granola bars, hard, plain 28.35 1 bar 17
16089 Peanuts, all types, oil-roasted, with salt 28.35 1 oz 17
09123 Grapefruit juice, white, canned, unsweetened 247 1 cup 17
18048 Bread, raisin, toasted, enriched 24 1 slice 17
20006 Barley, pearled, cooked 157 1 cup 17
11264 Mushrooms, canned, drained solids 156 1 cup 17
18047 Bread, raisin, enriched 26 1 slice 17
06443 Soup, cream of mushroom, canned, prepared with equal volume water 244 1 cup 17
15058 Fish, ocean perch, Atlantic, cooked, dry heat 50 1 fillet 17
17024 Lamb, domestic, loin, separable lean and fat, trimmed to 1/4" fat, choice, cooked, broiled 85 3 oz 17
13930 Beef, top sirloin, steak, separable lean and fat, trimmed to 1/8" fat, all grades, cooked, broiled 85 3 oz 17
18361 Toaster pastries, brown-sugar-cinnamon 50 1 pastry 17
11641 Squash, summer, all varieties, raw 113 1 cup 17
18005 Bagels, cinnamon-raisin 89 4" bagel 17
08031 Cereals ready-to-eat, KELLOGG'S FROSTED MINI-WHEATS, Big Bite 51 1 cup 17
11445 Seaweed, kelp, raw 10 2 tbsp 17
11206 Cucumber, peeled, raw 119 1 cup 17
11205 Cucumber, with peel, raw 104 1 cup 17
08319 Cereals ready-to-eat, KELLOGG, KELLOGG'S FROSTED MINIWHEATS, bite size and little bites 55 1 cup 17
19008 Snacks, corn-based, extruded, puffs or twists, cheese-flavor 28.35 1 oz 16
21047 Entrees, fish fillet, battered or breaded, and fried 91 1 fillet 16
18151 Cookies, brownies, commercially prepared 56 1 brownie 16
09087 Dates, deglet noor 41.5 5 dates 16
17027 Lamb, domestic, loin, separable lean only, trimmed to 1/4" fat, choice, cooked, broiled 85 3 oz 16
23610 Beef, top sirloin, steak, separable lean only, trimmed to 1/8" fat, all grades, cooked, broiled 85 3 oz 16
10047 Pork, fresh, loin, center rib (roasts), bone-in, separable lean and fat, cooked, roasted 85 3 oz 16
09132 Grapes, red or green (European type, such as Thompson seedless), raw 160 1 cup 16

11143 Celery, raw 40 1 stalk 16
05186 Turkey, all classes, light meat, cooked, roasted 84 3 oz 16
20045 Rice, white, long-grain, regular, cooked 158 1 cup 16
11144 Celery, cooked, boiled, drained, without salt 37.5 1 stalk 16
01049 Cream, fluid, half and half 15 1 tbsp 16
05059 Chicken, broilers or fryers, breast, meat and skin, cooked, fried, flour 98 1/2 breast 16
18033 Bread, italian 20 1 slice 16
01055 Cream, sour, reduced fat, cultured 15 1 tbsp 16
18452 Cake, snack cakes, cupcakes, chocolate, with frosting, low-fat 43 1 cupcake 15
05092 Chicken, broilers or fryers, thigh, meat and skin, cooked, fried, batter 86 1 thigh 15
16390 Peanuts, all types, dry-roasted, without salt 28.35 1 oz (approx 28) 15
16090 Peanuts, all types, dry-roasted, with salt 28.35 1 oz (approx 28) 15
19031 Snacks, oriental mix, rice-based 28.35 1 oz (about 1/4 cup) 15
19077 Baking chocolate, unsweetened, liquid 28.35 1 oz 15
23568 Beef, ground, 85% lean meat / 15% fat, patty, cooked, broiled 85 3 oz 15
18321 Pie, lemon meringue, prepared from recipe 127 1 piece 15
19039 Snacks, popcorn, caramel-coated, without peanuts 35.2 1 cup 15
05044 Chicken, broilers or fryers, dark meat, meat only, cooked, fried 84 3 oz 15
09150 Lemons, raw, without peel 58 1 lemon 15
08028 Cereals ready-to-eat, KELLOGG, KELLOGG'S ALL-BRAN COMPLETE Wheat Flakes 29 3/4 cup 15
18184 Cookies, oatmeal, prepared from recipe, with raisins 15 1 cookie 15
09252 Pears, raw 166 1 pear 15
11333 Peppers, sweet, green, raw 149 1 cup 15
09100 Fruit cocktail, (peach and pineapple and pear and grape and cherry), canned, heavy syrup, solids and liquids 248 1 cup 15
11044 Mung beans, mature seeds, sprouted, cooked, boiled, drained,without salt 124 1 cup 15
09238 Peaches, canned, juice pack, solids and liquids 248 1 cup 15
21229 Fast foods, chicken, breaded and fried, boneless pieces, plain 106 6 pieces 15
02029 Spices, parsley, dried 1.3 1 tbsp 15
15027 Fish, fish portions and sticks, frozen, preheated 57 1 portion (4" x 2" x 1/2") 15
11091 Broccoli, cooked, boiled, drained, without salt 37 1 spear 15
12516 Seeds, pumpkin and squash seed kernels, roasted, with salt added 28.35 1 oz (142 seeds) 15
18015 Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked 27 2-1/2" biscuit 15
11090 Broccoli, raw 31 1 spear 15
06419 Soup, chicken noodle, canned, prepared with equal volume water 241 1 cup 14
15071 Fish, rockfish, Pacific, mixed species, cooked, dry heat 85 3 oz 14
01050 Cream, fluid, light (coffee cream or table cream) 15 1 tbsp 14
09181 Melons, cantaloupe, raw 160 1 cup 14
21139 Fast foods, potato, mashed 80 1/3 cup 14
15037 Fish, halibut, Atlantic and Pacific, cooked, dry heat 159 1/2 fillet 14
01017 Cheese, cream 14.5 1 tbsp 14
14143 Carbonated beverage, low calorie, other than cola or pepper, without caffeine 355 12 fl oz 14
14003 Alcoholic beverage, beer, regular, all 355 12 fl oz 14
18110 Cake, fruitcake, commercially prepared 43 1 piece 14
19042 Snacks, potato chips, barbecue-flavor 28.35 1 oz 14
14006 Alcoholic beverage, beer, light 354 12 fl oz 14
09116 Grapefruit, raw, white, all areas 118 1/2 grapefruit 14
18308 Pie, cherry, commercially prepared 117 1 piece 14
12179 Nuts, coconut meat, dried (desiccated), sweetened, shredded 93 1 cup 14
19074 Candies, caramels 10.1 1 piece 14
11297 Parsley, fresh 10 10 sprigs 14
11012 Asparagus, cooked, boiled, drained 60 4 spears 14
09055 Blueberries, frozen, sweetened 230 1 cup 14
07029 Ham, sliced, regular (approximately 11% fat) 56.7 2 slices 14
10075 Pork, fresh, shoulder, arm picnic, separable lean and fat,cooked, braised 85 3 oz 14
18214 Crackers, cheese, regular 10 10 crackers 14

10078 Pork, fresh, shoulder, arm picnic, separable lean only, cooked, braised 85 3 oz 14
01058 Sour dressing, non-butterfat, cultured, filled cream-type 12 1 tbsp 14
11043 Mung beans, mature seeds, sprouted, raw 104 1 cup 14
18179 Cookies, oatmeal, commercially prepared, soft-type 15 1 cookie 14
18206 Cookies, sugar, refrigerated dough, baked 15 1 cookie 14
18005 Bagels, cinnamon-raisin 71 3-1/2" bagel 13
04134 Salad dressing, home recipe, cooked 16 1 tbsp 13
05040 Chicken, broilers or fryers, light meat, meat only, cooked, fried 84 3 oz 13
18360 Taco shells, baked 13.3 1 medium 13
09257 Pears, canned, heavy syrup pack, solids and liquids 266 1 cup 13
18388 Muffins, wheat bran, toaster-type with raisins, toasted 34 1 muffin 13
01056 Cream, sour, cultured 12 1 tbsp 13
20049 Rice, white, long-grain, precooked or instant, enriched, prepared 165 1 cup 13
05064 Chicken, broilers or fryers, breast, meat only, cooked, roasted 86 1/2 breast 13

18301 Pie, apple, commercially prepared, enriched flour 117 1 piece 13
11284 Onions, dehydrated flakes 5 1 tbsp 13
12585 Nuts, cashew nuts, dry roasted, with salt added 28.35 1 oz 13
18019 Bread, banana, prepared from recipe, made with margarine 60 1 slice 13
20029 Couscous, cooked 157 1 cup 13
14341 Pineapple and orange juice drink, canned 250 8 fl oz 13
11367 Potatoes, boiled, cooked without skin, flesh, without salt 156 1 cup 12
19040 Snacks, popcorn, cheese-flavor 11 1 cup 12
11529 Tomatoes, red, ripe, raw, year round average 123 1 tomato 12
11334 Peppers, sweet, green, cooked, boiled, drained, without salt 136 1 cup 12
05067 Chicken, broilers or fryers, drumstick, meat and skin, cooked, fried, batter 72 1 drumstick 12
11823 Peppers, sweet, red, cooked, boiled, drained, without salt 136 1 cup 12
12586 Nuts, cashew nuts, oil roasted, with salt added 28.35 1 oz (18 nuts) 12
18451 Cake, pound, commercially prepared, fat-free 28 1 slice 12
10009 Pork, fresh, leg (ham), whole, separable lean and fat, cooked, roasted 85 3 oz 12
15034 Fish, haddock, cooked, dry heat 85 3 oz 12
11333 Peppers, sweet, green, raw 119 1 pepper 12
06119 Gravy, chicken, canned, ready-to-serve 59.5 1/4 cup 12
15126 Fish, tuna, white, canned in water, drained solids 85 3 oz 12
20010 Buckwheat groats, roasted, cooked 168 1 cup 12
18248 Doughnuts, cake-type, plain (includes unsugared, old-fashioned) 47 1 medium 12
19404 Snacks, granola bars, soft, uncoated, chocolate chip 28.35 1 bar 12
18003 Bagels, egg 89 4" bagel 12
11015 Asparagus, canned, drained solids 72 4 spears 12
21026 Fast foods, potatoes, hashed brown 72 1/2 cup 12
18229 Crackers, standard snack-type, regular 12 4 crackers 11
14017 Alcoholic beverage, pina colada, prepared-from-recipe 141 4.5 fl oz 11
14142 Carbonated beverage, grape soda 372 12 fl oz 11
18177 Cookies, molasses 15 1 cookie, medium 11
11399 Potato puffs, frozen, oven-heated 79 10 puffs 11
15119 Fish, tuna, light, canned in oil, drained solids 85.05 3 oz 11
15138 Crustaceans, crab, alaska king, imitation, made from surimi 85 3 oz 11
21138 Fast foods, potato, french fried in vegetable oil 85 1 small 11
10051 Pork, fresh, loin, center rib (roasts), bone-in, separable lean only, cooked, roasted 85 3 oz 11
13382 Beef, chuck, blade roast, separable lean only, trimmed to 0" fat, all grades, cooked, braised 85 3 oz 11
13818 Beef, chuck, blade roast, separable lean and fat, trimmed to 1/8" fat, choice, cooked, braised 85 3 oz 11
14153 Carbonated beverage, pepper-type, contains caffeine 368 12 fl oz 11
18029 Bread, french or vienna (includes sourdough) 25 1/2" slice 11
09340 Pears, asian, raw 275 1 pear 11
14136 Carbonated beverage, ginger ale 366 12 fl oz 11
09246 Peaches, dried, sulfured, uncooked 39 3 halves 11
18302 Pie, apple, prepared from recipe 155 1 piece 11
19101 Candies, fudge, chocolate, with nuts, prepared-from-recipe 19 1 piece 11
19047 Snacks, pretzels, hard, plain, salted 60 10 pretzels 11
11291 Onions, spring or scallions (includes tops and bulb), raw 15 1 whole 11
11367 Potatoes, boiled, cooked without skin, flesh, without salt 135 1 potato 11
11019 Asparagus, frozen, cooked, boiled, drained, without salt 60 4 spears 11
18025 Bread, cracked-wheat 25 1 slice 11
14416 Carbonated beverage, low calorie, cola or pepper-type, with aspartame, contains caffeine 355 12 fl oz 11
09326 Watermelon, raw 152 1 cup 11
14297 Lemonade-flavor drink, powder, prepared with water 266 8 fl oz 11
11001 Alfalfa seeds, sprouted, raw 33 1 cup 11
11176 Corn, sweet, yellow, canned, vacuum pack, regular pack 210 1 cup 11
11028 Bamboo shoots, canned, drained solids 131 1 cup 10
11821 Peppers, sweet, red, raw 149 1 cup 10
01052 Cream, fluid, light whipping 15 1 tbsp 10
18306 Pie, blueberry, prepared from recipe 147 1 piece 10
18170 Cookies, fig bars 16 1 cookie 10
18208 Cookies, sugar, prepared from recipe, made with margarine 14 1 cookie 10
13348 Beef, cured, corned beef, canned 85.05 3 oz 10
09184 Melons, honeydew, raw 170 1 cup 10
15086 Fish, salmon, sockeye, cooked, dry heat 85 3 oz 10
18358 Sweet rolls, cinnamon, refrigerated dough with frosting, baked 30 1 roll 10
09236 Peaches, raw 170 1 cup 10
18128 Cake, snack cakes, creme-filled, sponge 42.5 1 cake 10
09137 Grape juice cocktail, frozen concentrate, diluted with 3 volume water, with added ascorbic acid 250 1 cup 10
14293 Lemonade, frozen concentrate, white, prepared with water 248 8 fl oz 10
11457 Spinach, raw 10 1 leaf 10
11252 Lettuce, iceberg (includes crisphead types), raw 55 1 cup 10
05101 Chicken, broilers or fryers, wing, meat and skin, cooked, fried, batter 49 1 wing 10
18120 Cake, pound, commercially prepared, butter 28 1 piece 10

20100 Macaroni, cooked, enriched 140 1 cup 10
20121 Spaghetti, cooked, enriched, without added salt 140 1 cup 10
09019 Applesauce, canned, unsweetened, without added ascorbic acid (includes USDA commodity) 244 1 cup 10
01053 Cream, fluid, heavy whipping 15 1 tbsp 10
06432 Soup, beef broth, bouillon, consomme, prepared with equal volume water 241 1 cup 10
19033 Snacks, GENERAL MILLS, CHEX MIX, traditional flavor 28.35 1 oz (about 2/3 cup) 10
09184 Melons, honeydew, raw 160 1/8 melon 10
02015 Spices, curry powder 2 1 tsp 10
09206 Orange juice, raw 86 juice from 1 orange 9
18305 Pie, blueberry, commercially prepared 117 1 piece 9
11261 Mushrooms, white, cooked, boiled, drained, without salt 156 1 cup 9
15077 Fish, salmon, chinook, smoked 85.05 3 oz 9
17012 Lamb, domestic, leg, whole (shank and sirloin), separable lean and fat, trimmed to 1/4" fat, choice, cooked, roasted 85 3 oz 9
13826 Beef, rib, whole (ribs 6-12), separable lean and fat, trimmed to 1/8" fat, all grades, cooked, roasted 85 3 oz 9
15232 Fish, roughy, orange, cooked, dry heat 85 3 oz 9
15121 Fish, tuna, light, canned in water, drained solids 85 3 oz 9
13826 Beef, rib, whole (ribs 6-12), separable lean and fat, trimmed to
1/8" fat, all grades, cooked, roasted 85 3 oz 9
17112 Veal, rib, separable lean and fat, cooked, roasted 85 3 oz 9
19348 Syrups, chocolate, fudge-type 19 1 tbsp 9
02030 Spices, pepper, black 2.1 1 tsp 9
14106 Alcoholic beverage, wine, table, white 103 3.5 fl oz 9
18178 Cookies, oatmeal, commercially prepared, regular 25 1 cookie 9
18003 Bagels, egg 71 3-1/2" bagel 9
07017 Chicken roll, light meat 56.7 2 slices 9
20113 Noodles, chinese, chow mein 45 1 cup 9
05292 Turkey patties, breaded, battered, fried 64 1 patty 9
09070 Cherries, sweet, raw 68 10 cherries 9
05172 Turkey, all classes, giblets, cooked, simmered, some giblet fat 145 1 cup 9
09050 Blueberries, raw 145 1 cup 9
11136 Cauliflower, cooked, boiled, drained, without salt 54 3 flowerets 9
19127 Candies, milk chocolate coated raisins 10 10 pieces 9
02009 Spices, chili powder 2.6 1 tsp 9
07069 Salami, cooked, beef and pork 56.7 2 slices 9
19041 Snacks, pork skins, plain 28.35 1 oz 9
15192 Fish, cod, Pacific, cooked, dry heat 85 3 oz 9
11821 Peppers, sweet, red, raw 119 1 pepper 8
19100 Candies, fudge, chocolate, prepared-from-recipe 17 1 piece 8
09003 Apples, raw, with skin 138 1 apple 8
14536 Alcoholic beverage, wine, dessert, dry 103 3.5 fl oz 8
14057 Alcoholic beverage, wine, dessert, sweet 103 3.5 fl oz 8
14096 Alcoholic beverage, wine, table, red 103 3.5 fl oz 8
19045 Snacks, potato chips, made from dried potatoes, reduced fat 28.35 1 oz 8
09191 Nectarines, raw 136 1 nectarine 8
19314 Pie fillings, canned, cherry 74 1/8 of 21-oz can 8
11670 Peppers, hot chili, green, raw 45 1 pepper 8
02026 Spices, onion powder 2.1 1 tsp 8
11081 Beets, cooked, boiled, drained 50 1 beet 8
14175 Chocolate-flavor beverage mix for milk, powder, without added nutrients 21.6 2-3 heaping tsp 8
05090 Chicken, broilers or fryers, neck, meat only, cooked, simmered 18 1 neck 8
09241 Peaches, canned, heavy syrup pack, solids and liquids 262 1 cup 8
18189 Cookies, peanut butter, prepared from recipe 20 1 cookie 8
11363 Potatoes, baked, flesh, without salt 156 1 potato 8
08067 Cereals ready-to-eat, KELLOGG, KELLOGG'S SPECIAL K 31 1 cup 8
11174 Corn, sweet, yellow, canned, cream style, regular pack 256 1 cup 8
19410 Snack, potato chips, made from dried potatoes, plain 28.35 1 oz 8
09020 Applesauce, canned, sweetened, without salt (includes USDA commodity) 255 1 cup 8
15037 Fish, halibut, Atlantic and Pacific, cooked, dry heat 85 3 oz 8
14242 Cranberry juice cocktail, bottled 253 8 fl oz 8
09040 Bananas, raw 150 1 cup 8
09250 Peaches, frozen, sliced, sweetened 250 1 cup 8
14400 Carbonated beverage, cola, contains caffeine 370 12 fl oz 7
14145 Carbonated beverage, SPRITE, lemon-lime, without caffeine 368 12 fl oz 7
19141 Candies, MARS SNACKFOOD US, M&M's Milk Chocolate Candies 7 10 pieces 7
20020 Cornmeal, whole-grain, yellow 122 1 cup 7
15027 Fish, fish portions and sticks, frozen, preheated 28 1 stick (4" x 1" x 1/2") 7
18164 Cookies, chocolate chip, refrigerated dough, baked 26 1 cookie 7
16097 Peanut butter, chunk style, with salt 16 1 tbsp 7
14215 Coffee, instant, regular, prepared with water 179 6 fl oz 7
14367 Tea, instant, unsweetened, powder, prepared 237 8 fl oz 7

14429 Water, tap, municipal 237 8 fl oz 7
14376 Tea, instant, sweetened with sodium saccharin, lemon-flavored, prepared 237 8 fl oz 7
19104 Candies, fudge, vanilla with nuts 15 1 piece 7
09298 Raisins, seedless 14 1 packet 7
06174 Soup, stock, fish, home-prepared 233 1 cup 7
19165 Cocoa, dry powder, unsweetened 5.4 1 tbsp 7
16098 Peanut butter, smooth style, with salt 16 1 tbsp 7
09270 Pineapple, canned, heavy syrup pack, solids and liquids 49 1 slice 7
09254 Pears, canned, juice pack, solids and liquids 76 1 half 7
19411 Snacks, potato chips, plain, salted 28.35 1 oz 7
19811 Snacks, potato chips, plain, unsalted 28.35 1 oz 7
13869 Beef, round, bottom round, steak, separable lean and fat, trimmed to 1/8" fat, all grades, cooked, braised 85 3 oz 7
11365 Potatoes, boiled, cooked in skin, flesh, without salt 136 1 potato 7
17014 Lamb, domestic, leg, whole (shank and sirloin), separable lean only, trimmed to 1/4" fat, choice, cooked, roasted 85 3 oz 7
17095 Veal, leg (top round), separable lean and fat, cooked, braised 85 3 oz 7
19014 Snacks, fruit leather, rolls 21 1 large 7
09268 Pineapple, canned, juice pack, solids and liquids 47 1 slice 7
08071 Cereals ready-to-eat, KELLOGG, KELLOGG'S HONEY SMACKS 27 3/4 cup 6
18232 Crackers, wheat, regular 8 4 crackers 6
15111 Fish, swordfish, cooked, dry heat 106 1 piece 6
11819 Peppers, hot chili, red, raw 45 1 pepper 6
12104 Nuts, coconut meat, raw 45 1 piece 6
18165 Cookies, chocolate chip, prepared from recipe, made with margarine 16 1 cookie 6
09181 Melons, cantaloupe, raw 69 1/8 melon 6
19103 Candies, fudge, vanilla, prepared-from-recipe 16 1 piece 6
11403 Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated 50 10 strips 6
18255 Doughnuts, yeast-leavened, glazed, enriched (includes honey buns) 13 1 hole 6
11632 Peppers, jalapeno, canned, solids and liquids 26 1/4 cup 6
19422 Snacks, potato chips, reduced fat 28.35 1 oz 6
23605 Beef, round, bottom round, steak, separable lean only, trimmed to 1/8" fat, all grades, cooked, braised 85 3 oz 6
10185 Pork, cured, ham, extra lean and regular, canned, roasted 85 3 oz 6
13878 Beef, round, eye of round, roast, separable lean and fat, trimmed to 1/8" fat, all grades, cooked, roasted 85 3 oz 6
10151 Pork, cured, ham, whole, separable lean and fat, roasted 85 3 oz 6
10011 Pork, fresh, leg (ham), whole, separable lean only, cooked, roasted 85 3 oz 6
10153 Pork, cured, ham, whole, separable lean only, roasted 85 3 oz 6
11210 Eggplant, cooked, boiled, drained, without salt 99 1 cup 6
09040 Bananas, raw 118 1 banana 6
05068 Chicken, broilers or fryers, drumstick, meat and skin, cooked, fried, flour 49 1 drumstick 6
09238 Peaches, canned, juice pack, solids and liquids 98 1 half 6
09236 Peaches, raw 98 1 peach 6
07022 Frankfurter, beef, unheated 45 1 frank 6
18235 Crackers, whole-wheat 16 4 crackers 6
18362 Toaster pastries, fruit (includes apple, blueberry, cherry, strawberry) 52 1 pastry 6
04539 Salad dressing, blue or roquefort cheese dressing, commercial, regular 15.3 1 tbsp 6
11590 Waterchestnuts, chinese, canned, solids and liquids 140 1 cup 6
09004 Apples, raw, without skin 110 1 cup 6
11215 Garlic, raw 3 1 clove 5
09277 Plantains, raw 179 1 medium 5
16158 Hummus, commercial 14 1 tbsp 5
09160 Lime juice, raw 38 juice of 1 lime 5
05073 Chicken, broilers or fryers, dark meat, drumstick, meat only, cooked, roasted 44 1 drumstick 5
11740 Broccoli, flower clusters, raw 11 1 floweret 5
18185 Cookies, peanut butter, commercially prepared, regular 15 1 cookie 5
05098 Chicken, broilers or fryers, thigh, meat only, cooked, roasted 52 1 thigh 5
14371 Tea, instant, sweetened with sugar, lemon-flavored, without added ascorbic acid, powder, prepared 259 8 fl oz 5
06175 Sauce, hoisin, ready-to-serve 16 1 tbsp 5
19013 Snacks, fruit leather, pieces 28.35 1 oz 5
07014 Braunschweiger (a liver sausage), pork 56.7 2 slices 5
13327 Beef, variety meats and by-products, liver, cooked, pan-fried 85 3 oz 5
23598 Beef, round, eye of round, roast, separable lean only, trimmed to 1/8" fat, all grades, cooked, roasted 85 3 oz 5
15111 Fish, swordfish, cooked, dry heat 85 3 oz 5
06528 Soup, chicken noodle, dry, mix, prepared with water 252.3 1 cup 5
09132 Grapes, red or green (European type, such as Thompson seedless), raw 50 10 grapes 5
07023 Frankfurter, beef and pork 45 1 frank 5
20089 Wild rice, cooked 164 1 cup 5
11179 Corn, sweet, yellow, frozen, kernels cut off cob, boiled, drained, without salt 164 1 cup 5
09340 Pears, asian, raw 122 1 pear 5
02028 Spices, paprika 2.1 1 tsp 5
12201 Seeds, sesame seed kernels, dried (decorticated) 8 1 tbsp 5
18651 NABISCO, NABISCO SNACKWELL'S Fat Free Devil's Food Cookie Cakes 16 1 cookie 5

08058 Cereals ready-to-eat, KELLOGG, KELLOGG'S PRODUCT 19 30 1 cup 5
10131 Pork, cured, canadian-style bacon, grilled 46.5 2 slices 5
09282 Plums, canned, purple, juice pack, solids and liquids 46 1 plum 5
09021 Apricots, raw 35 1 apricot 5
12147 Nuts, pine nuts, dried 28.35 1 oz 5
06112 Sauce, teriyaki, ready-to-serve 18 1 tbsp 5
09011 Apples, dried, sulfured, uncooked 32 5 rings 4
18456 Cookies, oatmeal, commercially prepared, fat-free 11 1 cookie 4
18226 Crackers, rye, wafers, plain 11 1 wafer 4
11269 Mushrooms, shiitake, cooked, without salt 145 1 cup 4
11391 Potatoes, hashed brown, frozen, plain, prepared 29 1 patty 4
06164 Sauce, salsa, ready-to-serve 16 1 tbsp 4
05296 Turkey roast, boneless, frozen, seasoned, light and dark meat, roasted 85.05 3 oz 4
18193 Cookies, shortbread, commercially prepared, pecan 14 1 cookie 4
06121 Gravy, mushroom, canned 59.6 1/4 cup 4
20022 Cornmeal, degermed, enriched, yellow 138 1 cup 4
09284 Plums, canned, purple, heavy syrup pack, solids and liquids 46 1 plum 4
04023 Salad dressing, thousand island dressing, reduced fat 15.3 1 tbsp 4
18210 Cookies, vanilla sandwich with creme filling 15 1 cookie 4
19173 Gelatin desserts, dry mix, prepared with water 135 1/2 cup 4
19297 Jams and preserves 20 1 tbsp 4
18013 Biscuits, plain or buttermilk, refrigerated dough, lower fat, baked 21 2-1/4" biscuit 4
09279 Plums, raw 66 1 plum 4
19002 Snacks, beef jerky, chopped and formed 19.8 1 large piece 4
19263 Frozen novelties, fruit and juice bars 77 1 bar (2.5 fl oz) 4
09257 Pears, canned, heavy syrup pack, solids and liquids 76 1 half 4
04120 Salad dressing, french dressing, commercial, regular 15.6 1 tbsp 4
11677 Shallots, raw 10 1 tbsp 4
18217 Crackers, matzo, plain 28.35 1 matzo 4
09038 Avocados, raw, California 28.35 1 oz 4
08030 Cereals ready-to-eat, KELLOGG, KELLOGG'S FROOT LOOPS 30 1 cup 4
06075 Soup, beef broth or bouillon, powder, dry 6 1 packet 4
11253 Lettuce, green leaf, raw 10 1 leaf 4
01071 Dessert topping, powdered, 1.5 ounce prepared with 1/2 cup milk 4 1 tbsp 4
11084 Beets, canned, drained solids 24 1 beet 4
14545 Tea, herb, chamomile, brewed 178 6 fl oz 4
14381 Tea, herb, other than chamomile, brewed 178 6 fl oz 4
14209 Coffee, brewed from grounds, prepared with tap water 178 6 fl oz 4
19176 Gelatin desserts, dry mix, reduced calorie, with aspartame, prepared with water 117 1/2 cup 4
07064 Pork sausage, fresh, cooked 27 1 patty 4
18215 Crackers, cheese, sandwich-type with peanut butter filling 7 1 sandwich 4
18248 Doughnuts, cake-type, plain (includes unsugared, old-fashioned) 14 1 hole 4
06116 Gravy, beef, canned, ready-to-serve 58.25 1/4 cup 3
08068 Cereals ready-to-eat, KELLOGG, KELLOGG'S CORN POPS 31 1 cup 3
01001 Butter, salted 14.2 1 tbsp 3
01145 Butter, without salt 14.2 1 tbsp 3
15221 Fish, tuna, yellowfin, fresh, cooked, dry heat 85 3 oz 3
07064 Pork sausage, fresh, cooked 26 2 links 3
08157 Cereals ready-to-eat, wheat, puffed, fortified 12 1 cup 3
18173 Cookies, graham crackers, plain or honey (includes cinnamon) 14 2 squares 3
11251 Lettuce, cos or romaine, raw 10 1 leaf 3
08003 Cereals ready-to-eat, KELLOGG, KELLOGG'S APPLE JACKS 30 1 cup 3
09060 Carambola, (starfruit), raw 108 1 cup 3
18374 Leavening agents, yeast, baker's, compressed 17 1 cake 3
11282 Onions, raw 14 1 slice 3
08084 Cereals ready-to-eat, wheat germ, toasted, plain 7.119 1 tbsp 3
11960 Carrots, baby, raw 10 1 medium 3
18204 Cookies, sugar, commercially prepared, regular (includes vanilla) 15 1 cookie 3
04022 Salad dressing, russian dressing, low calorie 16.3 1 tbsp 3
09278 Plantains, cooked 154 1 cup 3
16123 Soy sauce made from soy and wheat (shoyu) 16 1 tbsp 3
19226 Frostings, chocolate, creamy, ready-to-eat 38 1/12 package 3
01054 Cream, whipped, cream topping, pressurized 3 1 tbsp 3
04612 Margarine-like, vegetable oil spread, 60% fat, stick, with salt 14.3 1 tbsp 3
08288 Cereals ready-to-eat, KELLOGG, KELLOGG'S RICE KRISPIES TREATS Cereal 30 3/4 cup 3
08010 Cereals ready-to-eat, QUAKER, CAP'N CRUNCH 27 3/4 cup 3
19312 Pie fillings, apple, canned 74 1/8 of 21-oz can 3
09241 Peaches, canned, heavy syrup pack, solids and liquids 98 1 half 3
08259 Cereals ready-to-eat, KELLOGG, KELLOGG'S CRISPIX 29 1 cup 3
02046 Mustard, prepared, yellow 5 1 tsp or 1 packet 3
09316 Strawberries, raw 18 1 strawberry 3

11135 Cauliflower, raw 13 1 floweret 3
08011 Cereals ready-to-eat, QUAKER, CAP'N CRUNCH with CRUNCHBERRIES 26 3/4 cup 3
09039 Avocados, raw, Florida 28.35 1 oz 3
07028 Ham, sliced, prepackaged (96% fat free, water added) 56.7 2 slices 3
09152 Lemon juice, raw 47 juice of 1 lemon 3
18192 Cookies, shortbread, commercially prepared, plain 8 1 cookie 3
02055 Horseradish, prepared 5 1 tsp 3
11156 Chives, raw 3 1 tbsp 3
09060 Carambola, (starfruit), raw 91 1 fruit 3
11935 Catsup 15 1 tbsp 3
18210 Cookies, vanilla sandwich with creme filling 10 1 cookie 3
19334 Sugars, brown 3.2 1 tsp 3
04017 Salad dressing, thousand island, commercial, regular 15.6 1 tbsp 3
18197 Cookies, brownies, dry mix, special dietary, prepared 22 1 brownie 3
11250 Lettuce, butterhead (includes boston and bibb types), raw 7.5 1 medium leaf 3
14181 Chocolate syrup 18.75 1 tbsp 3
19350 Syrups, corn, light 20 1 tbsp 3
18159 Cookies, chocolate chip, commercially prepared, regular, higher fat, enriched 10 1 cookie 3
07065 Pork and beef sausage, fresh, cooked 26 2 links 3
19164 Candies, SPECIAL DARK Chocolate Bar 8.4 1 miniature 3
18228 Crackers, saltines (includes oyster, soda, soup) 12 4 crackers 3
19069 Candies, NESTLE, BUTTERFINGER Bar 7 1 fun size bar 3
19076 Candies, caramels, chocolate-flavor roll 7 1 piece 3
08012 Cereals ready-to-eat, QUAKER, CAP'N CRUNCH'S PEANUT BUTTER CRUNCH 27 3/4 cup 2
08164 Cereals, corn grits, yellow, regular and quick, enriched, cooked with water, without salt 242 1 cup 2
08091 Cereals, corn grits, white, regular and quick, enriched, cooked with water, without salt 242 1 cup 2
06125 Gravy, turkey, canned, ready-to-serve 59.6 1/4 cup 2
19294 Fruit butters, apple 17 1 tbsp 2
11954 Tomatillos, raw 34 1 medium 2
01124 Egg, white, raw, fresh 33.4 1 large 2
08065 Cereals ready-to-eat, KELLOGG, KELLOGG'S RICE KRISPIES 33 1-1/4 cup 2
11168 Corn, sweet, yellow, cooked, boiled, drained, without salt 77 1 ear 2
09081 Cranberry sauce, canned, sweetened 57 1 slice 2
13350 Beef, cured, dried 28.35 1 oz 2
19106 Candies, gumdrops, starch jelly pieces 74 10 worms 2
02020 Spices, garlic powder 2.8 1 tsp 2
11955 Tomatoes, sun-dried 2 1 piece 2
18166 Cookies, chocolate sandwich, with creme filling, regular 10 1 cookie 2
05028 Chicken, liver, all classes, cooked, simmered 19.6 1 liver 2
11260 Mushrooms, white, raw 70 1 cup 2
18375 Leavening agents, yeast, baker's, active dry 7 1 pkg 2
10124 Pork, cured, bacon, cooked, broiled, pan-fried or roasted 19 3 medium slices 2
02045 Dill weed, fresh 1 5 sprigs 2
11529 Tomatoes, red, ripe, raw, year round average 20 1 slice 2
04015 Salad dressing, russian dressing 15.3 1 tbsp 2
08020 Cereals ready-to-eat, KELLOGG, KELLOGG'S Corn Flakes 28 1 cup 2
09316 Strawberries, raw 12 1 strawberry 2
18212 Cookies, vanilla wafers, lower fat 4 1 cookie 2
18158 Cookies, chocolate chip, commercially prepared, regular, lower fat
10 1 cookie 2
06150 Sauce, barbecue 15.75 1 tbsp 2
11181 Corn, sweet, yellow, frozen, kernels on cob, cooked, boiled, drained, without salt 63 1 ear 2
09161 Lime juice, canned or bottled, unsweetened 15.4 1 tbsp 2
07073 Sandwich spread, pork, beef 15 1 tbsp 2
14010 Alcoholic beverage, daiquiri, prepared-from-recipe 60 2 fl oz 2
04020 Salad dressing, french dressing, reduced fat 16.3 1 tbsp 2
11529 Tomatoes, red, ripe, raw, year round average 17 1 cherry tomato 2
09153 Lemon juice, canned or bottled 15.2 1 tbsp 2
07083 Sausage, Vienna, canned, chicken, beef, pork 16 1 sausage 2
07072 Salami, dry or hard, pork, beef 20 2 slices 2
11901 Corn, sweet, white, cooked, boiled, drained, without salt 77 1 ear 2
19128 Syrups, table blends, pancake, reduced-calorie 15 1 tbsp 2
19116 Candies, marshmallows 50 1 cup 2
07027 Ham, chopped, not canned 21 2 slices 1
18155 Cookies, butter, commercially prepared, enriched 5 1 cookie 1
02047 Salt, table 6 1 tsp 1
11252 Lettuce, iceberg (includes crisphead types), raw 8 1 medium 1
04585 Margarine-like, margarine-butter blend, soybean oil and butter 14.2 1 tbsp 1
11956 Tomatoes, sun-dried, packed in oil, drained 3 1 piece 1
12147 Nuts, pine nuts, dried 8.6 1 tbsp 1
04021 Salad dressing, italian dressing, reduced fat 15 1 tbsp 1

01067 Cream substitute, liquid, with hydrogenated vegetable oil and soy protein 15 1 tbsp 1
19300 Jellies 19 1 tbsp 1
19296 Honey 21 1 tbsp 1
14210 Coffee, brewed, espresso, restaurant-prepared 60 2 fl oz 1
18375 Leavening agents, yeast, baker's, active dry 4 1 tsp 1
19281 Frozen novelties, ice type, italian, restaurant-prepared 116 1/2 cup 1
19230 Frostings, vanilla, creamy, ready-to-eat 38 1/12 package 1
11429 Radishes, raw 4.5 1 radish 1
11667 Seaweed, spirulina, dried 0.93 1 tbsp 1
11935 Catsup 6 1 packet 1
02048 Vinegar, cider 15 1 tbsp 1
04114 Salad dressing, italian dressing, commercial, regular 14.7 1 tbsp 1
04613 Margarine-like, vegetable oil spread, 60% fat, tub, with salt 4.8 1 tsp 1
04612 Margarine-like, vegetable oil spread, 60% fat, stick, with salt 4.8 1 tsp 1
11333 Peppers, sweet, green, raw 10 1 ring 1
19051 Snacks, rice cakes, brown rice, plain 9 1 cake 1
04025 Salad dressing, mayonnaise, soybean oil, with salt 13.8 1 tbsp 1
08069 Cereals ready-to-eat, KELLOGG, KELLOGG'S FROSTED FLAKES 31 3/4 cup 1
19036 Snacks, popcorn, cakes 10 1 cake 1
19108 Candies, jellybeans 28.35 10 large 1
08156 Cereals ready-to-eat, rice, puffed, fortified 14 1 cup 1
04133 Salad dressing, french, home recipe 14 1 tbsp 1
11943 Pimento, canned 12 1 tbsp 1
19106 Candies, gumdrops, starch jelly pieces 22 10 bears 1
19438 Snacks, KELLOGG, KELLOGG'S RICE KRISPIES TREATS Squares 22 1 bar 1
19129 Syrups, table blends, pancake 20 1 tbsp 1
19034 Snacks, popcorn, air-popped 8 1 cup 1
14414 Alcoholic beverage, liqueur, coffee, 53 proof 52 1.5 fl oz 1
02050 Vanilla extract 4.2 1 tsp 0
11945 Pickle relish, sweet 15 1 tbsp 0
19035 Snacks, popcorn, oil-popped, microwave, regular flavor 11 1 cup 0
01069 Cream substitute, powdered 2 1 tsp 0
04611 Margarine, regular, 80% fat, composite, tub, with salt 14.2 1 tbsp 0
04610 Margarine, regular, 80% fat, composite, stick, with salt 14 1 tbsp 0
11268 Mushrooms, shiitake, dried 3.6 1 mushroom 0
06168 Sauce, ready-to-serve, pepper or hot 4.7 1 tsp 0
04128 Margarine-like, vegetable oil spread, unspecified oils, approximately 37% fat, with salt 4.8 1 tsp 0
01073 Dessert topping, semi solid, frozen 4 1 tbsp 0
18373 Leavening agents, cream of tartar 3 1 tsp 0
01072 Dessert topping, pressurized 4 1 tbsp 0
19107 Candies, hard 6 1 piece 0
20027 Cornstarch 8.064 1 tbsp 0
04053 Oil, olive, salad or cooking 13.5 1 tbsp 0
19106 Candies, gumdrops, starch jelly pieces 4.2 1 medium 0
19107 Candies, hard 3 1 small piece 0
19336 Sugars, powdered 8 1 tbsp 0
19335 Sugars, granulated 4.2 1 tsp 0
04582 Oil, canola 14 1 tbsp 0
08243 Cereals ready-to-eat, GENERAL MILLS, HONEY NUT CLUSTERS 55 1 cup 0
14551 Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 90 proof 42 1.5 fl oz 0
18372 Leavening agents, baking soda 4.6 1 tsp 0
14550 Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 86 proof 42 1.5 fl oz 0
14355 Tea, black, brewed, prepared with tap water 178 6 fl oz 0
14037 Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 80 proof 42 1.5 fl oz 0
04543 Oil, soybean, salad or cooking, (partially hydrogenated) and cottonseed 13.6 1 tbsp 0
04518 Oil, corn, industrial and retail, all purpose salad or cooking 13.6 1 tbsp 0
04511 Oil, safflower, salad or cooking, high oleic (primary safflower oil of commerce) 13.6 1 tbsp 0
04135 Salad dressing, home recipe, vinegar and oil 15.6 1 tbsp 0
04058 Oil, sesame, salad or cooking 13.6 1 tbsp 0
04042 Oil, peanut, salad or cooking 13.5 1 tbsp 0
04034 Oil, soybean, salad or cooking, (partially hydrogenated) 13.6 1 tbsp 0
04031 Shortening, household, soybean (partially hydrogenated)-cottonseed (partially hydrogenated) 12.8 1 tbsp 0
04002 Lard 12.8 1 tbsp 0
19283 Frozen novelties, ice type, pop 59 1 bar (2 fl oz) 0
19156 Candies, MARS SNACKFOOD US, STARBURST Fruit Chews, Original fruits 5 1 piece 0
04506 Oil, sunflower, linoleic, (approx. 65%) 13.6 1 tbsp 0

INTRODUCTION

Alkaline Earth Metals:
Series of reactive metals (less reactive than alkali metals)
group 2 on periodic table
Be, Mg, Ca, Sr, Ba, Ra

Metalloids - elements that exhibit metallic characteristics as well as some nonmetallic characteristics, such as reactivity (whether as metal or nonmetal) depending on which element it's reacting with (ex: Silicon) has a metallic luster but is not a good electricity conductor groups 13 - 16, but only the highlighted ones next to stair steps on periodic table B, Al, Ga, In, Tl, C, Si, Ge, Sn, Pb, N, P, As, Sb, Bi, O, S, Se, Te, Po

Cation hydration determined by neutron diffraction

Cation	Anion	Molality /mol kg−1 (a)	Hydration number	θ /deg (b)
Ca2+	Cl−	4.49	6.4 (3)	34 (9)
		2.80	7.2 (2)	34 (9)
		1.0	10.0 (6)	38 (9)

Hydration numbers measured by dynamic methods

	Ca2+
Transport number	8-12
Ion mobility	7-11
Diffusion	9

Single ion standard hydration enthalpy /kJ mol−1

Ca2+	-1592.4

Single ion standard hydration entropy at 25 °C /J deg−1 mol−1

Ca2+	-209.2

log K1,-1 = A + 11.0 z/d

cation	A
Ca2+	−22.0±0.5

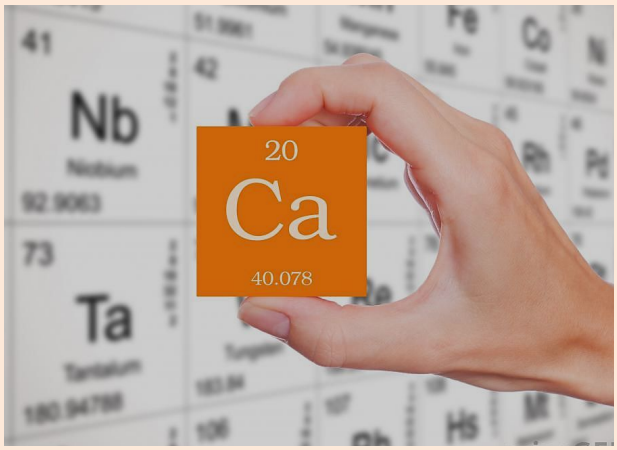
Standard electrode potentials /V for couples

Ca2+	−2.868

Metals usually form cations while Nonmetals usually form anions.

Conventional methods for preparing fine particles include a Bottom-Up approach using precipitation, and a Top-Down approach using milling.

ABOUT CALCIUM



It has been found that among many factors considered for determining the storage, utilisation, bioavailability of calcium in calcium supplements the one that is most important is the other dietary ingredients included in it (this factor is even more important than the calcium salt's aqueous solubility).

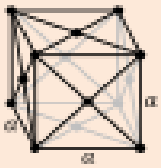
NANOCAL is a suspension, containing a high level of calcium as well as Vitamin D3

Atomic number (*Z*)	20
Group, **block**	group 2 (alkaline earth metals), s-block
Period	period 4
Element category	alkaline earth metal
Standard atomic weight (±) (A_r)	40.078(4)[2]
Electron configuration	[Ar] $4s^2$
per shell	2, 8, 8, 2
Physical properties	
Phase	solid
Melting point	1115 K (842 °C, 1548 °F)
Boiling point	1757 K (1484 °C, 2703 °F)
Density near r.t.	1.55 g/cm^3
when liquid, at m.p.	1.378 g/cm^3
Heat of fusion	8.54 kJ/mol
Heat of vaporization	154.7 kJ/mol
Molar heat capacity	25.929 J/(mol·K)

vapor pressure

P (Pa)	1	10	100	1 k	10 k	100 k
at T (K)	864	956	1071	1227	1443	1755

Atomic properties	
Oxidation states	**+2**, +1, −1[3] (a strongly basic oxide)

Electronegativity	Pauling scale: 1.00
Ionization energies	1st: 589.8 kJ/mol 2nd: 1145.4 kJ/mol 3rd: 4912.4 kJ/mol (more)
Atomic radius	empirical: 197 pm
Covalent radius	176±10 pm
Van der Waals radius	231 pm
Miscellanea	
Crystal structure	face-centered cubic (fcc) 
Speed of sound thin rod	3810 m/s (at 20 °C)
Thermal expansion	22.3 µm/(m·K) (at 25 °C)
Thermal conductivity	201 W/(m·K)
Electrical resistivity	33.6 nΩ·m (at 20 °C)
Magnetic ordering	diamagnetic
Young's modulus	20 GPa
Shear modulus	7.4 GPa
Bulk modulus	17 GPa
Poisson ratio	0.31
Mohs hardness	1.75
Brinell hardness	170–416 MPa
CAS Number	7440-70-2
History	
Discovery and first isolation	Humphry Davy (1808)

Most stable isotopes of calcium

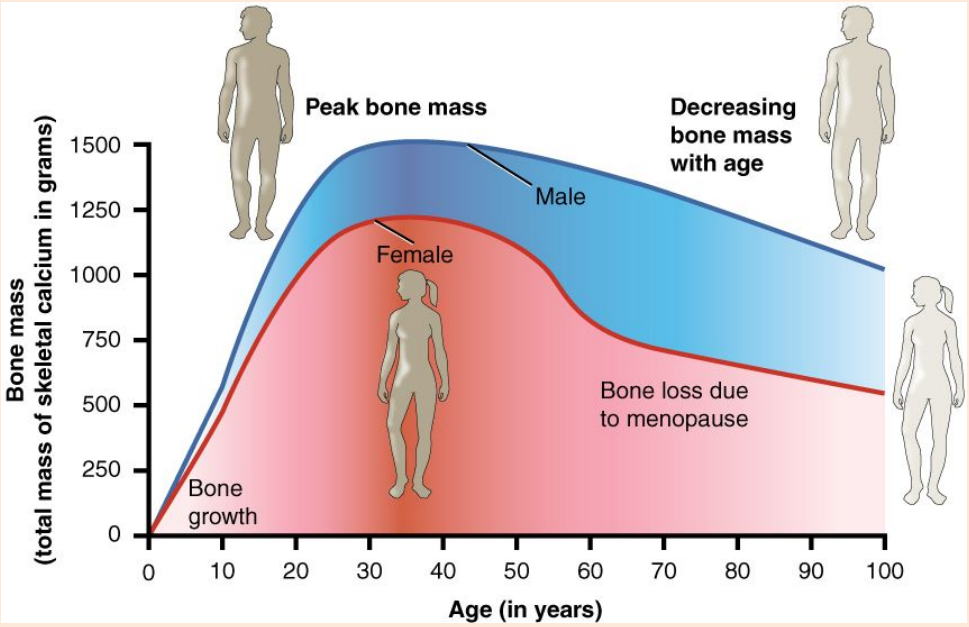
iso	NA	half-life	DM	DE (MeV)	DP
^{40}Ca	96.941%	>5.9×10^{21} y	($\beta^{+}\beta^{+}$)	0.194	^{40}Ar
^{41}Ca	trace	1.03×10^{5} y	ε	–	^{41}K
^{42}Ca	0.647%	^{42}Ca is stable with 22 neutrons			
^{43}Ca	0.135%	^{43}Ca is stable with 23 neutrons			
^{44}Ca	2.086%	^{44}Ca is stable with 24 neutrons			
^{45}Ca	syn	162.7 d	β^{-}	0.258	^{45}Sc
^{46}Ca	0.004%	>8.8×10^{22} y	($\beta^{-}\beta^{-}$)	0.988	^{46}Ti
^{47}Ca	syn	4.536 d	β^{-} γ	0.694, 1.99 1.297	^{47}Sc –
^{48}Ca	0.187%	4.3×10^{19} y	$\beta^{-}\beta^{-}$ (β^{-})	4.274 0.0058	^{48}Ti ^{48}Sc

Decay modes in parentheses are predicted, but have not yet been observed

Calcium is a mineral that is necessary for life. In addition to building bones and keeping them healthy, calcium helps our blood clot, nerves send messages and muscles contract .

About 99 percent of the calcium in our bodies is in our bones and teeth. Each day, we lose calcium through our skin, nails, hair, sweat, urine and feces, but our bodies cannot produce new calcium.
That's why it's important to try to get calcium from the food we eat. When we don't get enough calcium for our body's needs, it is taken from our bones.

Role of Calcium in Plant, Animal and Human Nutrition



(https://en.wikipedia.org/wiki/Osteoporosis)

Calcium ions (Ca2+) play a pivotal role in the physiology and biochemistry of organisms and the cell. They play an important role in signal transduction pathways,[1][2] where they act as a second messenger, in neurotransmitter release from neurons, in contraction of all muscle cell types, and in fertilization. Many enzymes require calcium ions as a cofactor, those of the blood-clotting cascade being notable examples. Extracellular calcium is also important for maintaining the potential difference across excitable cell membranes, as well as proper bone formation.

Calcium levels in mammals are tightly regulated,[1][2] with bone acting as the major mineral storage site. Calcium ions, Ca2+, are released from bone into the bloodstream under controlled conditions. Calcium is transported through the bloodstream as dissolved ions or bound to proteins such as serum albumin. Parathyroid hormone secreted by the parathyroid gland regulates the resorption of Ca2+ from bone, reabsorption in the kidney back into circulation, and increases in the activation of vitamin D3 to Calcitriol. Calcitriol, the active form of vitamin D3, promotes absorption of calcium from the intestines and the mobilization of calcium ions from bone matrix. Calcitonin secreted from the parafollicular cells of the thyroid gland also affects calcium levels by opposing parathyroid hormone; however, its physiological significance in humans is dubious.

Calcium storages are intracellular organelles, that constantly accumulate Ca2+ ions and release them during certain cellular events. Intracellular Ca2+ storages include mitochondria and the endoplasmic reticulum.

Calcium Research

Calcium is well known as a component of bone and is recommended as the supplement of choice for those with bone and joint ailments. The truth is that while calcium gives our

bones rigidity, it is only 20% of total bone mass and provides no flexibility to bone. Bone is the storehouse for calcium. Equally important metabolic roles for calcium are blood clotting, nerve transmission, and energy production. The body recognizes the essential need for calcium and will hold on to whatever it can absorb. When taken in excess and without the other elements necessary to properly store calcium in bones, where 99% of it is supposed to be, our body will store it wherever it can. This can lead to many problems including: arteriosclerosis, stones, fibromyalgia, osteoarthritis, and osteoporosis.

Calcium is absorbed in small intestines. Not all calcium we consume will be absorbed. The amount of calcium absorbed is dependent on a number of factors such as the acidic condition in our intestines, Vitamin D level, estrogen level and the type of calcium supplement.

Deficiency and Toxicity

Because bone stores of calcium can be used to maintain adequate blood calcium levels, short-term dietary deficiency of calcium generally does not result in significantly low blood calcium levels. But, over the long term, dietary deficiency eventually depletes bone stores, rendering the bones weak and prone to fracture. A low blood calcium level is more often the result of a disturbance in the body's calcium regulating mechanisms, such as insufficient PTH or vitamin D, rather than dietary deficiency. When calcium levels fall too low, nerve and muscle impairments can result. Skeletal muscles can spasm and the heart can beat abnormally-it can even cease functioning.
Toxicity from calcium is not common because the gastrointestinal tract normally limits the amount of calcium absorbed. Therefore, short-term intake of large amounts of calcium does not generally produce any ill effects aside from constipation and an increased risk of kidney stones. However, more severe toxicity can occur when excess calcium is ingested over long periods, or when calcium is combined with increased amounts of vitamin D, which increases calcium absorption. Calcium toxicity is also sometimes found after excessive intravenous administration of calcium. Toxicity is manifested by abnormal deposition of calcium in tissues and by elevated blood calcium levels (hypercalcemia). However, hypercalcemia is often due to other causes, such as abnormally high amounts of PTH. Usually, under these circumstances, bone density is lost and the resulting hypercalcemia can cause kidney stones and abdominal pain. Some cancers can also cause hypercalcemia, either by secreting abnormal proteins that act like PTH or by invading and killing bone cells causing them to release calcium. Very high levels of calcium can result in appetite loss, nausea, vomiting, abdominal pain, confusion, seizures, and even coma.

Calcium Primer

The human populations that consume the most calcium have the highest mortality rates in the world. The Scandinavian countries, the USA and New Zealand are the dairy consuming countries and mortality rates soar in these countries. In Japan and Portugal where the consumption of calcium from dairy products is the lowest on the planet so are the mortality rates. [International Journal Cardiology, Volume 33, 1991]

Overdoses of nonorganically based elements, seen in many mineral preparations must accumulate when they are continually taken, and the result is usually bad in the long run.

There is a lot of calcium in most diets, and even a relatively small amount of calcium supplementation, taken on a regular basis, can result in undesirable, rocklike, nonbiologic deposits of calcium in the tissues. -- *Thomas E. Levy, MD JD* (http://shop.wellnesscenter.net/nano-ionic-minerals.html)

In Vertebrates

In vertebrates, calcium ions, like many other ions, are of such vital importance to many physiological processes that its concentration is maintained within specific limits to ensure adequate homeostasis. This is evidenced by human plasma calcium, which is one of the most closely regulated physiological variables in the human body. Normal plasma levels vary between 1 and 2% over any given time. Approximately half of all ionized calcium circulates in its unbound form, with the other half being complexed with plasma proteins such as albumin, as well as anions including bicarbonate, citrate, phosphate, and sulfate.[4]

Calcium regulation in the human body.

Different tissues contain calcium in different concentrations. For instance, Ca2+ (mostly calcium phosphate and some calcium sulfate) is the most important (and specific) element of bone and calcified cartilage. In humans, the total body content of calcium is present mostly in the form of bone mineral (roughly 99%). In this state, it is largely unavailable for exchange/bioavailability. The way to overcome this is through the process of bone resorption, in which calcium is liberated into the bloodstream through the action of bone osteoclasts. The remainder of calcium is present within the extracellular and intracellular fluids.

Within a typical cell, the intracellular concentration of ionized calcium is roughly 100 nM, but is subject to increases of 10– to 100-fold during various cellular functions. The intracellular calcium level is kept relatively low with respect to the extracellular fluid, by an approximate magnitude of 12,000-fold. This gradient is maintained through various plasma membrane calcium pumps that utilize ATP for energy, as well as a sizable storage within intracellular compartments. In electrically excitable cells, such as skeletal and cardiac muscles and neurons, membrane depolarization leads to a Ca2+ transient with cytosolic Ca2+ concentration reaching 400 nM and above. Mitochondria are capable of sequestering and storing some of that Ca2+. It has been estimated that mitochondrial matrix free calcium concentration rises to the tens of micromolar levels in situ during neuronal activity.[6]

Effects

The effects of calcium on human cells are specific, meaning that different types of cells respond in different ways. However, in certain circumstances, its action may be more general. Ca2+ ions are one of the most widespread second messengers used in signal transduction. They make their entrance into the cytoplasm either from outside the cell through the cell membrane via calcium channels (such as Calcium-binding proteins or voltage-gated calcium channels), or from some internal calcium storages such as the endoplasmic reticulum[3] and mitochondria. Levels of intracellular calcium are regulated by transport proteins that remove it from the cell. For example, the sodium-calcium exchanger uses energy from the electrochemical gradient of sodium by coupling the influx of sodium into cell (and down its concentration gradient) with the transport of calcium out of the cell. In addition, the plasma membrane Ca2+ ATPase (PMCA) obtains energy to pump calcium out of the cell by hydrolysing adenosine triphosphate (ATP). In neurons, voltage-dependent, calcium-selective ion channels are important for synaptic transmission through the release of neurotransmitters into the synaptic cleft by vesicle fusion of synaptic vesicles.

Calcium's function in muscle contraction was found as early as 1882 by Ringer. Subsequent investigations were to reveal its role as a messenger about a century later. Because its action is interconnected with cAMP, they are called synarchic messengers. Calcium can bind to several different calcium-modulated proteins such as troponin-C (the first one to be identified) and calmodulin, proteins that are necessary for promoting contraction in muscle.

In the endothelial cells which line the inside of blood vessels, Ca2+ ions can regulate several signaling pathways which cause the smooth muscle surrounding blood vessels to relax.[citation needed] Some of these Ca2+-activated pathways include the stimulation of eNOS to produce nitric oxide, as well as the stimulation of Kca channels to efflux K+ and cause hyperpolarization of the cell membrane. Both nitric oxide and hyperpolarization cause the smooth muscle to relax in order to regulate the amount of tone in blood vessels.[7] However, dysfunction within these Ca2+-activated pathways can lead to an increase in tone caused by unregulated smooth muscle contraction. This type of dysfunction can be seen in cardiovascular diseases, hypertension, and diabetes.[8]

Cell type	Effect
endothelial cells	↑ vasodilation
secretory cells (mostly)	↑ secretion (vesicle fusion)
juxtaglomerular cell	↓ secretion[9]
Parathyroid chief cells	↓ secretion[9]
Neurons	transmission (vesicle fusion)
T cells	Activation in response to antigen presentation to the T cell receptor[10]
myocytes contraction	Activation of protein kinase C
Various	Activation of protein kinase C

Negative effects and pathology

Substantial decreases in extracellular Ca2+ ion concentrations may result in a condition known as hypocalcemic tetany, which is marked by spontaneous motor neuron discharge. In addition, severe hypocalcaemia will begin to affect aspects of blood coagulation and signal transduction.

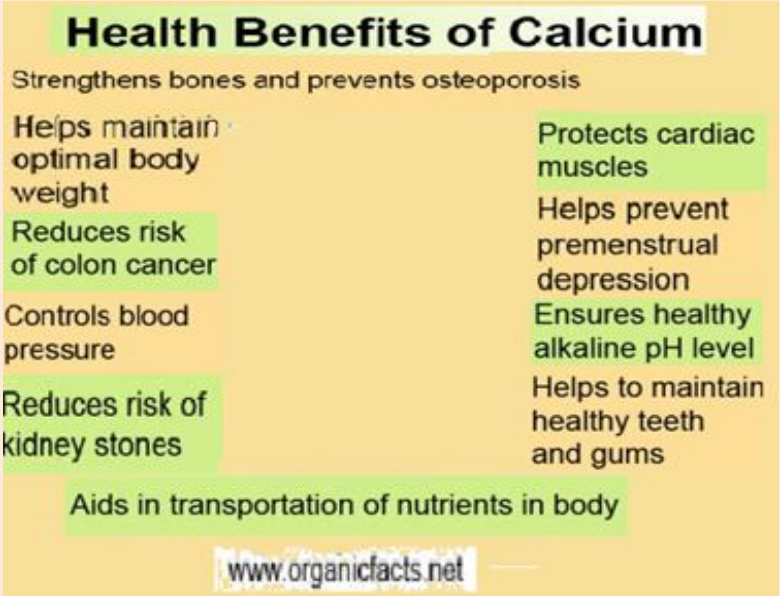
Ca2+ ions can damage cells if they enter in excessive numbers (for example, in the case of excitotoxicity, or over-excitation of neural circuits, which can occur in neurodegenerative diseases, or after insults such as brain trauma or stroke). Excessive entry of calcium into a cell may damage it or even cause it to undergo apoptosis, or death by necrosis. Calcium also acts as one of the primary regulators of osmotic stress (Osmotic shock). Chronically elevated plasma calcium (hypercalcemia) is associated with cardiac arrhythmias and decreased neuromuscular excitability. One cause of hypercalcemia is a condition known as hyperparathyroidism.
Invertebrates

Some invertebrates use calcium compounds for building their exoskeleton (shells and carapaces) or endoskeleton (echinoderm plates and poriferan calcareous spicules)

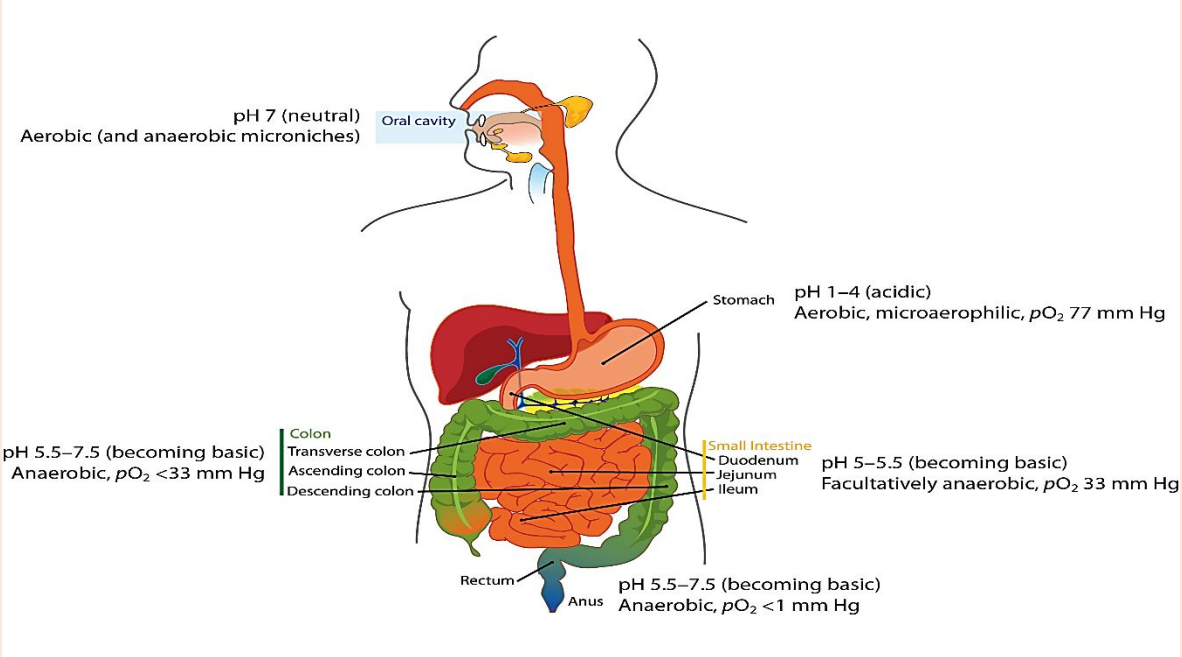
Symptoms of Calcium Deficiency

Recognizing calcium deficiency in the body is quite easy. It occurs when your muscles ache and twitch, or if you get sudden cramps and spasms. Also, if you suffer from palpitations, high blood pressure, osteoporosis, loose teeth and gum diseases, insomnia, premenstrual cramps, tetany,

hypertension and arthritis, that may also indicate calcium deficiency. Often, many children suffer from rickets, where the bones become weak and flexible, they have bowed legs, sunken chests and beaded ribs. These children have not been nourished with calcium since birth. Thus, a regular calcium supply is very important in growing children and teenagers as it can substantially reduce the risks of osteoporosis in old age. This bone ailment is common in one out of every three women and in one man in every 12, above 50 years of age.



In Humans



Calcium absorption

Calcium is absorbed from the intestinal luman by two distinct mechanims, and their relati ve magnitude of importance is determined by the amount of free calcium available for absorption:

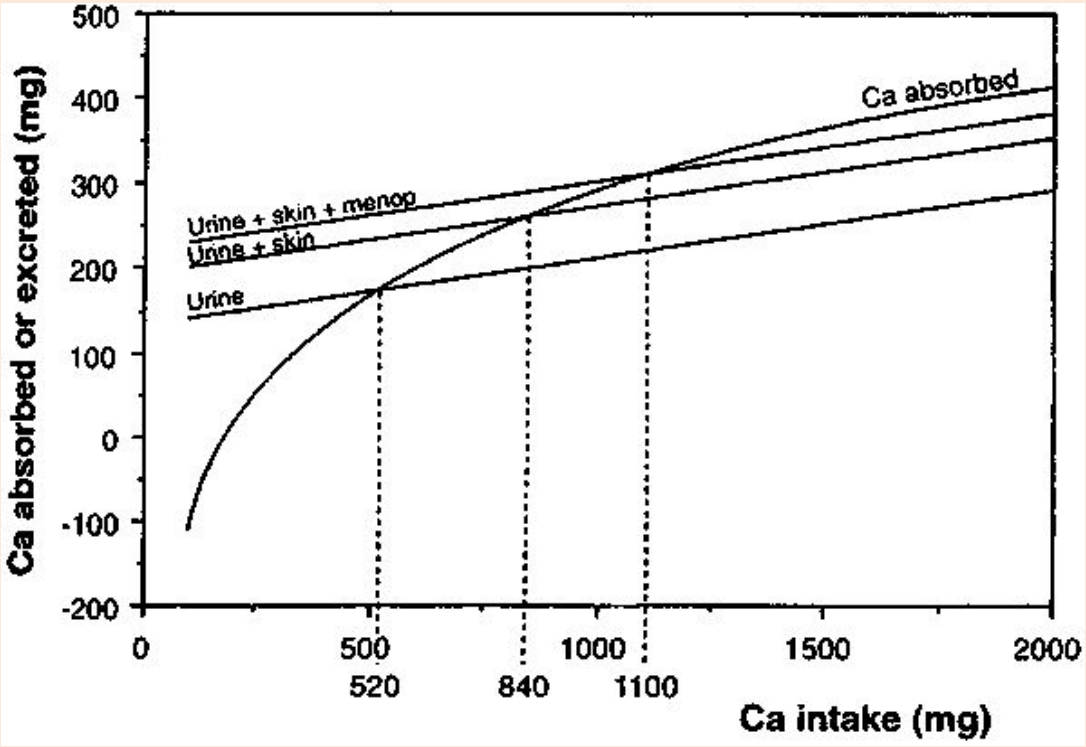
1. Active, transcellular absorption occurs only in the duodenum when calcium intake is low. This process involves import of calcium into the enterocyte, transport across the cell, and export into extracellular fluid and blood. Calcium enters the intestinal epithelial cells through voltageinsensitive (TRP) channels and is pumped out of the cell via a calciumATPase. The rate limiting step in transcellular calcium absorption is transport across the epithelial cell, which is greatly enhanced by the carrier protein calbindin, the synthesis of which is totally dependent on vitamin D.

2. Passive, paracellular absorption occurs in the jejunum and ileum, and, to a much lesser extent, in the colon when dietary calcium levels are moderate or high. In this case, ionized calcium diffuses through tight junctions into the basolateral spaces around enterocytes, and hence into blood. When calcium availability is high, this pathway responsible for the bulk of calcium absorption, due to the very short time available for active transport in the duodenum.

Ingested calcium mixes with digestive juice calcium in the proximal small intestine from where it is absorbed by a process, which has an active saturable component and a diffusion component (*24-27*). At low calcium intakes calcium is mainly absorbed by active (transcellular) transport, but at higher intakes an increasing proportion of calcium is absorbed by simple (paracellular) diffusion. The unabsorbed component appears in the faeces together with the unabsorbed component of digestive juice calcium known as endogenous faecal calcium. Thus, the faeces contain unabsorbed dietary calcium and unreabsorbed digestive juice calcium .

True absorbed calcium is the total calcium absorbed from the calcium pool in the intestines and therefore contains both dietary and digestive juice components. Net absorbed calcium is the difference between dietary calcium and faecal calcium and is numerically the same as true absorbed calcium minus endogenous faecal calcium. At zero calcium intake, all the faecal calcium is endogenous and represents the digestive juice calcium which has not been reabsorbed; net absorbed calcium at this intake is therefore negative to the extent of about 200 mg (5 mmol) (*28,29*). When the intake reaches about 200 mg (5 mmol), dietary and faecal calcium become equal and net absorbed calcium is zero. As calcium intake increases, net absorbed calcium also increases, steeply at first but then, as the active transport becomes saturated, more slowly until the slope of absorbed on ingested calcium approaches linearity with an ultimate gradient of about 5-10 percent (*24,25,30,31*). The relationship between intestinal calcium absorption and calcium intake, derived from 210 balance studies performed in 81 individuals collected from the literature (*32-39*), is below.

Relationship between calcium absorption and calcium intake



The relationships between calcium intake and calcium absorbed and excreted calcium calculated from 210 balance experiments in 81 subjects (32-39). Equilibrium is reached at an intake of 520 mg, which rises to 840 mg when skin losses of 60 mg are added and to 1100 mg when menopausal loss is included. The curvilinear relationship between intestinal calcium absorption and calcium intake can be made linear by using the logarithm of calcium intake to yield the equation: Caa = 174 loge Cai -909 ± 71 (SD) mg/day, where Cai represents ingested calcium and Caa net absorbed calcium. The relationship between urinary calcium excretion and calcium intake is given by the equation: Cau = 0.078 Cai + 137 ± 11.2 (SD) mg/day, where Cau is urinary calcium and Cai calcium intake.

True absorption is an inverse function of calcium intake, falling from some 70 percent at very low intakes to about 35 percent at high intakes. Percent net absorption is negative at low intakes, becomes positive as intake increases, reaches a peak of about 30 percent at an intake of about 400 mg, and then falls off as the intake increases. The two lines converge as intake rises because the endogenous faecal component (which separates them) becomes proportionately smaller.

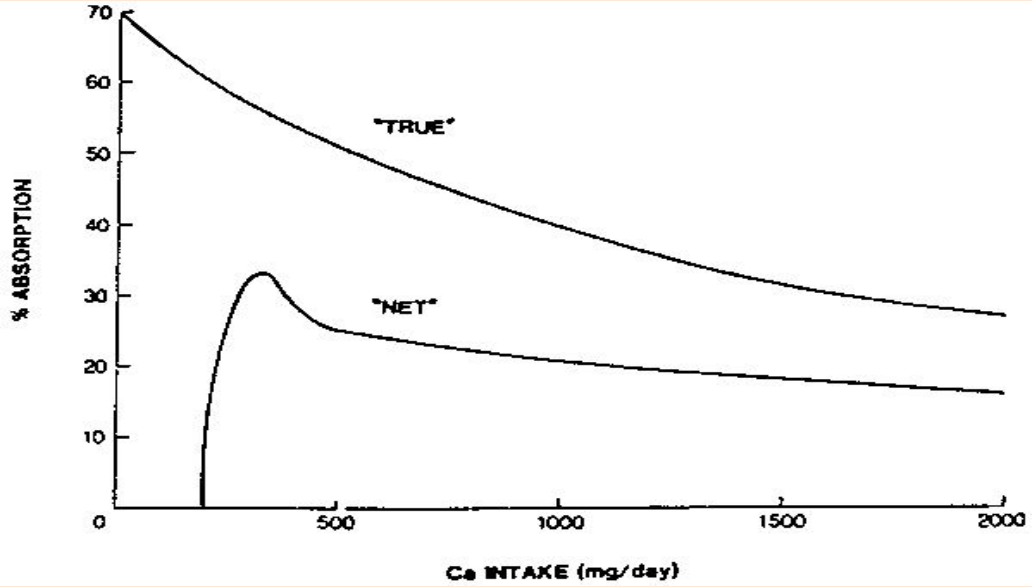
Many factors influence the availability of calcium for absorption and the absorptive mechanism itself. The former includes substances, which form insoluble complexes with calcium, such as the phosphate ion. The relatively high calcium-phosphate ratio of 2.2 in human milk compared with 0.77 in cow milk (*18*) may be a factor in the higher absorption of calcium from human milk than cow milk (see below).

Intestinal calcium absorption is mainly controlled by the serum concentration of $1,25(OH)_2D$. The activity of the 1-a-hydroxylase, which catalyses $1,25(OH)_2D$ production from 25-hydroxycolecalciferol (25OHD) in the kidneys, is negatively related to the plasma calcium and phosphate concentrations and positively to plasma parathyroid hormone (*21*). Thus the inverse relationship between calcium intake and fractional absorption described above is

enhanced by the inverse relationship between dietary calcium and serum 1,25$(OH)_2$D (*21,40,41*).

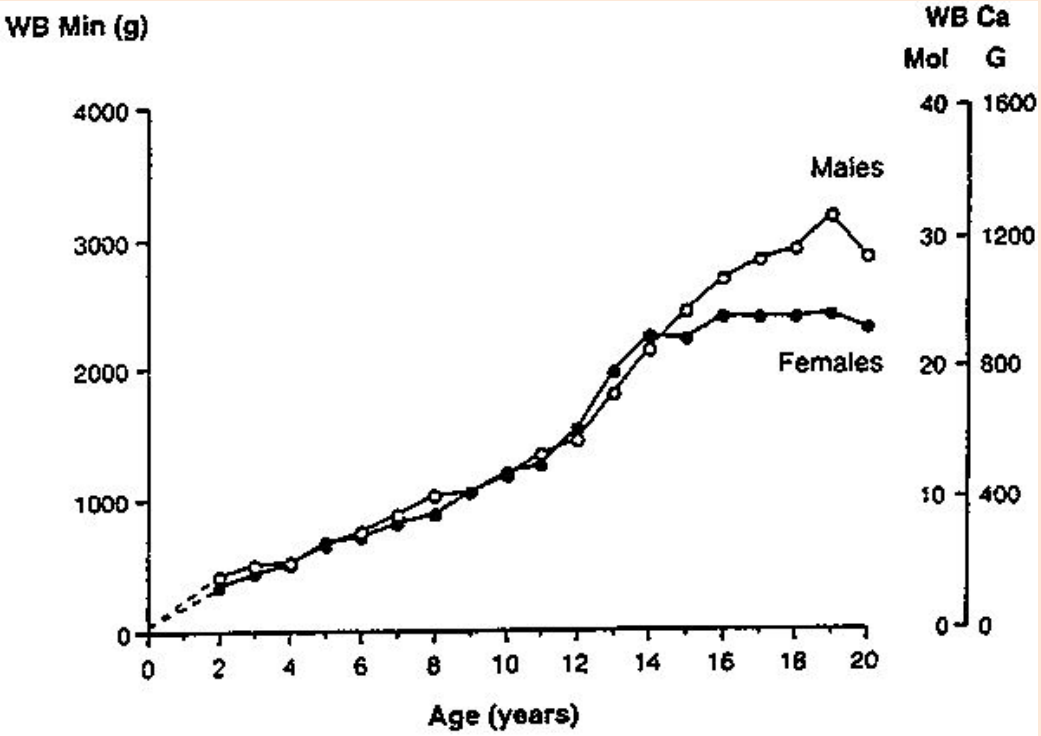
Phytates, present in the husks of many cereals as well as in nuts, seeds, and legumes, can form insoluble calcium phytate salts in the gastrointestinal tract. Excess oxalates can precipitate calcium in the bowel but are not an important factor in most diets.

True and net calcium absorption as percent of calcium intake



Note: The great differences between these functions at low calcium intakes and their progressive convergence as calcium intake increases.

Whole-body bone mineral (WB Min) (left axis) and calcium (right axis) as a function of age as determined by total-body dual-energy X-ray absorptiometry



(Dr Zanchetta, IDIM, Buenos Aires, Argentina).
(http://www.fao.org/docrep/004/y2809e/y2809e0h.htm)

Urinary calcium

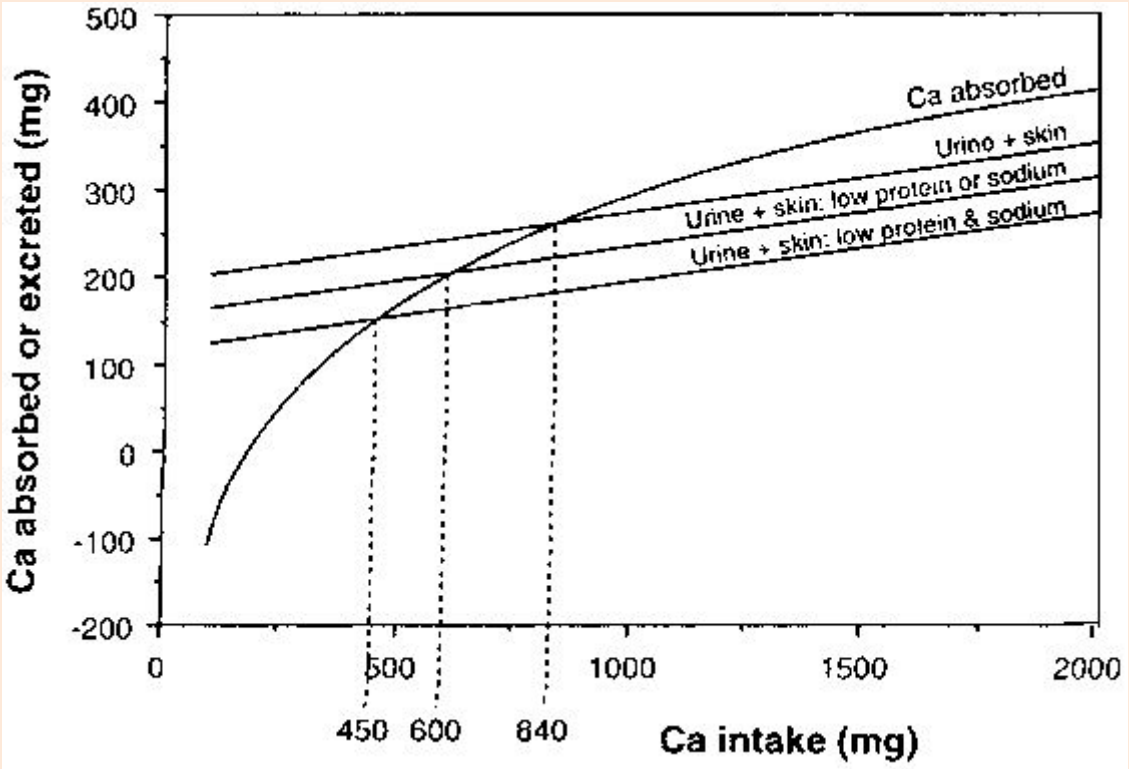
Urinary calcium is the fraction of the filtered plasma water calcium, which is not reabsorbed in the renal tubules. At a normal glomerular filtration rate of 120 ml/min and ultrafiltrable calcium of 6.4 mg/100 ml (1.60 mmol/l), the filtered load of calcium is about 8 mg/min (0.20 mmol/min) or 11.6 g/day (290 mmol/day). Because the usual 24-hour calcium excretion in developed countries is about 160-200 mg (4-5 mmol), it follows that 98-99 percent of the filtered calcium is usually reabsorbed in the renal tubules. However, calcium excretion is extremely sensitive to changes in filtered load. A decrease in plasma water calcium of only 0.17 mg/100 ml (0.043 mmol/l), which is barely detectable, was sufficient to account for a decrease in urinary calcium of 63 mg (1.51 mmol) when 27 subjects changed from a normal- to a low-calcium diet (*42*). This very sensitive renal response to calcium deprivation combines with the inverse relationship between calcium intake and absorption to stabilise the plasma ionised calcium concentration and to preserve the equilibrium between calcium entering and leaving the ECF over a wide range of calcium intakes. However, there is always a significant obligatory loss of calcium in the urine (as there is in the faeces), even on a low calcium intake, simply because maintenance of the plasma ionised calcium and, therefore, of the filtered load, prevents total elimination of the calcium from the urine. The lower limit for urinary calcium in developed countries is about 140 mg (3.5 mmol) but depends on protein and salt intakes. From this obligatory minimum, urinary calcium increases on intake with a slope of about 5-10 percent (*30,31,43*). In the graph derived from 210 balance studies referred to above, the relationship between urinary calcium excretion and calcium intake is represented by the line which intersects the absorbed calcium line at an intake of 520 mg.

Insensible losses

Urinary and endogenous faecal calcium are not the only forms of excreted calcium; losses through skin, hair, and nails need to be taken into account. These are not easily measured, but a combined balance and isotope procedure has yielded estimates of daily insensible calcium losses in the range of 40-80 mg (1-2 mmol), which are unrelated to calcium intake (*44,45*). The addition of a loss of 60 mg (1.5 mmol) as a constant to urinary calcium loss raises the dietary calcium at which absorbed and excreted calcium reach equilibrium from 520 to 840 mg (13 to 21 mmol)

The positive effect of dietary protein - particularly animal protein - on urinary calcium has also been known at least since the 1960s (*127-129*). One study found that 0.85 mg of calcium was lost for each gram of protein in the diet (*130*). A meta-analysis of 16 studies in 154 adult humans on protein intakes up to 200 g found that 1.2 mg of calcium was lost in the urine for every 1g rise in dietary protein (*131*). A small but more focussed study showed a rise of 40 mg in urinary calcium when dietary animal protein was raised from 40 to 80 g (i.e., within the physiological range) (*132*). This ratio of urinary calcium to dietary protein ratio (1mg to 1g) is a representative value, which we have adopted. This means that a 40g reduction in animal protein intake from 60 to 20 g (or from the developed to the developing world [***Table 30***]) would reduce calcium requirement by the same amount as a 2.3g reduction in dietary sodium, i.e. from 840 to 600 mg.

The effect of varying protein or sodium intake on theoretical calcium requirement.



Note: In a western-style diet, absorbed calcium matches urinary and skin calcium at an intake of 840 mg. Reducing animal protein intakes by 40 g reduces the intercept value and

requirement to 600 mg. Reducing both sodium and protein reduces the intercept value to 450 mg.

How animal protein exerts its effect on calcium excretion is not fully understood. A rise in glomerular filtration rate in response to protein has been suggested as one factor (*128*) but this is unlikely to be important in the steady state. The major mechanisms are thought to be the effect of the acid load contained in animal proteins and the complexing of calcium in the renal tubules by sulphate and phosphate ions released by protein metabolism (*133,134*). Urinary calcium is significantly related to urinary phosphate (as well as to urinary sodium), particularly in subjects on restricted calcium intakes or in the fasting state, and most of the phosphorus in the urine of people on Western-style diets comes from animal protein in the diet (*63*). Similar considerations apply to urinary sulphate but it is probably less important than the phosphate ion because the association constant for calcium sulphate is lower than that for calcium phosphate (*135*). The empirical observation that each 1 g of protein results in 1 mg of calcium in the urine agrees very well with the phosphorus content of animal protein (about 1 percent by weight) and the observed relationship between calcium and phosphate in the urine (*63*).

Vitamin D

One of the first observations made on vitamin D after it had been identified in 1918 (*136*) was that it promoted calcium absorption (*137*). It is now well established that vitamin D (synthesised in the skin under the influence of sunlight) is converted to 25OHD in the liver and then to 1,25$(OH)_2$D in the kidneys and that the latter metabolite controls calcium absorption (*21*) . However, plasma 25OHD closely reflects vitamin D nutritional status and because it is the substrate for the renal enzyme which produces 1,25$(OH)_2$D, it could have an indirect effect on calcium absorption. The plasma level of 1,25-$(OH)_2$D is principally regulated is through increased gene expression of the 1-a-hydroxylase (CYP1a) and not by increased 25OHD levels. This has been seen consistently in animal studies, and the high calcium absorption (138) and high plasma 1,25-$(OH)_2$D (139) observed in Gambian mothers is consistent with this type of adaptation. However, increasing latitude may compromise vitamin D synthesis to the degree that 25OHD levels are no longer sufficient to sustain adequate 1,25-$(OH)_2$D levels and efficient intestinal calcium absorption, although this theory remains unproved. Regardless of the mechanism of compromised vitamin D homeostasis, the differences in calcium absorption efficiency have a major effect on theoretical calcium requirement, which shows that an increase in calcium absorption of as little as 10 percent reduces the intercept of excreted and absorbed calcium (and therefore calcium requirement) from 840 to 680 mg. (The above figure also shows the great increase in calcium requirement that must result from any impairment of calcium absorption.)

(http://www.fao.org/docrep/004/y2809e/y2809e0h.htm)

Measurement

The amount of calcium in blood (more specifically, in blood plasma) can be measured as total calcium, which includes both protein-bound and free calcium. In contrast, ionized calcium is a measure of free calcium. An abnormally high level of calcium in plasma is termed hypercalcemia and an abnormally low level is termed hypocalcemia, with "abnormal" generally referring to levels outside the reference range.

Reference ranges for blood tests for calcium Target Lower limit Upper limit Unit

Ionized calcium	1.03,[13] 1.10[14]	1.23,[13] 1.30[14]	mmol/L	
4.1,[15] 4.4[15]	4.9,[15] 5.2[15]	mg/dL		
Total calcium	2.1,[16][17] 2.2[14]	2.5,[14][17] 2.6,[17] 2.8[16]	mmol/L	
8.4,[16] 8.5[18]	10.2,[16] 10.5[18]	mg/dL		

The main methods to measure serum calcium are:[19]

O-Cresolphalein Complexone Method; A disadvantage of this method is that the volatile nature of the 2-Amino-2-Methyl-1-Propanol used in this method makes it necessary to calibrate the method every few hours in a clinical laboratory setup.

Arsenazo III Method; This method is more robust, but the arsenic in the reagent is a health hazard.

The total amount of Ca^{2+} present in a tissue may be measured using Atomic absorption spectroscopy, in which the tissue is vaporized and combusted. To measure Ca^{2+} concentration or spatial distribution within the cell cytoplasm in vivo, a range of fluorescent reporters may be used. These include cell permeable, calcium-binding fluorescent dyes such as Fura-2 or genetically engineered variant of green fluorescent protein (GFP) named Cameleon.

In Plantae

When a plant processes minerals from the earth, they end up as ionic minerals, the form necessary in order to be useable and absorbable by tany life form.

Stomata closing

When ABA signals the guard cells, free Ca^{2+} ions enter the cytosol from both outside the cell and internal stores, reversing the concentration gradient so the K^+ ions begin exiting the cell. The loss of solutes makes the cell flaccid and closes the stomatal pores.

Cellular division

Calcium is a necessary ion in the formation of the mitotic spindle. Without the mitotic spindle, cellular division cannot occur. Although young leaves have a higher need for calcium, older leaves contain higher amounts of calcium because calcium is relatively immobile through the plant. It is not transported through the phloem because it can bind with other nutrient ions and precipitate out of liquid solutions.

Structural roles

Ca^{2+} ions are an essential component of plant cell walls and cell membranes, and are used as cations to balance organic anions in the plant vacuole.[11] The Ca^{2+} concentration of the vacuole may reach millimolar levels. The most striking use of Ca^{2+} ions as a structural element in plants occurs in the marine coccolithophores, which use Ca^{2+} to form the calcium carbonate plates, with which they are covered.

Calcium is needed to form the pectin in the middle lamella of newly formed cells.

Calcium is needed to stabilize the permeability of cell membranes. Without calcium, the cell walls are unable to stabilize and hold their contents. This is particularly important in developing fruits. Without calcium, the cell walls are weak and unable to hold the contents of the fruit.

Some plants accumulate Ca in their tissues, thus making them more firm. Calcium is stored as Ca-oxalate crystals in plastids.

Calcium coordination plays an important role in defining the structure and function of proteins. An example a protein with calcium coordination is von Willebrand factor (vWF) which has an essential role in blood clot formation process. It is discovered -using single molecule optical tweezers measurement - that calcium-bound vWF acts as a shear force sensor in the blood. Shear force leads to unfolding of the A2 domain of vWF whose refolding rate is dramatically enhanced in the presence of calcium.[12]

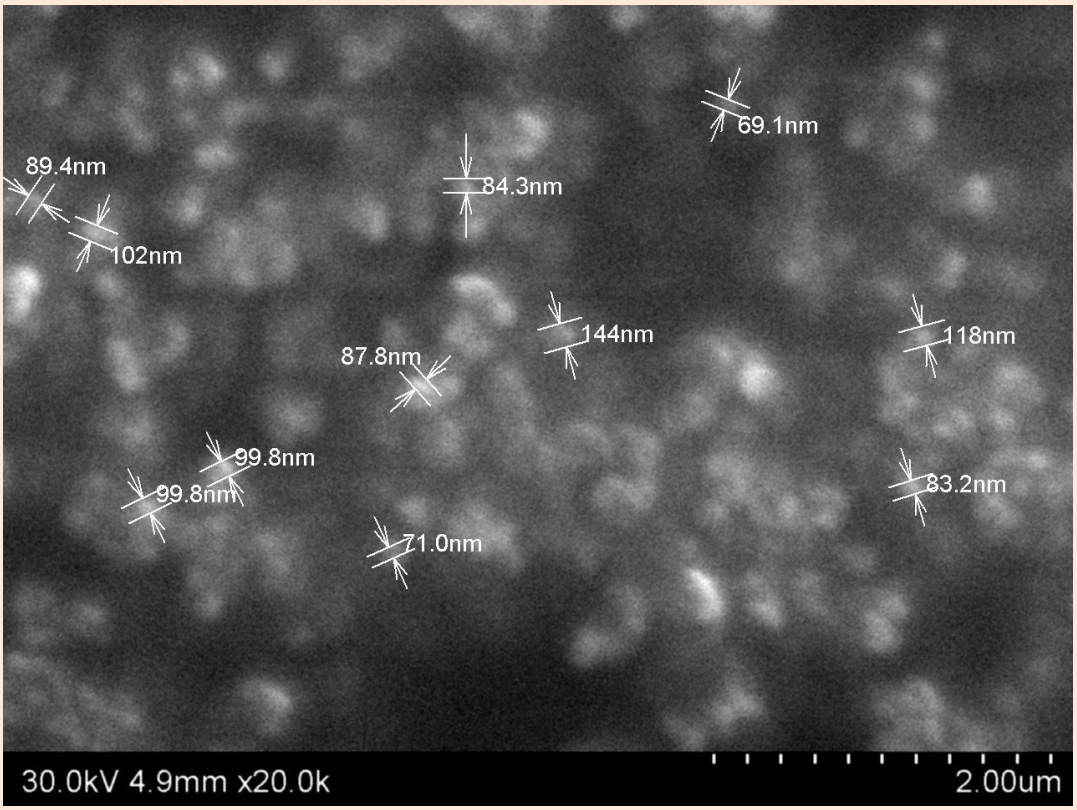
Cell signaling

Ca2+ ions are usually kept at nanomolar levels in the cytosol of plant cells, and act in a number of signal transduction pathways as second messengers.

Protists

Many protists make use of calcium.

Nano Calcium



PROCESS:

Through a complex proprietary process, minerals are removed from their salts and ionized and then embedded into a matrix of near nano size amino acid and further bioencapsulated employing biopolymers, aminoacids, C-3 to C-6 Sugars, PUFA like 3 omega fatty acids.

An ion is any atom or group of atoms that holds one or more positive or negative electrical charges. Positively charged ions are known as cations while negatively charged ions are called anions. Ions are formed by the addition of electrons to, or the removal of electrons from, neutral atoms or molecules or other ions. Additionally, the splitting of the bond between two atoms such that a portion of the electrons shared by the previously joined atoms are split between the two now individual atoms. Examples of this include the reaction between a sodium atom and a chlorine atom to form sodium chloride (NaCl), now comprised of a sodium cation and a chloride anion. Some important cations for human health are calcium, hydrogen, magnesium, sodium and potassium, while the important anions are bicarbonate, chloride and phosphate, to name a few.

Ionic versus Colloidal

The chemical gradient results in the passive movement of ions from a region of higher concentration to lesser concentration. In humans, this process is achieved in the stomach, where hydrochloric acid assists in splitting apart groups of atoms, leaving them in an ionic state which allows them to more easily penetrate the intestinal wall, where a large

amount of absorption takes place. The body preferentially absorbs minerals in ionic form, while other mineral forms (organic, colloidal) are not as readily absorbed.

The term used to describe the condition in which materials are held in a stable, colloidal suspension is called the ëdispersed phase. In the dispersed phase they are distributed evenly and uniformly throughout whatever medium they are suspended. The problem with this is that the ability of colloids to be readily absorbed by the body is limited due to their size and that they are not charged. Without an electrical charge, minerals are not likely to penetrate the cell membrane.

Minerals found in the stable colloidal state, are too large and insoluble to dissolve but are also too small to settle out of the suspension. This fixed state of suspension occurs regardless of whether the substances are inorganic (metals) or organic (plant tissues). Colloids, by definition, cannot penetrate the semi-permeable membranes, which line our intestinal tract, mouth and esophagus. Because of their relatively large particle size, it is difficult for most living tissues to directly absorb colloids.

Ionic minerals are already in a form that the body recognizes and understands so they can be easily assimilated through the selectively permeable cell membranes. The colloidal minerals, on the other hand, must first undergo a process of conversion within the body prior to being absorbed, and then only a certain percentage is utilized after the conversion process. The bioavailability of a mineral is influenced by the form in which it is consumed in the diet, and by the presence of other factors in the food that enhance or depress mineral absorption and utilization.

Ions play an important role in the body. Larger minerals such as calcium, potassium, sodium, and chloride are some key ions that participate in the body's electrical conduction systems. Imbalances of any of these ions or certain trace ions in the body can negatively affect the transport of minerals across the cell membranes, leading to dysfunction. Meanwhile, trace minerals such as chromium, manganese, molybdenum, selenium, vanadium and copper have very specific effects in the body, and have far-reaching health effects as evidenced by current research.

Colloidal and Ionic Minerals:

The Difference is in the ABSORPTION!!!!

Minerals can generally be found in two different forms. The first form is that of a colloid, where minerals are suspended in a stable form. In this stable form, the minerals are evenly distributed throughout the medium in which they are suspended. Minerals in this colloid state are held in large, organized patterns, whereby they remain in suspension without settling out.

Manufacturers claim that supplements made from these colloids are more balanced than other mineral supplements and are in a natural form that is easier for the body to use. According to the Food and Drug Administration (FDA) and the American Dietetic Association, no scientific evidence supports these claims. Commercial colloidal mineral products are derived from clay or humic shale deposits and there is a tremendous amount

of promotional claims for colloidal mineral products. There is no reliable medical evidence to support using these products.

Ionic minerals, on the other hand, are easily transported across the highly selective cell membranes of the human digestive tract. Because ionic minerals are charged, the body has to employ less energy in order to absorb these minerals. Colloidal minerals must be dismantled, into smaller parts, and obtain an electrical charge in order to cross the intestinal membrane. This electrical gradient allows for the easy flow of ionic minerals from an area of higher concentration (intestines) to an area of lesser concentration (cells of the body). The body assists in this process by further charging ions during the course of the digestive process. The body absorbs ionic minerals with greater efficacy than colloidal minerals, as colloids must undergo the complete processes of digestion into smaller charged particles, and even after undergoing these processes; the body utilizes not all of the colloid mineral form, just as not all foods eaten are completely utilized.

Various minerals, in their atomic form, link with other minerals to form ionic complexes. Nature has designed an intricate fit between atoms of different species. For instance, each atom has a particular number of electrons within its grasp that it constantly maintains. As this atom interacts with other atoms of the same type, or even different types, it enters into electron-sharing agreements with these different atoms, forming different mineral complexes. This association is highly important to the workings of all biological organisms, as the linking of many different types of atoms forms solid matter.

Importance of Ionic minerals

Minerals are found both in their single, unlinked form (such as a solitary potassium ion) and their ionic form in which they have joined with another atom to make a charged mineral particle. The large majority of minerals are found bound in some form or another, which is important for their utilization in human physiology. When the body absorbs ionized, or electrically charged minerals, they can be readily absorbed through our selectively permeable intestinal membranes. In fact, the membranes lining our intestinal tract maintain their own specific electrical charge in the form of ionic receptors. The body maintains this charge on the lining of membranes in order to facilitate the absorption of food nutrients. Different receptor areas maintain different charge qualities, allowing for the attraction of the multitudes of diverse nutrients that pass through the intestinal tract. Because of this charge, ionic minerals are easily taken in to the cells lining the intestinal tract, whereby they may be readily employed in the many physiologic activities of the body.

(http://shop.wellnesscenter.net/nano-ionic-minerals.html)

TRIALS IN BROILERS REGARDING NANOCAL

OMEGA LABORATORIES
WORKING OFFICE : Flat No. 5, Ashwini Apartment, Ashwamegh Society
Old Sangvi, Shitole Nagar, PUNE-411027
E mail : vetdayapath@rediffmail.com
LAB : A/p. LONAND, Tal. Khandala, Dist. Satara, Pin- 415 521.
Ph. (02169) 226142 Maharashtra (India) Mob. +918600891946

To,
Director,
DVS BioLife Ltd.
154/A5, S V Coop Ind Estate, IDA, Bollaram, HYDERABAD,
Medak Dt. Telangana State, India. Pin Code: 502 325

Table no 1: Day old weights

No	NANOCAL	Normal feed
1	45	49
2	44	46
3	48	40
4	46	45
5	49	43
6	38	46
7	45	38
8	43	48
9	43	44
10	52	48
11	45	50
12	43	49
13	46	44
14	49	52
15	38	48
16	45	42
17	43	44
18	43	43
19	52	42
20	48	51
21	46	42

22	**49**	**50**
23	**38**	**46**
24	**45**	**44**
25	**43**	**50**
	45.04	**45.76**

Table no 2: first week weights

No	NANOCAL	Normal feed
1	155	158
2	142	155
3	162	164
4	151	164
5	153	152
6	150	158
7	132	155
8	169	164
9	132	152
10	163	150
11	155	151
12	142	153
13	154	145
14	132	148
15	169	148
16	132	153
17	163	157
18	155	169
19	142	160
20	164	161
21	132	151
22	169	153
23	132	145
24	163	148
25	168	161
Avg.	151.083	154.87

Feed consumed	3090	3080
Per bird	123.6	123.2
FCR	1.2236	1.258

Table no 3: second week weights

No	NANOCAL	Normal feed
1	220	256
2	213	257
3	233	259
4	209	245
5	210	254
6	219	250
7	220	241
8	230	243
9	231	251
10	224	240
11	214	241
12	233	245
13	209	245
14	210	243
15	219	233
16	220	236
17	230	254
18	231	243
19	217	251
20	210	250
21	220	241
22	213	243
23	233	251
24	240	257
25	210	254

	220.72	247.32
Feed consumed	6890	6889
Per Bird	275.6	275.56
FCR	1.2486	1.114

Table no 4: Third week weights

No	NANOCAL	Normal feed
1	630	710
2	590	630
3	610	586
4	650	652
5	640	654
6	670	546
7	600	539
8	590	540
9	570	560
10	779	623
11	652	709
12	654	660
13	546	586
14	524	652
15	561	654
16	526	546
17	560	539
18	610	540
19	510	560
20	680	670
21	520	594
22	554	645
23	570	590
24	560	613
25	532	689

Avg.	595.52	611.48
Feed consumed	8270	8300
Per bird	330.8	332
FCR	1.80	1.84

Table no 5: Forth week weights

No	NANOCAL	Normal feed
1	1253	953
2	1233	956
3	1200	1100
4	1005	1005
5	1189	988
6	1260	921
7	1343	1020
8	1029	1040
9	1010	923
10	1029	1292
11	1233	1270
12	1090	1310
13	1202	1340
14	1120	1298
15	1110	1182
16	1082	885
17	1070	985
18	1028	1352
19	1039	970
20	1073	1296
21	1146	1260
22	1246	1264
23	1305	1130
24	1266	
25		

Avg.	1148.375	1119.13
Feed consumed	21139.2	20424
per bird	880.8	888
FCR	1.30	1.26

Table no 6: Fifth week weights

No	NANOCAL	Normal feed
1	1632	1870
2	1563	1890
3	1613	1989
4	1569	1980
5	1645	1890
6	1652	1923
7	1976	1943
8	1963	1953
9	1829	1170
10	1856	1453
11	1936	1529
12	1386	1296
13	1544	1520
14	1478	1435
15	1539	1623
16	1914	1643
17	1660	1823
18	1720	1864
19	1643	2006
20	1920	1563
21	1520	1360
22	1521	1410
23	1529	1110
24	1740	
25		
Avg.	1681.166	1662.73

Feed consumed	25032	23460
per bird	1043	1020
FCR	1.6118	1.630

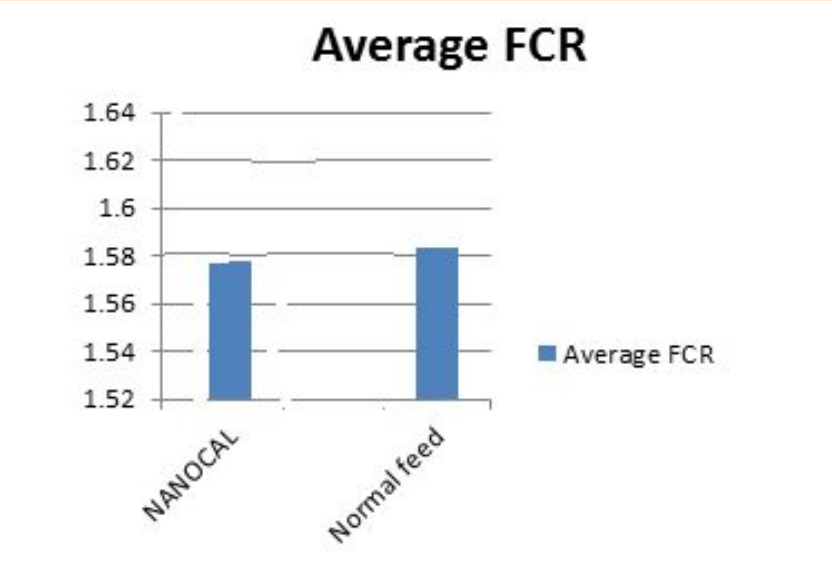
Table no 7: Sixth week weights

No	NANOCAL	Normal feed
1	2365	2257
2	2500	2451
3	2210	2241
4	2261	2008
5	2300	2022
6	2139	2019
7	2540	2060
8	2612	2340
9	2010	2410
10	2230	2460
11	1990	2400
12	2100	2385
13	2019	2543
14	2030	2156
15	2390	2398
16	2012	2390
17	2030	2200
18	2210	2390
19	2261	2210
20	2300	2214
21	2139	2543
22	2540	2156
23	2612	2214
24	2340	
25		
Avg.	2255.83	2281.17

Feed Consumed	**23688**	**26551**
per bird	987	**950**
FCR	2.285	2.401236

Table No 8: FCR

FCR per week	NANOCAL	Normal feed
1	1.2236	1.258
2	1.2486	1.114
3	1.80	1.84
4	1.30	1.26
5	1.6118	1.630
6	2.285	2.40
Average FCR	1.578	**1.583**



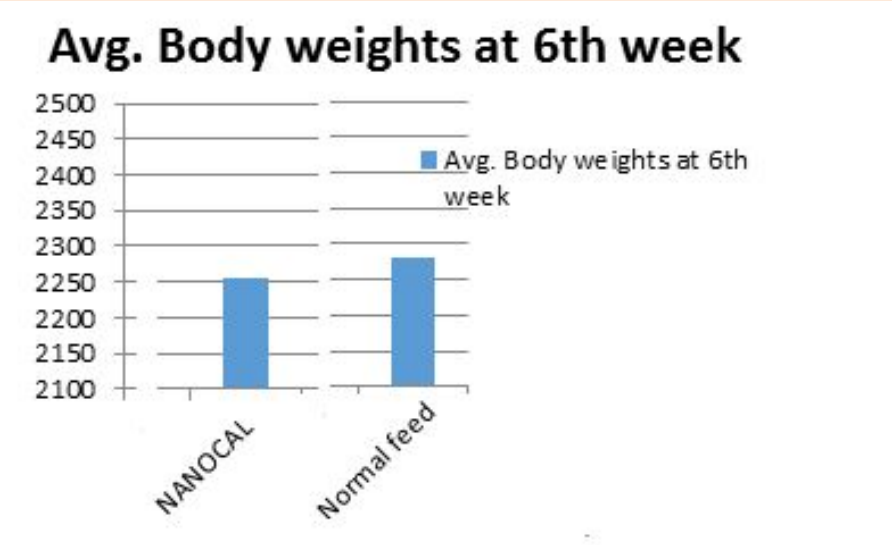


Table no 9a

Nano cal	Thigh weight Gms	Breast weights Gms
	473	553
	505	512
	466	510
	476	520
	483	529
	480.6	**524.8**

Table no 9 f.

Normal feed	Thigh weight Gms	Breast weights Gms
	435	422
	422	417
	432	420
	420	402
	437	429
	429.2	418

Table no 9 g. Average Thigh and breast weights (Gms)

Groups	Thigh weight Gms	Breast weights Gms	Ratio between Thigh and Breast weights
Nano cal	480.6	524.8	0.9158
Normal feed	429.2	418	**1.0268**

Average thigh and breast weights:

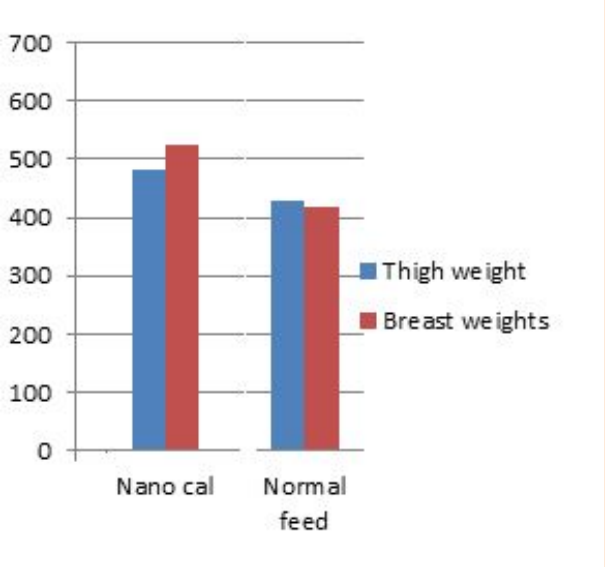


Table No 10 a. calcium phosphorus levels in serum and bone

Nanocal	Calcium mg/dl	Phosphorus mg/dl	Bone Phosphorus	Bone Calcium
1	9.33	4.44	0.189	0.29
2	9.65	3.45	0.192	0.292
3	9.42	3.98	0.21	0.297
4	9.23	4.12	0.195	0.291
5	9.55	4.21	0.198	0.293
Average	**9.436**	4.04	**0.1968**	**0.2926**

Table No 10 c. calcium phosphorus levels in serum and bone

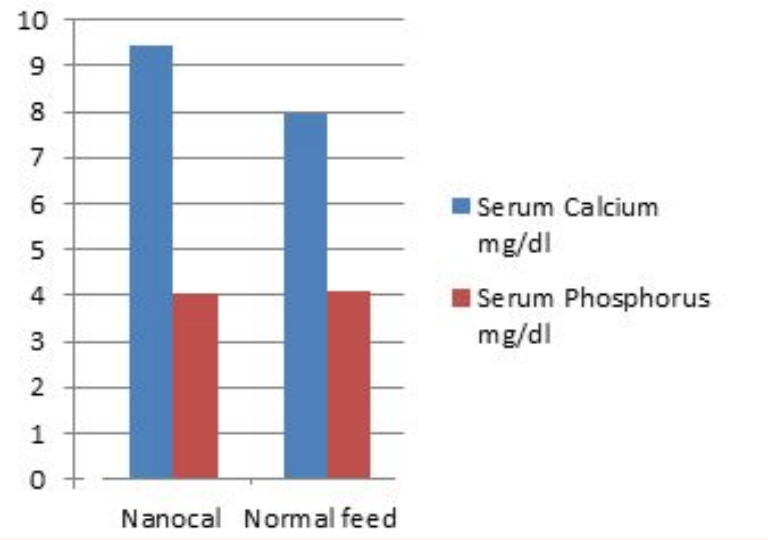
Normal feed	Calcium mg/dl	Phosphorus mg/dl	Bone Phosphorus	Bone Calcium
1	8.12	4.55	0.144	0.231
2	7.33	3.72	0.147	0.239
3	8.02	3.98	0.139	0.227
4	8.23	4.2	0.132	0.23
5	8.08	3.97	0.136	0.233
Average	**7.956**	**4.084**	**0.1396**	**0.232**

Table No 10 d. calcium phosphorus levels in serum and bone

Group	Calcium mg/dl	Phosphorus mg/dl	Bone Phosphorus	Bone Calcium

Nanocal	**9.436**	4.04	**0.1968**	**0.2926**
Normal feed	**7.956**	**4.084**	**0.1396**	**0.232**

Serum calcium phosphorus levels:



Bone calcium phosphorus levels:

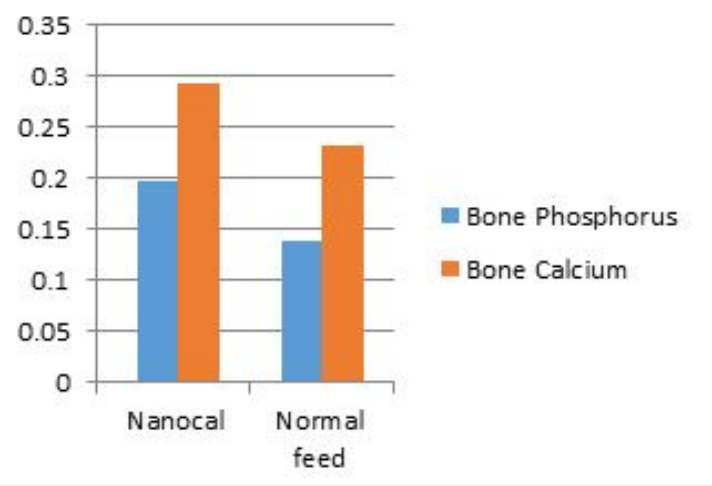
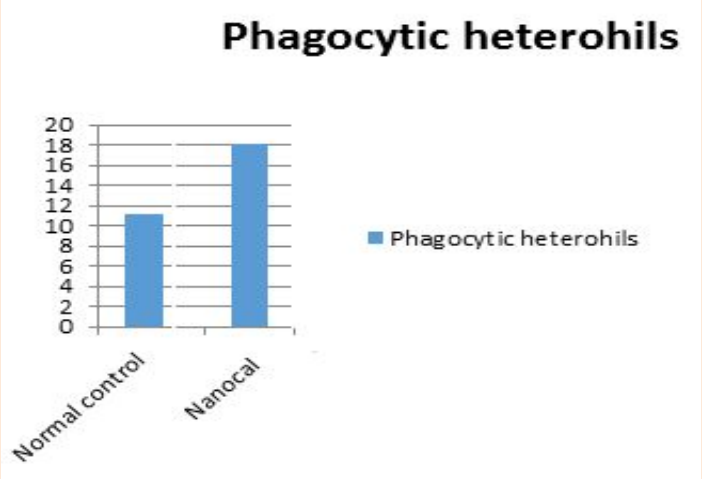


Table no 11. Phagocytic index:

Nos.	Normal control	Nanocal
1	10	16
2	11	18
3	12	18
4	12	17
5	10	18
6	13	19

7	11	18
8	10	18
9	12	19
10	10	17
Avg.	**11.1**	17.8



Heterophil phagocytosis

Heterophils were isolated from peripheral blood and adjusted to 5×10^6 cells/mL, combination of live SE of 5×10^7 cells/mL (ratio 1:10). The protocol was as described by Lowry et al. (2005). Briefly, the mixture was centrifuged and incubated at 39ºC in 5% CO_2 for 1 h. Samples were submerged in an ice bath for 15 min to stop phagocytosis. Samples were pelleted by centrifugation, supernatants were decanted, and cell/bacteria pellets were resuspended in ice-cold clear RPMI 1640 (Carlsbad, CA, USA) and washed three times by repeating this process. Gentamicin solution was added to remove residual extracellular SE at the second wash. Sediment cells of the blood were smeared on a slide, stained with Wright's stain and examined microscopically. The results were expressed as percentage of heterophils with bacteria and phagocytic index (PI), where PI = (the percentage of heterophils containing bacteria)×(the average number of bacteria per ingesting heterophil). Phagocytosis and PI values were counted from 200 heterophil cells in different microscope fields.
(http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4647107/)

Table no 12 Kidney function tests:
Table no 12.a. Creatinine levels mg/ dl:

Group	1	2	3	4	5	6	Average Creatinine mg/dl
Nanocal	0.22	0.25	0.3	0.3	0.28	0.39	0.29
Normal control	0.32	0.28	0.29	0.33	0.25	0.23	**0.283333**

creatinine by Jaffe's kinetic method

Creatinine is the waste product of creatine metabolism and is the common excreted compound. Normally, serum creatinine is 1 to 5 mg/dl and higher values indicate glomerular damage or cardiac insufficiency (Remington, 2000).

Blood urea nitrogen (BUN) by glutamate dehydrogenase method

Table no 12.b. BUN levels mg/dl:

Birds	1	2	3	4	5	6	Average BUN mg/dl
Nanocal	10	10	8	10	9	10	9.5
Normal control	8	9	8	9	11	10	**9.166667**

Table no 13 Liver Function test:

serum glutamate pyruvate transaminase (*SGPT*)

Table no 13. a. SGPT Levels IU/lit.

Group	1	2	3	4	5	6	Average SGPT IU
Nanocal	22	24	22	20	19	23	21.66667
Normal control	23	24	26	26	27	29	**25.83333**

Table no 13.b. SGOT levels IU/Lit.

Serum Glutamic Oxaloacetate transaminase)

Group	1	2	3	4	5	6	Average SGOT IU
Nanocal	38	35	36	37	34	39	**36.5**
Normal control	39	42	45	46	44	39	**42.5**

Table no 13.c. Serum Total Protein levels g/dl

Group	1	2	3	4	5	6	Average Total Proteins
Nanocal	4.5	4.6	5.6	5.3	5.2	5.8	5.166667
Normal control	4.1	3.8	4.2	4.3	4.5	4.4	**4.216667**

Table no 13.d.Serum Albumin g/dl

Group	1	2	3	4	5	6	Average Total Albumin
Nanocal	2.4	2.3	2.6	2.9	2.7	2.9	2.633333
Normal control	2.1	1.9	2.2	2.2	2.1	2.2	**2.116667**

Table no 13.e. Serum globulins g/dl

Group	1	2	3	4	5	6	Average Total Globulin
Nanocal	2.1	2.3	3	2.4	2.5	2.9	2.533333
Normal control	2	1.9	2	2.1	2.4	2.2	**2.1**

Ratio

Group	Average Total Albumin	Average Total Globulin	Albumin/globulin Ratio
Nanocal	2.633333	2.533333	1.03947
Normal control	**2.116667**	**2.1**	**1.00794**

Conclusions:

1. Nanocal did not showed any direct effect on increase in body weights and FCR as well as muscle deposition in breast and thigh region, **when used as a single.**
2. **Serum calcium and bone calcium deposition was found better in Nanocal groups.**
3. **After examining liver and kidney function tests it is concluded that Nanocal did not have any adverse effects on the Liver and Kidney functions of the broilers.**

Trial conducted by and Laboratory samples examined and analyzed by
Dr. Dayaram Shankar Suryawanshi.
MVSc. Pathology (Mumbai)
MSVC No 5715

TRIALS IN RATS REGARDING NANOCAL

Calcium Bioavailability in Rats

Rats (Sprague-Dawley type, 7 weeks of age, male) were fed an egg white-diet low in calcium. Chromic oxide (Cr.sub.2.O.sub.3, 0.5 g/kg diet), an insoluble and unabsorbed marker, was added to the egg white-diet to allow estimation of apparent Ca absorption by determining the ratio of Ca:Cr in the diet and feces. These rats were divided into four groups (C, T1. T2 and T3) each being formed of 12 rats and having a similar mean body weight of 200-205 grams.
NANOCAL was heat sterilized and used as follows
C: Regular low calcium egg white diet

T1: NANOCAL 0.5% (w/v) non-supplemented with calcium
T2: supplemented with calcium (400 ppm),
T3: NANOCAL 0.25% (w/v) supplemented with calcium (200 ppm),
All the above were respectively given from feeding bottles to the rats as drinking water.
The four groups of rats were free to take the feed and water in, during the treatment period of 21 days. Food intake was measured every day. Feces were collected during the last 3 days and freeze-dried. At the end of the 21-day, rats were deprived of food overnight and anesthetized by intraperitoneal injection of sodium pentobarbital (40 mg/kg body weight). The right femurs were excised for measurement of Ca content. The amounts of Ca, and Cr in the diets and feces were quantified by atomic absorption spectrometry (Varian Analytical Instruments, Walnut Creek, Calif., USA) after wet-washing with an acid mixture (16 mol/L HNO_3:9 mol/L $HClO_4$=3:1). The right femurs were treated with 1N HNO_3 and ashed at 550 degrees C. Ca content was determined in the same manner as in the case of the diets and feces. Apparent Ca absorption was calculated by the following formula: Apparent Ca absorption (%) = 100[(Ca intake/Cr intake)−(Ca in the feces/Cr in the feces)]/(Ca intake/Cr intake).
The apparent Ca absorption, and femoral bone Ca content of rats fed are shown in Table 1.

Group	Apparent Ca absorption (%)	Bone Ca content (mg/femur)
Control	49 ± 5.7	89.63 ± 0.27
T1	X1 ± x1	Y1 ± y1
T2	X2 ± x2	Y2 ± y2
T3	X3 ± x3	Y3 ± y3
T4	X4 ± x4	Y4 ± y4

The data show enhanced/ same/ reduced Ca bioavailability from the NANOCAL

Bone Metabolism and Dynamic Strength of Bone in Rats

Rats (Sprague-Dawley type, 7 weeks of age, male) were fed a diet low in calcium. These rats were divided into four groups (C, T1, T2 and T3)each being formed of 12 rats and having a similar mean body weight of 200-205 grams, then
C: Regular Low Calcium Diet
T1: heat-sterilized NAOCAL i.e., an NANOCAL of 0. 5% (w/v) non-supplemented with calcium
T2: supplemented with calcium (400 ppm),
T3: NANOCAL of 0. 25% (w/v) supplemented with calcium (200 ppm),
T4: NANOCAL 0.25% (w/v) supplemented with calcium (200 ppm),
were respectively given from feeding bottles to the rats as drinking water.

The four groups of rats were free to take the feed and water in, during the treatment period of 21 days. At the end of the 21-day, rats were deprived of food overnight and anesthetized by intraperitoneal injection of sodium pentobarbital (40 mg/kg body weight). The left femurs were collected from the animals and soft tissue was removed. The left femur from each animal was subjected to bone mineral content (BMC), bone mineral density (BMD), and bone mechanical strength (BMS) measurements using dual-energy X-ray absorptiometry (DEXA), which is a typical method used to study the status of bone growth. Table 2 shows the beneficial effects of an antioxidant composition according to an embodiment of the present invention on bone metabolism and dynamic strength of bone in rats.

BMC (g)	BMD (g/cm2)	BMS (kg force)
X1 ± x1	Y1 ± y1	Z1 ± z1
X2 ± x2	Y2 ± y2	Z2 ± z2

X3 ± x3	Y3 ± y3	Z3 ± z3
X4 ± x4	Y4 ± y4	Z4 ± z4

The data clearly indicated that the NANOCAL strengthened/did not strenghen the femur bones in rats by enhancing the amount of Calcium retained in bone, and that this results from increased apparent Calcium absorption

NOCAL is found to be thermally stable and deliver large/small/nil amount of Calcium to the proximal intestine, the site for calcium absorption. Thus NANOCAL can/cannot provide physiological activity of Calcium to low-pH, protein-based beverages/tonics/syrups and transparent beverages/tonics/syrups processed by heat treatment. NANOCAL prevented/not prevented protein sedimentation in low pH (3.5-4.2) beverages/tonics/syrups when used in combination with high-methoxyl pectins or pectin alginates.

SALIENT FEATURES OF NANOCAL

- Aids in feather development when molting
- Builds up resistance
- Completely water soluble formulation
- Cures Rickets and Osteomalacia and corrects Hypocalcemia.
- Effectively combats the summer stress.
- Helps considerably in eliminating egg binding in hen Gouldian Finches.
- Helps to prevent cannibalism
- Helps to produce strong and top quality Egg shell.
- Improves feed utilization.
- Improves skeletal growth.
- Increases egg production.
- Reduces Egg breakage
- Reduces thin shelled eggs
- Totally Bio-available

CONTENTS:

• Calcium
• Vitamin D3 (aids calcium absorption from the gut)
Phosphatase Enzyme

Each 1 L provides:
105 g Calcium
800,000 iu Vitamin D3
20,000 IU Phosphatase Enzyme

USAGE

IN CATTLE

- To be used in dairy cows at risk of developing hypocalcaemia (milk fever) – especially high yielding, multi-purpose dairy cows and those with a history of developing the condition.
- NANOCAL also helps in prevention of fractures and osteoporosis and in bone healing following a fracture and prevention of bone loss

- NANOCAL also assists in increasing body weight & in accelerating the growth rate of Calves.

Administer NANOCAL in drinking water.

For Better Nutrition: 30 ml/ adult animal/day

For reduction of milk fever:

- 400 ml/adult animal at the first signs of parturition to provide sustained calcium levels for up to 48 hours.
- If necessary repeat with a second dose 24 hours after administration of the first dose, for high risk cows (Provided that cows can raise their head and are starting to eat and drink).

For supplementation following calcium injection:

- Give 400 ml/adult animal 2-3 hours after calcium injection.
- Repeat with a second dose 24 hours later if necessary.

IN LAYERS

1 L/ Ton feed gives 80g Organic Nano Ca which is equivalent to 2000 g Inorganic Ca Present in about 8.3 Kg DCP or 5555 g of Calcium Carbonate or Limestone grit or Oyster Grit

IN BROILERS

1 L/ Ton feed gives 80g Organic Nano Ca which is equivalent to 2000 g Inorganic Ca Present in about 8.3 Kg DCP or 5555 g of Calcium Carbonate or Limestone grit or Oyster Grit

IN SHRIMP:

On every Ashtami and Navami both days @ 2 ml/Kg Feed

IN HUMANS

In Growing Kids: 2.5 ml twice a day preferably 15 minutes before lunch and dinner

In Pregnant mothers: 5 ml twice a day preferably 15 minutes before lunch and dinner

In people suffering with rheumatoid Arthritis or Osteoporosis: 5 ml twice a day preferably 15 minutes before lunch and dinner

MODE OF ABSORPTION AND UTILIZATION

IN LAYERS

Bio-efficacy of NANOCAL with partial and total replacement of Limestone powder

An experiment was planned with an aim to study the efficacy of, NANOCAL. in 90 commercial layers of equal age. These were randomly divided to five groups (One control and four treatment) comprising three replicates per treatment of 6 birds each.
Group A served as control and was supplemented with basal diet without any additional source of calcium as Limestone powder for duration of four weeks.
Group B served as control and was supplemented with basal diet with regular source of calcium as Limestone powder and Grit for duration of four weeks.
Group C was administered with NANOCAL @ 1400 ml/100birds/day with basal diet without any additional source of calcium as Limestone powder but with regular shell grit, for duration of four weeks.
Group D was administered with NANOCAL @ 700 ml/100birds/day with basal diet with 50% source of calcium as Limestone powder and with regular shell grit, for duration of four weeks.
Group E was administered with NANOCAL @ 350 ml/100birds/day with basal diet with regular source of calcium as Limestone powder and with regular shell grit, for duration of four weeks.

Parameters evaluated were egg laying percentages, egg weight, egg shell weights, and egg shell quality, soft shell eggs, broken eggs all these four weeks.
It can be concluded that supplementation of NANOCAL is highly efficacious/ efficacous/ not efficacious in replacing Calcium or in improving the bioavailability of Ca, thereby improving overall shell quality at a dose rate of xxxx.

Table 1: Effect of supplementing NANOCAL on average egg laying performance

Table 2: Effect of supplementing NANOCAL on average egg weight

Table 3: Effect of supplementing NANOCAL on number of loose shell eggs

Table 4: Effect of supplementing NANOCAL on Egg breakages

Table 5: Effect of supplementing NANOCAL on mean shell weight

Table 6: Effect of supplementing NANOCAL on shell quality like roughness

IN CATTLE

Calcium is released into the blood of the animal for up to 48 hours. NANOCAL provides an immediate surge of calcium.
NANOCAL also releases Vitamin D3 which encourage normal blood levels and aid in the animal's calcium control.
NANOCAL also has an acidifying effect, much like a DCAD diet has, which helps the animal to mobilise her own calcium reserves.

IN BROILERS

Bio-efficacy of NANOCAL with partial and total replacement of Limestone powder

- An experiment was planned with an aim to study the efficacy of, NANOCAL in 90 commercial broilers of equal weight from day 1 to day of culling.
- These were randomly divided to five groups (One control and four treatment) comprising three replicates per treatment of 6 birds each.
- Group A served as control and was supplemented with basal diet without any additional source of calcium as Limestone powder for duration of four weeks.
- Group B served as control and was supplemented with basal diet with regular source of calcium as Limestone powder and Grit for duration of four weeks.

- Group C was administered with NANOCAL @ 1400 ml/100 birds /day with basal diet without any additional source of calcium as Limestone powder but with regular shell grit, for duration of four weeks.
- Group D was administered with NANOCAL @ 700 ml/100 birds /day with basal diet with 50% source of calcium as Limestone powder and with regular shell grit, for duration of four weeks.
- Group E was administered with NANOCAL @ 350 ml/100 birds /day with basal diet with regular source of calcium as Limestone powder and with regular shell grit, for duration of four weeks.

- Parameters evaluated were growths, skeleton weight, all these 42 days.
- It can be concluded that supplementation of NANOCAL is highly efficacious/ efficacous/ not efficacious in replacing Calcium or in improving the bioavailability of Ca, thereby improving overall Skeletal quality at a dose rate of xxxx.

Table 1: Effect of supplementing NANOCAL on average growth
Table 2: Effect of supplementing NANOCAL on average Skeleton weight

IN SHRIMP

Bio-efficacy of NANOCAL on regular moulting, shell quality

- An experiment was planned with an aim to study the efficacy of, NANOCAL in four ponds of equal water column height, equal water surface area, equal stocking desnsity from day 1 to harvest.
- These were randomly divided to two groups (One control and four treatment) comprising two replicates per treatment of one pond each.
- Group A served as control and was supplemented with basal Standard diet and Group B served as Treated and was supplemented with basal diet with NANOCAL @ 2 ml/Kg Feed on Ashtami and Navami both days
- Parameters evaluated were moulting, growth, shell weights, and shell quality, soft shell, Loose Shell, from Day 1 to harvest
- It can be concluded that supplementation of NANOCAL is highly efficacious/ efficacous/ not efficacious in replacing Calcium or in improving the bioavailability of Ca, thereby improving overall shell quality.

Table 1: Effect of supplementing NANOCAL on average moulting bevaviour
Table 2: Effect of supplementing NANOCAL on average shell weight
Table 3: Effect of supplementing NANOCAL on incidence of diseases like Loose Shell Syndrome
Table 4: Effect of supplementing NANOCAL on Final Yield
Table 5: Effect of supplementing NANOCAL on me Survival (Mortality due to other than loose shell, thick shell are ignored)

IN HUMANS:

Requirement of Calcium

The Panel on Food Additives and Nutrient Sources added to Food provides a scientific opinion re-evaluating the safety of calcium carbonate.
The Panel notes that the estimated exposures to calcium from all sources, including the use of calcium carbonate as a food additive, taken together with intakes of calcium from supplements and from food fortification are below the UL of 2500 mg/day for calcium from all sources established by the SCF in 2003. The Panel concludes that trace levels of

adventitious nanoscale material within macroscale calcium carbonate are not of toxicological concern.
(http://www.efsa.europa.eu/sites/default/files/scientific_output/files/main_documents/2318.pdf)

Dental Care:
Nano calcium Mouthwash is a mouthwash made by using nanokalsium and nanokitosan with shrimp shell waste material. The methods used to produce nanokalsium is top down and bottom up and gelasi ionic to produce nanokitosan. The use of nanokalsium in the mouthwash is intended to allow the calcium it needs teeth can be absorbed at 100% so that it can prevent cavities and closes the teeth layer cracked. Based on the data obtained 100% absorption of nanokalsium into gear very quickly about 9 minutes. In addition there are also nanokalsium the use of nanokitosan. Used Nanokitosan function as antibacterial so it can prevent plaque and bad breath. The data shows in 40 seconds, bacterial can be reduce until < 25 * cfu/ml. this research serves to add value of shrimp waste so it can be beneficial to health, particularly the health of human teeth and can be a first step in the application of the principle of zero waste to support Indonesia's economic blue.
(http://macrojournals.com/yahoo_site_admin/assets/docs/12HM11Ay.2135256.pdf)

Mineral Absorption: A Complex Process

A. Absorption

Absorption is the rate at which and the process by which molecules and atoms from the environment enter the interior of the organism via passage across (or around) the lining cells of the gastro-intestinal tract. Absorption can occur all the way from the stomach to the rectum, although the small intestine is the organ most importantly involved in absorption(12).

Absorptive efficiency for many nutrients, notably iron, calcium and zinc, is governed by homeostatic feedback regulation. When the body stores are too low, the intestine up-regulates the avidity with which the intestine takes up the nutrient. When the body reserves are adequate or increased, the gut down-regulates the nutrient's uptake. At a molecular level, this regulation can be expressed by the control of intraluminal binding ligands, cell surface receptors, intracellular carrier proteins, intracellular storage proteins, or the energetics of the transmembrane transport.

B. Bioavailability

Bioavailability refers to the extent to which a nutrient reaches its site of pharmacologic action. For practical purposes, this definition includes the extent to which the nutrient reaches a fluid (e.g. blood) that bathes the site of action and via which the nutrient can readily reach the site of action.

The bioavailability of a mineral depends directly on the extent to which the mineral is absorbed and distributed to the site of action and depends inversely on the extent to which it is metabolized and excreted prior to arriving at the site of action.(1620). It is

necessary to consider the factors that affect absorption in order to determine the relative bioavailability of nutrients in different forms.

Factors Affecting Absorption

Current knowledge on intestinal absorption of nutrients includes multiple factors that can affect absorption. Physiochemical processes that in fluence both the extent and the rate at which minerals cross the mucosal barrier and enter the bloodstream influence absorption. The following table lists factors that specifically enhance absorption of an orally administered nutrient:

Factors That Enhance the Extent and Rate of Absorption of an Orally Administered Nutrient(13)

Lack of complex formation with diet ingredients
Maintenance of chemical stability
at stomach/small intestine pH
Presence of a specific transporter
Small size for transportation with bulk water flow
Lipid solubility-nonionized at local pH
High circulation to the site of absorption, to maintain concentration gradient
Appropriate stomach-emptying rate
Low small intestinal motility

Moreover, the clinical study of absorption is complex and potentially misleading. For example, absorption data derived from giving pulse doses of a miniscule quantity of an element in fasting subjects may not accurately reflect the real life situation in which individuals consume larger amounts in diets full of inhibitory and/or accelerating factors (i.e., phytates(14), fiber(15), ascorbic acid(16), tannins(17) , and other minerals(18).

(a) In contrast, mineral absorption may be understood through basic principles of biochemistry and physical chemistry(19).

(B) Absorption of one mineral can decrease absorption of another. For example, there are absorptive interactions between calcium and magnesium and between iron, zinc, and copper.

These interactions can be used therapeutically; oral zinc supplementation inhibits copper absorption in patients with Wilson's disease, who have excessive tissue copper loads.

Mechanisms of Absorption

The vast bulk of mineral absorption occurs in the small intestine. The best-studied mechanisms of absorption are clearly for calcium and iron, deficiencies of which are significant health problems throughout the world. Intestinal absorption is a key regulatory step in mineral homeostasis.

Mineral homeostasis is the body's physiologic efficiency in absorbing the level of minerals the body requires from those mineral s that are available to it.

Active transport of minerals is an important mechanism of homeostatic control. The minerals in foods are normally present at low concentrations. Active transport

mechanisms have evolved to ensure their absorption. In general, there is an inverse relationship between mineral availability and absorption. Active transport of minerals increases in response to a mineral deficiency or decreases if a mineral is in excess(20).

Thus, the more of an actively transported nutrient is supplied, the less that is absorbed.

For example, feeding a diet low in calcium results in an increase in intestinal calcium absorption. This adaptive mechanism is caused by a PTH-mediated stimulation of 1,25-dihydroxyvitamin D synthesis, the active vitamin D metabolite that increases the rate of transcellular active calcium transport in the intestine(21).

EVIDENCE THAT MINERALS IN COLLOIDAL FORM ARE MORE ABSORBABLE THAN MINERALS IN SOLID FORMS

A. Colloidal Minerals

Liquid preparations of minerals are known as "colloidal minerals." A "colloid" is a substance dispersed in particle size large enough to prevent or delay passage through a semipermeable membrane, but small enough to remain in suspension in a liquid or as(22). Colloids consist of very tiny particles that are usually between 1 nanometer and 1000 nanometers in diameter and that are suspended in a continuous medium, such as a liquid, a solid, or a gaseous substance (23).

The surface area of colloidal particles is very large. Particles may be electrically charged and have stabilizing agents added to prevent precipitation. Most are negatively charged but this varies between different colloid types

. The charges are particularly important for attracting water molecules and cations. The enormous surface area and charged sites on colloids attract and bind many biologically active substances. Another advantage of minerals in colloidal form is that the bound substances are able to withstand enzymatic attack(24).

Surface charges of colloidal minerals may be affected by pH.

The ionic form of minerals is important for mineral absorbability. Colloidal minerals from humic shale extracts predominantly contain sulfates of iron and aluminum and traces of metal hydroxides. Many of the minerals in humic shale extracts are present in ionic forms. This may make it easier for them to cross cellular membranes. Mineral bioavailability is facilitated by the way in which metals cross the intestinal mucosa. A variety of conditions may affect metal transport across the intestinal mucosa. These factors can act at the brush border membrane, within the cytosol, and at the basolateral membrane. Metal ions, probably bound to intracellular ligands, cross the cytosol and are extruded across the basolateral membrane into the portal circulation. Once a metal ion enters the enterocyte, it may be used by the cell for its own metabolic needs or released in the circulation for the metabolic needs of other tissues. Because colloidal minerals do not have to undergo disintegration and dissolution, in contrast with minerals taken in the form of tablets and capsules, under applicable principles of biochemistry they are said to have enhanced-absorption capability, i.e. absorbability(25).

This absorbability is evident in solubility. For example, small-molecular weight ligands, such as amino acids and other organic acids, can increase solubility and facilitate

absorption; In liquid supplements, minerals are already dissolved and therefore are immediately bioavailable.

Furthermore, the liquid supplements usually are acidic; specifically, they are formulated to contain citric acid, ascorbicacid, and other substances that increase the bioavailability of minerals(26) such as carbohydrates (glucose(27), lactose(28)), polyols (sorbitol), amino acids (arginine, lysine), vegetable gums, peptides, and emulsifying agents. Solid vitamin-mineral preparations instead contain inert excipients and are usually buffered so as not to cause gastric discomfort on ingestion, although this may reduce mineral ioavailability(29).

The bioavailability of a mineral in the body is governed by multiple factors,including body stores, hormonal regulation, the chemical form of the nutrient, and concomitant nutrient intake. There are few controlled clinical studies that examine the composition, efficacy, absorbability, or other properties of mineral supplements. There are, however, biochemical reviews of the properties of colloidal minerals that conclude that they are more bioavailable than minerals in other forms(30).

That conclusion is consistent with the applicable principles of biochemistry discussed above.

<u>The Form of a Mineral Affects Absorption</u>
The chemical form of a mineral is an important factor in its absorption. Although few studies have been done comparing absorption differences among mineral supplements, there is biologically plausible evidence that the form in which minerals are ingested affects absorption

For example, in one study of bioavailability, when glucose polymer was perfused on a 30-cm segment of jejunum for 60 minutes, net calcium absorption increased by fourfold (95 vs. 488 mumol/30 cm/h), and net jejunal uptake of magnesium (393 mumol/30 cm/h) was observed. In addition, coadministration of glucose polymer doubled net zinc absorption (13 vs 29 mumol/30 cm/h). These results suggest that glucose polymer may have
potential as an agent to significantly enhance mineral absorption(32).

Biological plausibility is one of the criteria by which scientists evaluate studies.

In contrast, the properties of minerals in solid forms have an impact on their bioavailability. For example, the particle size, surface area and solubility of a substance affect its dissolution rate(33). A number of studies involving solid dosage forms of drugs have demonstrated that the gastrointestinal absorption of these forms is often dissolution rate limited(34). Thus, the dissolution rate is important for measuring the absorbability of a mineral. There are a number of manufacturing variables that may also affect the release characteristics of minerals in a tablet, including tablet compression force, the type and am ount of excipients, and coating materials(35).

Thus, the availability of a mineral in a solid dosage form is a function of its dissolution in the body into a liquid form(36). Once dissolved, the minerals from a solid dosage are only then available for absorption. Thus, the liquid form is in this sense superior.

The bioavailability and absorbability of minerals in foods is similarly complicated as minerals in solid dosage form. The composition of foods and beverages determines the chemical form of a mineral component. In many solid foods, elements are not free, but firmly bound in the food matrix. They can be in covalent association with a protein, as in metalloenzymes, or in electrochemical chelation arrangements to a non-specific binder.

Chelated forms of minerals may interact with other minerals to reduce absorbability(37). For example, metallic iron in food is poorly assimilated because it must be oxidized to Fe (III) and then reduced to Fe (II) while still in the upper small intestine, before it is absorbed. Whatever fraction of the metallic iron becomes oxidized , at any level of the intestinal tract, is likely to be chelated by phytate in cereal and thus be rendered nonabsorbable(38).

Absorption of supplements is improved when they are taken with food, perhaps by slowing gastric emptying and thereby extending the time in which the mineral-containing chyme is in contact with the absorptive surface. However, some foods may actually diminish the bioavailability or absorption of nutrients. For example, several plant constituents form indigestible salts with calcium, thereby decreasing absorption of calc ium. In addition, long-chain fatty acids from ingestion of lipids form insoluble calcium and magnesium salts, which are poorly absorbed.

Protein rich foods also contain phosphorus, which reduces calcium absorption.

Commercial supplements of minerals are available in a wide variety of forms. The time required for absorption affects their absorbability. These include isolated compounds such as inorganic salts, organic salts, amino acid chelates and a yeast form. Bioavailability of trace elements has been studied in long-term animal supplementation (3-4 weeks) studies by measuring the trace element in liver, blood, serum or plasma and comparing the slope of the dose-concentration - plots. A preliminary depletion is usually performed using trace element deficient food. In shortterm experiments, the area under the blood, serum or plasma concentration-time curve is used to compare bioavailabilities after a single dose of the test substance is given. In laboratory studies, examination of the blood concentra tion-time curves for short-term human experiments involving selenium, zinc and copper revealed that the yeas t form was more slowly absorbed, i.e., took longer to reach its maximum concentration, and was thus more bioavailable(39).

This is analogous to the situation of trace elements in foods that have been shown to be more slowly absorbed than the isolated salts of the trace elements. Thus, because minerals in colloidal form are at lower concentration than isolated salts of trace elements, they may be more slowly absorbed. Since low concentration and slower absorption rates enhance absorption, the bioavailablity of colloidal minerals can be expected to be superior to that of minerals in other forms.

Furthermore, because minerals in colloidal form do not have to go through dissolution or

disintegration as solid tablets do, and have particles that are small in size with a large surface area, the colloidal mineral ingested can be expected to be more available for absorption.

Clinical Evidence That Mineral Supplementation in Colloidal or Liquid Form Are More Absorbable Than Minerals in Solid Form

Further evidence that a liquid medium may be a superior vehicle for mineral absorption comes from clinical studies of calcium and magnesium supplementation and their deficiency.

The efficacy of commercially available brands of calcium carbonate tablets on mineral metabolism has been studied(40). Formal investigation of the bioavailability of this product revealed it to have impaired disintegration and dissolution and a lack of clinical efficacy(41).

Solubility of minerals is an important consideration in absorption. Most people absorb calcium better from calcium citrate than from carbonate because calcium citrate is soluble in water. The citrate form is also considered safer and better tolerated.

Therapies to correct calcium deficiency recommend a liquid medium for greater absorbability. Of the therapies approved for the prevention or treatment of postmenopausal osteoporosis in the United States (which include hormone-replacem ent therapy, the selective estrogen-receptor modulator raloxifene, calcitonin, and the oral bisphosphonates alendronate and risedronate), the bisphosphonates are the only medications that have been shown in large randomized trials to reduce the risk of hip fracture. Bisphosphonates have low oral bioavailability and can cause esophageal inflammation or, rarely, ulceration. Thus, when taking alendronate or risedronate, the patient must be upright, have an empty stomach, drink a full glass of water, and remain sitting or standing and eat nothing for 30 minutes(44). This therapy recommends that oral ingestion of a liquid medium, as in colloidal minerals, increases absorbability of minerals.

Calcium Supplementation in Diabetes

The rationale for recommending daily intakes of 1,000-1,500 mg of calcium, especially in older subjects with diabetes(80) is based on the recommendations of the Institute of Medicine Food and Nutrition Board (81) and the National Institutes of Health Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy (82). This recommendation appears to be safe and likely to reduce the incidence of osteoporosis in older individuals with diabetes. Vitamin D is also required for optimal calcium absorption, and a recommended vitamin D intake of 400-600 IU/day has been established for adults (83).

Calcium Supplementation in Colon Cancer

The effect of dietary calcium in reducing the risk for colonic tumors has been suggested in a number of studies. Dietary calcium may protect against abnormal epithelial growth (84).

One proposed mechanism is that Ca^{2+} precipitates bile acids and fatty acids that can otherwise stimulate colon cell proliferation. Intakes of 1800 mg/day for men and 1500/day for women have been recommended to reduce the incidence of colon cancer

(85). Data supporting the hypothesis that dietary vitamin D and/or calcium could prevent cancer came from the observation of a gradient of increasing colon cancer mortality rates with increasing latitude north(86). Such an association could be due to the impact of ultraviolet light on synthesis of vitamin D in the skin and, subsequently, on absorption of dietary calcium. A 19-year prospective study in Chicago demonstrated a 50% reduction in colon cancer risk in men with a daily intake of 3.75 ug vitamin D and 75% reduction in men with a daily intake above 1200 mg calcium(87). A prospective study on women in Iowa further supported the hypothesis that vitamin D and/or calcium protect against colon cancer(88).

Hypertension

The role of calcium in ameliorating hypertension is less well documented than for osteoporosis but has been extensively studied in the last decade. A recent metaanalysis (102) of randomized, controlled intervention trials showed that calcium supplementaion has a small lowering effect on systolic blood pressure (-1.27 mm Hg) but not on diastolic blood pressure. However, a metaanalysis specifically confined to calcium supplementation trials with pregnant women showed a much more dramatic effect of calcium (103) Other groups that may be vulnerable to calcium deficiency -related hypertension include African Americans and the elderly (104).

The inverse association between blood pressure and magnesium nutriture has also been examined by a number of approaches. In epidemiological studies in which hypertension was correlated with dietary food records, higher magnesium intake was associated with decreased diastolic pressure (105). In a 4-year followup of 1248 male health professionals, the same relationship was noted; namely, hypertension was inversely related to the intakes of magnesium and dietary fiber. Only dietary fiber, however, had an independent inverse association (106).

With adult females in a similar type of study, dietary magnesium (and calcium) was independently inversely related to hypertension (107) (http://www.californiaearthminerals.com/media/mineral-absorption-%26-deficiency.pdf)

IN ELDERLY

The deleterious effects of increased gastric pH on calcium absorption from calcium carbonate supplements were observed about 25 years ago. Increasing use of calcium supplements, especially by the elderly, has raised questions about bioavailability from various calcium sources. Decreased gastric acidity is common in the elderly and in patients taking antiulcer medications. A critical review of the available human studies that have investigated the role of gastric acidity in calcium bioavailability suggests that the effects of increased gastric pH are only apparent when poorly soluble calcium salts are taken after an overnight fast. Soluble calcium sources, such as calcium citrate and calcium from milk, are absorbed normally in elderly subjects with atrophic gastritis. Moreover, calcium carbonate, a relatively insoluble calcium salt, is well absorbed in atrophic gastritis patients if administered with a meal. In order to maximize calcium bioavailability, elderly subjects should increase their calcium intakes to at least recommended levels, preferably by increasing milk consumption. When calcium supplements are used to augment dietary

calcium sources, a highly soluble source should be of benefit or calcium carbonate may be taken with a meal.
(http://www.ncbi.nlm.nih.gov/pubmed/1570081)

LEVEL AND METHOD OF USAGE RECOMMENDED

IN CATTLE

Administer NANOCAL in drinking water.

For Better Nutrition:
30 ml/ adult animal/day

For reduction of milk fever:
400 ml/adult animal at the first signs of parturition to provide sustained calcium levels for up to 48 hours.
If necessary repeat with a second dose 24 hours after administration of the first dose, for high risk cows (Provided that cows can raise their head and are starting to eat and drink).

For supplementation following calcium injection:
Give 400 ml/adult animal 2-3 hours after calcium injection. Repeat with a second dose 24 hours later if necessary.

Precautions

NANOCAL must not be given to animals with clinical signs of milk fever as the swallowing reflex may be impaired. Do not give NANOCAL to a down cow (paresis).

IN LAYERS

1 L/ Ton feed gives 80g Organic Nano Ca which is equivalent to 2000 g Inorganic Ca Present in about 8.3 Kg DCP or 5555 g of Calcium Carbonate or Limestone grit or Oyster Grit

IN BROILERS

1 L/ Ton feed gives 80g Organic Nano Ca which is equivalent to 2000 g Inorganic Ca Present in about 8.3 Kg DCP or 5555 g of Calcium Carbonate or Limestone grit or Oyster Grit

IN SHRIMP:

On every Ashtami and Navami both days @ 2 ml/Kg Feed

IN HUMANS

In Growing Kids: 2.5 ml twice a day preferably 15 minutes before lunch and dinner

In Pregnant mothers: 5 ml twice a day preferably 15 minutes before lunch and dinner

In people suffering with rheumatoid Arthritis or Osteoporosis: 5 ml twice a day preferably 15 minutes before lunch and dinner

STORAGE AND HANDLING

Store at room temperature away from direct sunlight.
Keep out of reach and sight of children.

FREQUENTLY ASKED QUESTIONS

1. **How is this NANOCAL better than other calcium in terms of absorption?**
2. **HOW NANOCAL DIFFERS WITH EDTA CHELATED CALCIUM OR PROTEINATED CALCIUM?**
3. **How 100 ml NANOCAL REPLACES 643 g Calcium Carbonate?**
4. **When in Feeds calcium carbonate is removed, alternate fillers are to be incorporated to balance, for example DORB, which is costlier. Then why should I use this NANOCAL?**
5. **Since NANOCAL is in liquid form, how can I mix it in Feed Mash?**
6. **Can I provide NANOCAL in drinking water which is having sanitizers present?**
7. **How NANOCAL is beneficial in terms of better shell quality, better lactation and better weight gain in broilers?**

MoA for INORGANIC CALCIUM

Gravimetric and Titrimetric Methods

Cone, combined filtrates and washings from 917.01 to ca 50 mL; make slightly aik. with NH 4 OH (1 + 1); while still hot, add satd (NH a) 2 C 2 O a soln dropwise as long as any ppt forms, and then enough excess to convert Mg salts also to oxalate.

Heat to bp, let stand ^3 hr, decant clear soln thru filter, pour 15-20 mL hot H 2 on ppt, and again decant clear soln thru filter. Dissolve any ppt remaining on filter by washing with hot HC1 (1+9) into original beaker, wash 6 times with hot H 2 0, and then reppt at bp by adding NH 4 OH and a little satd

AOAC Official Methods of Analysis (1990)

Elemental Analysis
(NH4) 2 C 2 04 soln. Let stand as before, filter thru same filter, and wash with hot H 2 G until Cl-free, Reserve filtrates and washings from both pptns for detn of Mg, as given below.

Complete detection by one of following methods and report as % CaO:

(a) Ignite ppt in crucible, either over S-free blast lamp, or in elec. furnace at 950°, to const wt, cool in desiccator, and weigh as CaO.

(b) Incinerate filter over low flame, mix ignited ppt with finely pulverized and dried mixt. of equal parts of (NH 4) 2 S0 4 and NH 4 Cl, and drive off excess sulfate by carefully heating upper portion of crucible. Complete ignition, cool in desiccator, and weigh as CaS0 4 .

(c) Perforate apex of cone; wash CaC 2 4 ppt into beaker used for pptn; then wash filter with hot H 2 S0 4 (1 +4), and titr. at 85-90° with 0.17V KMn0 4 .

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