

This document provides breast milk nutritional composition information based on ESPGHAN Position paper on Enteral Nutrition for Preterm Infants (2022) and fortifier manufacturer's data.

Collated by BDA Neonatal Dietitians Interest Group August 2023

**Breast milk nutritional composition per 100ml**

[mpg.1.1.2022.11.28.embleton.228.sdc1.pdf](http://mpg.1.1.2022.11.28.embleton.228.sdc1.pdf) (lww.com)

| Nutrient           | Colostrum<br>Lower range<br>of means/<br>medians | Colostrum<br>Upper range<br>of means/<br>medians | Colostrum<br>Mid-point of<br>means/<br>medians | Postnatal age<br>7-28 days<br>Lower range of<br>mean/<br>medians | Postnatal age<br>7-28 days<br>Upper range of<br>mean/<br>medians | Postnatal age<br>7-28 days<br>Midpoint of<br>mean/ medians | Postnatal age<br>> 28 days<br>Lower range of<br>mean/<br>medians | Postnatal age<br>> 28 days<br>Upper range of<br>mean/ medians | Postnatal age<br>> 28 days<br>Midpoint of<br>mean/<br>medians |
|--------------------|--|--|--|--|--|--|--|---|---|
| Energy Kcal        | 50   | 65   | 57.5   | 65   | 75   | 70   | 66   | 68  | 67  |
| Protein g          | 1.8  | 3  | 2.4  | 1.2  | 1.5  | 1.35   | 0.9  | 1.2   | 1.1   |
| Lactose g          | 5.1  | 6  | 5.6  | 5.7  | 6.7  | 6.2  | 5.8  | 6.8   | 6.3   |
| Fat g              | 2.2  | 2.6  | 2.4  | 3  | 3.5  | 3.25   | 3.4  | 3.7   | 3.6   |
| Sodium mmol        | 1.7  | 2.4  | 2.1  | 0.9  | 1.1  | 1  | 0.8  | 0.9   | 0.9   |
| Sodium mg          | 40   | 55   | 47.5   | 20   | 25   | 22.5   | 18   | 20  | 19  |
| Potassium<br>mmol  | 1.7  | 1.7  | 1.7  | 1.2  | 1.4  | 1.3  | 1.2  | 1.4   | 1.3   |
| Potassium mg       | 65   | 65   | 65.0   | 45   | 55   | 50   | 45   | 55  | 50  |
| Chloride mmol      | 2.1  | 3.1  | 2.6  | 1  | 1.8  | 1.4  | 1  | 1.4   | 1.2   |
| Chloride mg        | 75   | 110  | 92.5   | 35   | 65   | 50   | 35   | 50  | 43  |
| Calcium mmol       | 0.6  | 0.75   | 0.7  | 0.6  | 0.75   | 0.675  | 0.6  | 0.75  | 0.68  |
| Calcium mg         | 25   | 30   | 27.5   | 25   | 30   | 27.5   | 25   | 30  | 28  |
| Phosphorus<br>mmol | 0.3  | 0.4  | 0.4  | 0.4  | 0.55   | 0.475  | 0.4  | 0.5   | 0.45  |
| Phosphorus mg      | 10   | 12   | 11.0   | 13   | 17   | 15   | 12   | 16  | 14  |
| Magnesium<br>mmol  | 0.12   | 0.14   | 0.1  | 0.12   | 0.13   | 0.125  | 0.13   | 0.13  | 0.13  |
| Magnesium mg       | 2.8  | 3.4  | 3.1  | 2.8  | 3.2  | 3  | 3.1  | 3.1   | 3.1   |

|                     |       |       |       |       |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Iron mg             | NA    | NA    | NA    | NA    | NA    | NA    | 0.02  | 0.04  | 0.03  |
| Zinc mg             | 0.25  | 0.5   | 0.4   | 0.2   | 0.47  | 0.335 | 0.15  | 0.4   | 0.275 |
| Copper ug           | 50    | 50    | 50.0  | 40    | 45    | 42.5  | 22    | 40    | 31    |
| Selenium ug         | NA    | NA    | NA    | NA    | NA    | NA    | 1.2   | 1.8   | 1.5   |
| Manganese ug        | NA    | NA    | NA    | NA    | NA    | NA    | 0.4   | 0.4   | 0.4   |
| Iodine ug           | NA    | NA    | NA    | NA    | NA    | NA    | 5     | 10    | 7.5   |
| Molybdenum ug       | NA    | NA    | NA    | NA    | NA    | NA    | 0.25  | 0.25  | 0.25  |
| Vit A ug (RE)       | 135   | 135   | 135.0 | 240   | 240   | 240   | 23    | 53    | 38    |
| Vit A IU            | 449.6 | 449.6 | 449.6 | 799.2 | 799.2 | 799.2 | 76.6  | 176.5 | 126.5 |
| Vit D ug            | NA    | NA    | NA    | NA    | NA    | NA    | 0.025 | 0.2   | 0.11  |
| Vit D IU            | NA    | NA    | NA    | NA    | NA    | NA    | 1     | 8     | 4.50  |
| Vit E mg            | 2.4   | 2.4   | 2.4   | 1.2   | 1.2   | 1.2   | 0.32  | 0.49  | 0.41  |
| Vit K ug            | NA    | NA    | NA    | NA    | NA    | NA    | 0.2   | 0.25  | 0.23  |
| Vit C mg            | NA    | NA    | NA    | NA    | NA    | NA    | 3     | 9     | 6     |
| Thiamine ug         | NA    | NA    | NA    | 25    | 25    | 25    | 7     | 21    | 14    |
| Riboflavin ug       | NA    | NA    | NA    | NA    | NA    | NA    | 30    | 60    | 45    |
| Pyridoxine ug       | NA    | NA    | NA    | NA    | NA    | NA    | 13    | 26    | 20    |
| Niacin mg           | NA    | NA    | NA    | NA    | NA    | NA    | 0.18  | 0.27  | 0.23  |
| Pantothenic acid mg | NA    | NA    | NA    | NA    | NA    | NA    | 0.25  | 0.25  | 0.25  |
| Biotin ug           | NA    | NA    | NA    | NA    | NA    | NA    | 0.5   | 0.5   | 0.5   |
| Folate ug           | NA    | NA    | NA    | NA    | NA    | NA    | 3.2   | 8.5   | 5.85  |
| Cobalamin ug        | NA    | NA    | NA    | 0.1   | 0.1   | 0.1   | 0.03  | 0.12  | 0.08  |
| L-Carnitine mg      | NA    | NA    | NA    | NA    | NA    | NA    | 0.6   | 1.1   | 0.9   |
| Choline mg          | 4.2   | 7     | 5.6   | NA    | NA    | NA    | 14    | 17    | 15.5  |

**Breast milk nutritional composition per 100ml (ESPGHAN 2022)**

[mpg\\_1\\_1\\_2022\\_11\\_28\\_embleton\\_228\\_sdc1.pdf \(lww.com\)](#)

| <b>Nutrient</b>     | <b>Colostrum<br/>mid-point of<br/>means/medians</b> | <b>Postnatal age<br/>7-28 days<br/>Midpoint of<br/>mean/medians</b> | <b>Postnatal age &gt;<br/>28 days<br/>Midpoint of<br/>mean/medians</b> |
|---------------------|---|---|--|
| Energy Kcal         | 58  | 70  | 67   |
| Protein g           | 2.4   | 1.35  | 1.1  |
| Lactose g           | 5.6   | 6.2   | 6.3  |
| Fat g               | 2.4   | 3.25  | 3.6  |
| Sodium mmol         | 2.1   | 1   | 0.9  |
| Sodium mg           | 47.5  | 22.5  | 19   |
| Potassium mmol      | 1.7   | 1.3   | 1.3  |
| Potassium mg        | 65  | 50  | 50   |
| Chloride mmol       | 2.6   | 1.4   | 1.2  |
| Chloride mg         | 92.5  | 50  | 43   |
| Calcium mmol        | 0.68  | 0.675   | 0.68   |
| Calcium mg          | 27.5  | 27.5  | 28   |
| Phosphorus mmol     | 0.35  | 0.475   | 0.45   |
| Phosphorus mg       | 11  | 15  | 14   |
| Magnesium mmol      | 0.13  | 0.125   | 0.13   |
| Magnesium mg        | 3.1   | 3   | 3.1  |
| Iron mg             | NA  | NA  | 0.03   |
| Zinc mg             | 0.375   | 0.335   | 0.275  |
| Copper ug           | 50  | 42.5  | 31   |
| Selenium ug         | NA  | NA  | 1.5  |
| Manganese ug        | NA  | NA  | 0.4  |
| Iodine ug           | NA  | NA  | 7.5  |
| Molybdenum ug       | NA  | NA  | 0.25   |
| Vit A ug            | 135   | 240   | 38   |
| Vit A IU            | 449.6   | 799.2   | 126.5  |
| Vit D ug            | NA  | NA  | 0.11   |
| Vit D IU            | NA  | NA  | 4.50   |
| Vit E mg            | 2.4   | 1.2   | 0.41   |
| Vit K ug            | NA  | NA  | 0.23   |
| Vit C mg            | NA  | NA  | 6  |
| Thiamine ug         |   | 25  | 14   |
| Riboflavin ug       | NA  | NA  | 45   |
| Pyridoxine ug       | NA  | NA  | 20   |
| Niacin mg           | NA  | NA  | 0.23   |
| Pantothenic acid mg | NA  | NA  | 0.25   |
| Biotin ug           | NA  | NA  | 0.5  |
| Folate ug           | NA  | NA  | 5.85   |
| Cobalamin ug        | NA  | 0.1   | 0.08   |
| L-Carnitine mg      | NA  | NA  | 0.9  |
| Choline mg          | 5.6   | NA  | 16   |

**Expressed Breast Milk and SMA Gold Prem Fortifier 100ml + 4g**

[mpg 1 1 2022 11 28 embleton 228 sdc1.pdf \(lww.com\)](#)

[SMA80250 SMA PRO GP2 datacard FA2 \(smahcp.co.uk\)](#)

Data based on ESPGHAN 2022 human milk composition and manufacturer's data

| Nutrient        | Postnatal age 7-28 days  |                  |                  | Midpoint + 4g SMA Gold Prem Fortifier | Postnatal age > 28 days  |                  |                  | Midpoint + 4g SMA Gold Prem Fortifier 2 |
|-----------------|--------------------------|------------------|------------------|---------------------------------------|--------------------------|------------------|------------------|---|
|                 | Midpoint of mean/medians | 1g SMA Fortifier | 4g SMA Fortifier |                                       | Midpoint of mean/medians | 1g SMA Fortifier | 4g SMA Fortifier |   |
| Energy Kcal     | 70                       | 4.3              | 17.2             | 87.2                                  | 67                       | 4.3              | 17.2             | 84.2                                    |
| Protein g       | 1.35                     | 0.4              | 1.4              | 2.8                                   | 1.1                      | 0.4              | 1.4              | 2.5                                     |
| Lactose g       | 6.2                      | NA               | NA               | NA                                    | 6.3                      | NA               | NA               | NA                                      |
| Fat g           | 3.25                     | 0.2              | 0.7              | 4.0                                   | 3.6                      | 0.2              | 0.7              | 4.3                                     |
| Sodium mmol     | 1                        | 0.4              | 1.6              | 2.6                                   | 0.9                      | 0.4              | 1.6              | 2.5                                     |
| Sodium mg       | 22.5                     | 9.2              | 36.8             | 59.3                                  | 19                       | 9.2              | 36.8             | 55.8                                    |
| Potassium mmol  | 1.3                      | 0.3              | 1.2              | 2.5                                   | 1.3                      | 0.3              | 1.2              | 2.5                                     |
| Potassium mg    | 50                       | 12.0             | 48.0             | 98.0                                  | 50                       | 12.0             | 48.0             | 98.0                                    |
| Chloride mmol   | 1.4                      | 0.2              | 0.9              | 2.3                                   | 1.2                      | 0.2              | 0.9              | 2.1                                     |
| Chloride mg     | 50                       | 8.0              | 32.0             | 82.0                                  | 43                       | 8.0              | 32.0             | 74.5                                    |
| Calcium mmol    | 0.675                    | 0.5              | 1.9              | 2.6                                   | 0.68                     | 0.5              | 1.9              | 2.6                                     |
| Calcium mg      | 27.5                     | 19.0             | 76.0             | 103.5                                 | 28                       | 19.0             | 76.0             | 103.5                                   |
| Phosphorus mmol | 0.475                    | 0.4              | 1.4              | 1.9                                   | 0.45                     | 0.4              | 1.4              | 1.9                                     |
| Phosphorus mg   | 15                       | 11.0             | 44.0             | 59.0                                  | 14                       | 11.0             | 44.0             | 58.0                                    |
| Magnesium mmol  | 0.125                    | 0.0              | 0.2              | 0.3                                   | 0.13                     | 0.0              | 0.2              | 0.3                                     |
| Magnesium mg    | 3                        | 1.0              | 4.0              | 7.0                                   | 3.1                      | 1.0              | 4.0              | 7.1                                     |
| Iron mg         | NA                       | 0.5              | 1.8              | NA                                    | 0.03                     | 0.5              | 1.8              | 1.8                                     |
| Zinc mg         | 0.335                    | 0.2              | 1.0              | 1.3                                   | 0.275                    | 0.2              | 1.0              | 1.2                                     |
| Copper ug       | 42.5                     | 10.0             | 40.0             | 82.5                                  | 31                       | 10.0             | 40.0             | 71.0                                    |

|                     |       |        |        |        |        |       |        |        |
|---------------------|-------|--------|--------|--------|--------|-------|--------|--------|
| Selenium ug         | NA    | 0.9    | 3.7    | NA     | 1.5    | 0.9   | 3.7    | 5.2    |
| Manganese ug        | NA    | 0.0    | 0.0    | NA     | 0.4    | 0.0   | 0.0    | 0.4    |
| Iodine ug           | NA    | 4.2    | 16.8   | NA     | 7.5    | 4.2   | 16.8   | 24.3   |
| Molybdenum ug       | NA    | <0.2   | NA     | NA     | 0.25   | <0.2  | NA     | NA     |
| Vit A ug            | 240   | 95     | 380    | 620    | 38     | 95.0  | 380.0  | 418.0  |
| Vit A IU            | 799.2 | 316.35 | 1265.4 | 2064.6 | 126.54 | 316.4 | 1265.4 | 1391.9 |
| Vit D ug            | NA    | 1      | 4      | NA     | 0.11   | 1.0   | 4.0    | 4.1    |
| Vit D IU            | NA    | 40     | 160    | NA     | 4.50   | 40.0  | 160.0  | 164.5  |
| Vit E mg            | 1.2   | 1.1    | 4.4    | 5.6    | 0.41   | 1.1   | 4.4    | 4.8    |
| Vit K ug            | NA    | 2.2    | 8.8    | NA     | 0.23   | 2.2   | 8.8    | 9.0    |
| Vit C mg            | NA    | 5      | 20     | NA     | 6      | 5.0   | 20.0   | 26.0   |
| Thiamine ug         | 25    | 40     | 160    | 185    | 14     | 40.0  | 160.0  | 174.0  |
| Riboflavin ug       | NA    | 50     | 200    | NA     | 45     | 50.0  | 200.0  | 245.0  |
| Pyridoxine ug       | NA    | 30     | 120    | NA     | 20     | 30.0  | 120.0  | 139.5  |
| Niacin mg           | NA    | 0.38   | 1.52   | NA     | 0.23   | 0.4   | 1.5    | 1.7    |
| Pantothenic acid mg | NA    | 0.2    | 0.8    | NA     | 0.25   | 0.2   | 0.8    | 1.1    |
| Biotin ug           | NA    | 0.9    | 3.6    | NA     | 0.5    | 0.9   | 3.6    | 4.1    |
| Folate ug           | NA    | 17     | 68     | NA     | 5.85   | 17.0  | 68.0   | 73.9   |
| Cobalamin ug        | 0.1   | 0.1    | 0.2    | 0.3    | 0.08   | 0.1   | 0.2    | 0.3    |
| L-Carnitine mg      | NA    | 0.7    | 2.8    | NA     | 0.9    | 0.7   | 2.8    | 3.7    |
| Choline mg          | NA    | 2.2    | 8.8    | NA     | 16     | 2.2   | 8.8    | 24.3   |

## Expressed Breast Milk and Nutripem Fortifier 100ml + 4g

Data based on ESPGHAN 2022 human milk composition and manufacturer's data

[mpg 1 1 2022 11 28 embleton 228 sdc1.pdf \(lww.com\)](#)

[Cow & Gate nutripem Human milk Fortifier \(nutricia.co.uk\)](#)

| Nutrient        | Postnatal age<br>7-28 days  | 1g<br>Nutripem<br>Fortifier | 4g<br>Nutripem<br>Fortifier | Midpoint + 4g<br>Nutripem<br>Fortifier | Postnatal age<br>> 28 days  | 1g Nutripem<br>Fortifier | 4g Nutripem<br>Fortifier | Midpoint + 4g<br>Nutripem<br>Fortifier |
|-----------------|-----------------------------|-----------------------------|-----------------------------|--|-----------------------------|--------------------------|--------------------------|--|
|                 | Midpoint of<br>mean/medians |                             |                             |  | Midpoint of<br>mean/medians |                          |                          |  |
| Energy Kcal     | 70                          | 4.0                         | 16.0                        | 86.0                                   | 67                          | 4.0                      | 16.0                     | 83.0                                   |
| Protein g       | 1.35                        | 0.3                         | 1.3                         | 2.7                                    | 1.1                         | 0.3                      | 1.3                      | 2.4                                    |
| Lactose g       | 6.2                         | 0.0                         | 0.0                         | 6.2                                    | 6.3                         | 0.0                      | 0.0                      | 6.3                                    |
| Fat g           | 3.25                        | 0.2                         | 0.7                         | 4.0                                    | 3.6                         | 0.2                      | 0.7                      | 4.3                                    |
| Sodium mmol     | 1                           | 0.4                         | 1.4                         | 2.4                                    | 0.9                         | 0.4                      | 1.4                      | 2.3                                    |
| Sodium mg       | 22.5                        | 8.2                         | 33.0                        | 55.5                                   | 19                          | 8.2                      | 33.0                     | 52.0                                   |
| Potassium mmol  | 1.3                         | 0.2                         | 0.6                         | 1.9                                    | 1.3                         | 0.2                      | 0.6                      | 1.9                                    |
| Potassium mg    | 50                          | 5.8                         | 23.0                        | 73.0                                   | 50                          | 5.8                      | 23.0                     | 73.0                                   |
| Chloride mmol   | 1.4                         | 0.2                         | 0.7                         | 2.1                                    | 1.2                         | 0.2                      | 0.7                      | 1.9                                    |
| Chloride mg     | 50                          | 6.3                         | 25.0                        | 75.0                                   | 43                          | 6.3                      | 25.0                     | 67.5                                   |
| Calcium mmol    | 0.675                       | 0.4                         | 1.7                         | 2.4                                    | 0.68                        | 0.4                      | 1.7                      | 2.4                                    |
| Calcium mg      | 27.5                        | 17.3                        | 69.2                        | 96.7                                   | 28                          | 17.3                     | 69.2                     | 96.7                                   |
| Phosphorus mmol | 0.475                       | 0.3                         | 1.2                         | 1.7                                    | 0.45                        | 0.3                      | 1.2                      | 1.7                                    |
| Phosphorus mg   | 15                          | 9.5                         | 38.0                        | 53.0                                   | 14                          | 9.5                      | 38.0                     | 52.0                                   |
| Magnesium mmol  | 0.125                       | 0.1                         | 0.2                         | 0.3                                    | 0.13                        | 0.1                      | 0.2                      | 0.3                                    |
| Magnesium mg    | 3                           | 1.3                         | 5.0                         | 8.0                                    | 3.1                         | 1.3                      | 5.0                      | 8.1                                    |
| Iron mg         | NA                          | 0.0                         | 0.0                         | NA                                     | 0.03                        | 0.0                      | 0.0                      | 0.1                                    |
| Zinc mg         | 0.335                       | 0.2                         | 0.6                         | 0.9                                    | 0.275                       | 0.2                      | 0.6                      | 0.9                                    |
| Copper ug       | 42.5                        | 10.0                        | 40.0                        | 82.5                                   | 31                          | 10.0                     | 40.0                     | 71.0                                   |
| Selenium ug     | NA                          | 0.4                         | 1.8                         | NA                                     | 1.5                         | 0.4                      | 1.8                      | 3.3                                    |

|                     |       |       |       |        |       |       |       |       |
|---------------------|-------|-------|-------|--------|-------|-------|-------|-------|
| Manganese ug        | NA    | 0.0   | 0.0   | NA     | 0.4   | 0.0   | 0.0   | 0.4   |
| Iodine ug           | NA    | 2.8   | 11.2  | NA     | 7.5   | 2.8   | 11.2  | 18.7  |
| Molybdenum ug       | NA    | NA    | NA    | NA     | 0.25  | <0.6  | NA    | NA    |
| Vit A ug            | 240   | 58    | 232.0 | 472    | 38    | 58    | 232.0 | 270.0 |
| Vit A IU            | 799.2 | 193.1 | 772.6 | 1571.8 | 126.5 | 193.1 | 772.6 | 899.1 |
| Vit D ug            | NA    | 1.38  | 5.5   | NA     | 0.11  | 1.38  | 5.5   | 5.6   |
| Vit D IU            | NA    | 55.2  | 220.8 | NA     | 4.50  | 55.2  | 220.8 | 225.3 |
| Vit E mg            | 1.2   | 0.88  | 3.5   | 4.72   | 0.41  | 0.88  | 3.5   | 3.9   |
| Vit K ug            | NA    | 4.09  | 16.4  | NA     | 0.23  | 4.09  | 16.4  | 16.6  |
| Vit C mg            | NA    | 2.97  | 11.9  | NA     | 6     | 2.97  | 11.9  | 17.9  |
| Thiamine ug         | 25    | 30    | 120.0 | 145    | 14    | 30    | 120.0 | 134.0 |
| Riboflavin ug       | NA    | 40    | 160.0 | NA     | 45    | 40    | 160.0 | 205.0 |
| Pyridoxine ug       | NA    | 30    | 120.0 | NA     | 20    | 30    | 120.0 | 139.5 |
| Niacin mg           | NA    | 0.57  | 2.3   | NA     | 0.23  | 0.57  | 2.3   | 2.5   |
| Pantothenic acid mg | NA    | 0.19  | 0.8   | NA     | 0.25  | 0.19  | 0.8   | 1.0   |
| Biotin ug           | NA    | 0.62  | 2.5   | NA     | 0.5   | 0.62  | 2.5   | 3.0   |
| Folate ug           | NA    | 12.5  | 50.0  | NA     | 5.85  | 12.5  | 50.0  | 55.9  |
| Cobalamin ug        | 0.1   | 0.05  | 0.2   | 0.3    | 0.08  | 0.05  | 0.2   | 0.3   |
| L-Carnitine mg      | NA    | NA    | NA    | NA     | 0.9   | NA    | NA    | NA    |
| Choline mg          | NA    | 0.19  | 0.8   | NA     | 16    | 0.19  | 0.8   | 16.3  |