ISA BROWN

# ISA Brown
## Management Guide


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# Introduction

Many years of genetic research have produced the world leading ISA Brown, a very feed efficient brown layer, producing high egg numbers at a lower cost. These highly favourable genetic characteristics can only be fully realised when the bird is provided with, high quality feed, careful appropriate housing and experienced management practice.

The purpose of this Management Guide is to help the producer to gain the best possible results for their investment. This will be achieved by providing conditions in which the ISA Brown can thrive. The information supplied in this publication is based on the analysis of extensive research and field results, produced over time and with many years of experience.

We do recognise that over time, many egg producers have developed their own management programmes, based on specific housing-types, feed, market conditions, and other factors. These individual management techniques will also be the result of experience, and may also work very well for the ISA Brown. Therefore do not hesitate to use your own experience in conjunction with the guidelines in this publication – and of course, do not hesitate to consult your Joice and Hill representative who will be happy to help in any way they can.

ISA BROWN

Excellent feed conversion and high egg numbers

# Warranty disclaimer

The information supplied in this guide is based on many actual flock results obtained under good environmental and management conditions. It is presented as a service to our customers and should be used as a guide only. It does not constitute a guarantee or warranty of performance in any way.

The data contained in this guide should therefore be regarded not as a specification of standards but as performance objectives. All the programmes outlined in this text are supplied as recommendations only and should be modified to match specific circumstances according to the situation.

Our technical staff are of course available to assist you in determining the proper programme for your poultry operation. Please do not hesitate to contact us if you have any queries.

# Performance

## Performance summary

### Rearing Period (0-17 wks)

| | |
|---|---|
| Liveability (%) | 98 |
| Body weight at 5 wks (g) | 360 |
| Body weight at 17 wks (g) | 1425 |
| Feed Consumption per bird 0-17 wks (kg) | 6.0 |

### Laying Period (17-72 wks)

| | |
|---|---|
| Age at 50% production (days) | 146 |
| Peak production (%) | 96.0 |
| Liveability (17-72 wks) (%) | 95.7 |
| Body weight at 72 wks (g) | 1930 |

### Feed consumption as from 140 days of age

| | |
|---|---|
| Per bird per day (g) until 72 wks | 115 |

| | Age in weeks | | | |
|---|---|---|---|---|
| | 72 | 76 | 80 | 90 |
| No eggs per Hen Housed | 318 | 338 | 358 | 404 |
| Average egg weight (g) | 63.7 | 63.9 | 64.0 | 64.2 |
| Egg mass HH (kg) | 20.3 | 21.6 | 22.9 | 26.0 |
| Feed conversion | 2.09 | 2.11 | 2.14 | 2.20 |
| Liveability | 95.7 | 95.3 | 95.0 | 93.9 |

## Performance data rearing period

Do not change until body weight has been achieved.

| Age (weeks) | Age (days) | Type of feed | Feed intake (g/day) | Cumulative feed intake (kg) | Body weight target (g) |
|---|---|---|---|---|---|
| 1 | 0→7 | Super Chick | 11 | 0.1 | 60 |
| 2 | 8→14 | | 17 | 0.2 | 120 |
| 3 | 15→21 | | 25 | 0.4 | 190 |
| 4 | 22→28 | Chick | 32 | 0.6 | 275 |
| 5 | 29→35 | | 37 | 0.9 | 360 |
| 6 | 36→42 | | 42 | 1.1 | 450 |
| 7 | 43→49 | | 46 | 1.5 | 540 |
| 8 | 50→56 | | 50 | 1.8 | 630 |
| 9 | 57→63 | | 54 | 2.2 | 720 |
| 10 | 64→70 | Grower | 58 | 2.6 | 810 |
| 11 | 71→77 | | 61 | 3 | 900 |
| 12 | 78→84 | | 64 | 3.5 | 1000 |
| 13 | 85→91 | | 67 | 3.9 | 1095 |
| 14 | 92→98 | | 70 | 4.4 | 1180 |
| 15 | 99→105 | | 73 | 4.9 | 1265 |
| 16 | 106→112 | | 76 | 5.5 | 1350 |
| 17 | 113→119 | (Pre) Lay | 80 | 6 | 1425 |
| 18 | 120→126 | | 87 | 6.6 | 1475 -1500 |

**Please note the attached targets are a guide and not a guarantee. Heavy vaccination schedules and outdoor rearing are likely to affect actual growth. Also, transfer to the laying house normally reduces body weight by 8 to 10% which then take a few days to recover.**

## Performance data laying period

| Weeks | % HD | Egg size (g) | Egg Mass (g/day) | Feed Intake (colony system) g/bird/ day | Feed Intake (free range) g/bird/ day | Eggs per HH |
|---|---|---|---|---|---|---|
| 17 | 0 | 0.0 | 0.0 | 80 | 80 | |
| 18 | 2 | 44.2 | 0.9 | 84 | 92 | 0 |
| 19 | 15 | 47.2 | 7.1 | 92 | 106 | 1 |
| 20 | 38 | 51.4 | 19.5 | 101 | 111 | 4 |
| 21 | 65 | 53.6 | 34.8 | 108 | 118 | 8 |
| 22 | 87 | 55.2 | 48.0 | 111 | 121 | 14 |
| 23 | 92 | 57.2 | 52.6 | 112 | 122 | 21 |
| 24 | 94 | 59.2 | 55.6 | 113 | 123 | 27 |
| 25 | 95 | 60.2 | 57.2 | 114 | 124 | 34 |
| 26 | 96 | 60.8 | 58.4 | 114 | 124 | 41 |
| 27 | 96 | 61.5 | 59.0 | 114 | 124 | 47 |
| 28 | 96 | 62.1 | 59.6 | 114 | 124 | 54 |
| 29 | 96 | 62.5 | 60.0 | 114 | 124 | 61 |
| 30 | 95 | 62.8 | 59.7 | 114 | 124 | 67 |
| 31 | 95 | 63.1 | 59.9 | 114 | 124 | 74 |
| 32 | 95 | 63.4 | 60.2 | 114 | 124 | 80 |
| 33 | 94 | 63.7 | 59.9 | 115 | 125 | 87 |
| 34 | 94 | 63.9 | 60.1 | 115 | 125 | 93 |
| 35 | 94 | 64.1 | 60.3 | 115 | 125 | 100 |
| 36 | 94 | 64.3 | 60.4 | 115 | 125 | 106 |
| 37 | 93 | 64.4 | 59.9 | 115 | 125 | 113 |
| 38 | 93 | 64.5 | 60.0 | 115 | 125 | 119 |
| 39 | 93 | 64.6 | 60.1 | 115 | 125 | 126 |
| 40 | 92 | 64.7 | 59.5 | 115 | 125 | 132 |
| 41 | 92 | 64.7 | 59.5 | 115 | 125 | 138 |
| 42 | 92 | 64.8 | 59.6 | 115 | 125 | 145 |
| 43 | 92 | 64.8 | 59.6 | 115 | 125 | 151 |
| 44 | 91 | 64.9 | 59.1 | 115 | 125 | 157 |
| 45 | 91 | 64.9 | 59.1 | 115 | 125 | 163 |
| 46 | 91 | 65.0 | 59.2 | 115 | 125 | 170 |
| 47 | 91 | 65.0 | 59.2 | 115 | 125 | 176 |
| 48 | 90 | 65.0 | 58.5 | 115 | 125 | 182 |
| 49 | 90 | 65.1 | 58.6 | 115 | 125 | 188 |
| 50 | 89 | 65.1 | 57.9 | 115 | 125 | 194 |
| 51 | 89 | 65.2 | 58.0 | 115 | 125 | 200 |
| 52 | 88 | 65.2 | 57.4 | 115 | 125 | 206 |
| 53 | 88 | 65.2 | 57.4 | 115 | 125 | 212 |
| 54 | 87 | 65.3 | 56.8 | 115 | 125 | 218 |
| 55 | 87 | 65.3 | 56.8 | 115 | 125 | 224 |

| Weeks | Egg mass per HH (kg) | Feed Intake (cum.) (kg) | Feed conversion (per day.) | Feed conversion (cum.) | Mortality (%) | Body Weight (g) |
|---|---|---|---|---|---|---|
| 17 | | | | | | |
| 18 | 0.0 | | 95.02 | | 0.1 | 1475 |
| 19 | 0.1 | | 12.99 | | 0.2 | 1555 |
| 20 | 0.2 | 0.7 | 5.17 | 3.68 | 0.3 | 1605 |
| 21 | 0.4 | 1.5 | 3.10 | 3.36 | 0.4 | 1660 |
| 22 | 0.8 | 2.2 | 2.31 | 2.91 | 0.5 | 1715 |
| 23 | 1.1 | 3.0 | 2.13 | 2.66 | 0.5 | 1745 |
| 24 | 1.5 | 3.8 | 2.03 | 2.50 | 0.6 | 1765 |
| 25 | 1.9 | 4.6 | 1.99 | 2.40 | 0.7 | 1780 |
| 26 | 2.3 | 5.4 | 1.95 | 2.33 | 0.7 | 1795 |
| 27 | 2.7 | 6.2 | 1.93 | 2.27 | 0.8 | 1805 |
| 28 | 3.1 | 7.0 | 1.91 | 2.22 | 0.9 | 1815 |
| 29 | 3.6 | 7.8 | 1.90 | 2.19 | 1.0 | 1825 |
| 30 | 4.0 | 8.6 | 1.91 | 2.16 | 1.0 | 1835 |
| 31 | 4.4 | 9.4 | 1.90 | 2.14 | 1.1 | 1845 |
| 32 | 4.8 | 10.2 | 1.89 | 2.12 | 1.2 | 1850 |
| 33 | 5.2 | 11.0 | 1.92 | 2.11 | 1.2 | 1858 |
| 34 | 5.6 | 11.8 | 1.91 | 2.09 | 1.3 | 1860 |
| 35 | 6.1 | 12.6 | 1.91 | 2.08 | 1.4 | 1863 |
| 36 | 6.5 | 13.4 | 1.90 | 2.07 | 1.5 | 1870 |
| 37 | 6.9 | 14.2 | 1.92 | 2.07 | 1.5 | 1870 |
| 38 | 7.3 | 15.0 | 1.92 | 2.06 | 1.6 | 1873 |
| 39 | 7.7 | 15.8 | 1.91 | 2.05 | 1.7 | 1873 |
| 40 | 8.1 | 16.6 | 1.93 | 2.05 | 1.8 | 1875 |
| 41 | 8.5 | 17.4 | 1.93 | 2.05 | 1.9 | 1880 |
| 42 | 8.9 | 18.2 | 1.93 | 2.04 | 1.9 | 1883 |
| 43 | 9.3 | 19.1 | 1.93 | 2.04 | 2.0 | 1883 |
| 44 | 9.8 | 19.9 | 1.95 | 2.04 | 2.1 | 1883 |
| 45 | 10.2 | 20.7 | 1.95 | 2.03 | 2.2 | 1885 |
| 46 | 10.6 | 21.5 | 1.94 | 2.03 | 2.3 | 1890 |
| 47 | 11.0 | 22.3 | 1.94 | 2.03 | 2.3 | 1890 |
| 48 | 11.4 | 23.1 | 1.97 | 2.03 | 2.4 | 1890 |
| 49 | 11.8 | 23.9 | 1.96 | 2.03 | 2.5 | 1890 |
| 50 | 12.2 | 24.7 | 1.98 | 2.03 | 2.6 | 1890 |
| 51 | 12.6 | 25.5 | 1.98 | 2.03 | 2.7 | 1895 |
| 52 | 12.9 | 26.3 | 2.00 | 2.03 | 2.7 | 1900 |
| 53 | 13.3 | 27.1 | 2.00 | 2.03 | 2.8 | 1900 |
| 54 | 13.7 | 27.9 | 2.02 | 2.03 | 2.9 | 1900 |
| 55 | 14.1 | 28.7 | 2.02 | 2.04 | 3.0 | 1905 |

## Performance data laying period

| Weeks | % HD | Egg size (g) | Egg Mass (g/day) | Feed Intake (colony system) g/bird/ day | Feed Intake (free range) g/bird/ day | Eggs per HH |
|---|---|---|---|---|---|---|
| 56 | 86 | 65.3 | 56.2 | 115 | 125 | 230 |
| 57 | 86 | 65.4 | 56.2 | 115 | 125 | 236 |
| 58 | 85 | 65.4 | 55.6 | 115 | 125 | 241 |
| 59 | 85 | 65.4 | 55.6 | 115 | 125 | 247 |
| 60 | 84 | 65.5 | 55.0 | 115 | 125 | 253 |
| 61 | 83 | 65.5 | 54.4 | 115 | 125 | 258 |
| 62 | 83 | 65.5 | 54.4 | 115 | 125 | 264 |
| 63 | 82 | 65.6 | 53.8 | 115 | 125 | 270 |
| 64 | 82 | 65.6 | 53.8 | 115 | 125 | 275 |
| 65 | 81 | 65.6 | 53.1 | 115 | 125 | 281 |
| 66 | 81 | 65.7 | 53.2 | 115 | 125 | 286 |
| 67 | 80 | 65.7 | 52.6 | 115 | 125 | 291 |
| 68 | 80 | 65.7 | 52.6 | 116 | 126 | 297 |
| 69 | 79 | 65.7 | 51.9 | 116 | 126 | 302 |
| 70 | 79 | 65.8 | 52.0 | 116 | 126 | 307 |
| 71 | 78 | 65.8 | 51.3 | 116 | 126 | 313 |
| 72 | 78 | 65.8 | 51.3 | 116 | 126 | 318 |
| 73 | 77 | 65.9 | 50.7 | 116 | 126 | 323 |
| 74 | 77 | 65.9 | 50.7 | 116 | 126 | 328 |
| 75 | 76 | 65.9 | 50.1 | 116 | 126 | 333 |
| 76 | 76 | 66.0 | 50.2 | 116 | 126 | 338 |
| 77 | 75 | 66.0 | 49.5 | 116 | 126 | 343 |
| 78 | 74 | 66.0 | 48.8 | 116 | 126 | 348 |
| 79 | 74 | 66.0 | 48.8 | 116 | 126 | 353 |
| 80 | 73 | 66.0 | 48.2 | 116 | 126 | 358 |
| 81 | 73 | 66.1 | 48.3 | 116 | 126 | 363 |
| 82 | 72 | 66.1 | 47.6 | 116 | 126 | 368 |
| 83 | 71 | 66.1 | 46.9 | 116 | 126 | 372 |
| 84 | 71 | 66.1 | 46.9 | 116 | 126 | 377 |
| 85 | 70 | 66.2 | 46.3 | 116 | 126 | 382 |
| 86 | 69 | 66.2 | 45.7 | 116 | 126 | 386 |
| 87 | 69 | 66.2 | 45.7 | 116 | 126 | 391 |
| 88 | 68 | 66.2 | 45.0 | 116 | 126 | 395 |
| 89 | 67 | 66.3 | 44.4 | 116 | 126 | 400 |
| 90 | 67 | 66.3 | 44.4 | 116 | 126 | 404 |

| Weeks | Egg mass per HH (kg) | Feed Intake (cum.) (kg) | Feed conversion (per day.) | Feed conversion (cum.) | Mortality (%) | Body Weight (g) |
|---|---|---|---|---|---|---|
| 56 | 14.5 | 29.5 | 2.05 | 2.04 | 3.1 | 1905 |
| 57 | 14.9 | 30.3 | 2.04 | 2.04 | 3.1 | 1910 |
| 58 | 15.2 | 31.1 | 2.07 | 2.04 | 3.2 | 1910 |
| 59 | 15.6 | 31.9 | 2.07 | 2.04 | 3.3 | 1910 |
| 60 | 16.0 | 32.7 | 2.09 | 2.05 | 3.4 | 1915 |
| 61 | 16.4 | 33.5 | 2.12 | 2.05 | 3.5 | 1915 |
| 62 | 16.7 | 34.3 | 2.12 | 2.05 | 3.5 | 1915 |
| 63 | 17.1 | 35.2 | 2.14 | 2.06 | 3.6 | 1915 |
| 64 | 17.5 | 36.0 | 2.14 | 2.06 | 3.7 | 1915 |
| 65 | 17.8 | 36.8 | 2.16 | 2.06 | 3.8 | 1915 |
| 66 | 18.2 | 37.6 | 2.16 | 2.07 | 3.9 | 1925 |
| 67 | 18.5 | 38.4 | 2.19 | 2.07 | 3.9 | 1925 |
| 68 | 18.9 | 39.2 | 2.21 | 2.08 | 4.0 | 1925 |
| 69 | 19.2 | 40.0 | 2.23 | 2.08 | 4.1 | 1925 |
| 70 | 19.6 | 40.8 | 2.23 | 2.08 | 4.2 | 1925 |
| 71 | 19.9 | 41.6 | 2.26 | 2.09 | 4.3 | 1930 |
| 72 | 20.3 | 42.4 | 2.26 | 2.09 | 4.3 | 1930 |
| 73 | 20.6 | 43.2 | 2.29 | 2.10 | 4.4 | 1930 |
| 74 | 20.9 | 44.1 | 2.29 | 2.10 | 4.5 | 1935 |
| 75 | 21.3 | 44.9 | 2.32 | 2.11 | 4.6 | 1935 |
| 76 | 21.6 | 45.7 | 2.31 | 2.11 | 4.7 | 1940 |
| 77 | 21.9 | 46.5 | 2.34 | 2.12 | 4.7 | 1940 |
| 78 | 22.3 | 47.3 | 2.38 | 2.12 | 4.8 | 1940 |
| 79 | 22.6 | 48.1 | 2.38 | 2.13 | 4.9 | 1940 |
| 80 | 22.9 | 48.9 | 2.41 | 2.14 | 5.0 | 1940 |
| 81 | 23.2 | 49.7 | 2.40 | 2.14 | 5.1 | 1945 |
| 82 | 23.5 | 50.6 | 2.44 | 2.15 | 5.2 | 1950 |
| 83 | 23.9 | 51.4 | 2.47 | 2.15 | 5.3 | 1950 |
| 84 | 24.2 | 52.2 | 2.47 | 2.16 | 5.4 | 1950 |
| 85 | 24.5 | 53.0 | 2.50 | 2.16 | 5.5 | 1950 |
| 86 | 24.8 | 53.8 | 2.54 | 2.17 | 5.6 | 1955 |
| 87 | 25.1 | 54.6 | 2.54 | 2.18 | 5.7 | 1960 |
| 88 | 25.4 | 55.4 | 2.58 | 2.18 | 5.8 | 1960 |
| 89 | 25.7 | 56.2 | 2.61 | 2.19 | 5.9 | 1960 |
| 90 | 26.0 | 57.0 | 2.61 | 2.20 | 6.1 | 1960 |

# Classification of Eggs

## % Eggs per weight class at given weight

| Average egg weight (g) | Percentage of eggs in weight class | | | |
|---|---|---|---|---|
| | XL >73 | L 63-73 | M 53-63 | S <53 |
| 45 | 0 | 0 | 1 | 99 |
| 46 | 0 | 0 | 2 | 98 |
| 47 | 0 | 0 | 4 | 96 |
| 48 | 0 | 0 | 8 | 92 |
| 49 | 0 | 0 | 13 | 87 |
| 50 | 0 | 0 | 20 | 80 |
| 51 | 0 | 0 | 29 | 71 |
| 52 | 0 | 0 | 40 | 60 |
| 53 | 0 | 0 | 50 | 50 |
| 54 | 0 | 1 | 59 | 40 |
| 55 | 0 | 2 | 67 | 31 |
| 56 | 0 | 4 | 73 | 23 |
| 57 | 0 | 7 | 76 | 17 |
| 58 | 0 | 12 | 76 | 12 |
| 59 | 0 | 18 | 74 | 8 |
| 60 | 0 | 25 | 70 | 5 |
| 61 | 0 | 32 | 64 | 4 |
| 62 | 1 | 41 | 56 | 2 |
| 63 | 1 | 49 | 49 | 1 |
| 64 | 3 | 55 | 41 | 1 |
| 65 | 5 | 61 | 33 | 1 |
| 66 | 7 | 67 | 26 | 0 |
| 67 | 11 | 69 | 20 | 0 |
| 68 | 16 | 69 | 15 | 0 |
| 69 | 21 | 67 | 12 | 0 |
| 70 | 28 | 64 | 8 | 0 |

## % Eggs per class at a given age at breed std egg weight

| Weight Class | Weight (g) | Age (weeks) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 30 | 40 | 50 | 60 | 70 | 80 |
| XL | >73 | 1.9% | 5.0% | 5.9% | 7.0% | 7.9% | 8.6% |
| L | 63-73 | 44.9% | 56.5% | 58.3% | 60.0% | 61.1% | 61.7% |
| M | 53-63 | 50.4% | 37.3% | 34.6% | 32.1% | 30.2% | 29.0% |
| S | <53 | 2.8% | 1.3% | 1.1% | 0.9% | 0.8% | 0.8% |

## Cumulative eggs per class to 72 weeks when managed for a certain average egg weight (HH basis)

| Weight Class | Weight (g) | Average Egg Wt (g) to 72 wks | | | | | |
|---|---|---|---|---|---|---|---|
| | | 67g | 66g | 65g | 64g | 63g | 62g |
| XL | >73 | 17.4% | 13.5% | 9.8% | 6.8% | 4.4% | 2.7% |
| L | 63-73 | 56.7% | 56.2% | 54.6% | 51.7% | 47.6% | 42.5% |
| M | 53-63 | 23.5% | 27.3% | 31.5% | 36.4% | 41.6% | 46.7% |
| S | <53 | 2.4% | 3.0% | 4.2% | 5.2% | 6.5% | 8.1% |

# Nutrition

## UK colony recommendations

Do not change until body weight has been achieved.

| Diet | Super Chick | Chick | Grower | Prelay[2] |
|---|---|---|---|---|
| Age (weeks) | 0 to 4 | 5 to 9 | 10 to 16 | 17 to 1st egg |
| Production (%HD) | | | | 1st egg |
| Feed intake (g/b/day)[1] | 32 | 54 | 80 | 101 |
| Body weight at change to next diet (g) | 275 | 720 | 1350 | 1555 |
| Crude Protein (%) | 20 | 18 | 16 | 16.5 |
| ME (kcal/kg) | 2975 | 2875 | 2750 | 2750 |
| ME (MJ/kg) | 12.4 | 12.0 | 11.5 | 11.5 |
| Linoleic Acid | 1.50 | 1.25 | 1.25 | 1.25 |
| Methionine | 0.54 | 0.45 | 0.35 | 0.38 |
| Met + Cys | 0.92 | 0.79 | 0.63 | 0.68 |
| Lysine | 1.20 | 1.00 | 0.78 | 0.80 |
| Arginine | 1.20 | 1.10 | 1.00 | 0.95 |
| Tryptophan | 0.23 | 0.19 | 0.15 | 0.15 |
| Threonine | 0.78 | 0.65 | 0.51 | 0.52 |
| Ca | 1.00 | 0.95 | 0.90 | 2.20 |
| av Phosphorus | 0.50 | 0.48 | 0.45 | 0.42 |
| Sodium (%) | 0.16 | 0.15 | 0.15 | 0.15 |

| Diet | Layer 1[3] | Layer 2[4] | Layer 3 |
|---|---|---|---|
| Age (weeks) | 1st egg to 28 | 28 to 60 | 60+ |
| Production (%HD) | Peak | 84% | <80% |
| Feed intake (g/b/day)[1] | 114 | 115 | 116 |
| Body weight at change to next diet (g) | 1815 | 1890+ | |
| Crude Protein (%) | 17 | 16.25 | 15.25 |
| ME (kcal/kg) | 2800 | 2800 | 2800 |
| ME (MJ/kg) | 11.7 | 11.7 | 11.7 |
| Linoleic Acid | 1.2 | 1 | 0.8 |
| Methionine | 0.41 | 0.38 | 0.34 |
| Met + Cys | 0.68 | 0.67 | 0.63 |
| Lysine | 0.85 | 0.80 | 0.74 |
| Arginine | 1.07 | 1.04 | 0.95 |
| Tryptophan | 0.19 | 0.18 | 0.17 |
| Threonine | 0.56 | 0.53 | 0.50 |
| Ca | 4.00 | 4.10 | 4.30 |
| av Phosphorus | 0.40 | 0.33 | 0.30 |
| Sodium (%) | 0.19 | 0.18 | 0.18 |

### Notes

1. Lower ambient temperatures increase feed consumption through greater energy requirement.
2. When birds start to lay early change to layer ration more quickly or do not use prelay.
3. For colony flocks with good body weight, good feed intake and a smaller egg size requirement change to Layer 2 diet before peak. Ca levels can be adjusted down until the birds reach 40+ weeks.
4. Age of ration change is approximate and should be done in line with body weight, egg size requirements, egg mass output, environmental conditions and other management criteria.
5. Amino acids listed are in the form of total amino acid.
6. Further in-depth guidance on nutritional programmes can be obtained from your breed representative.
7. Linoleic acid has to be adjusted according to the target egg size. Level close to 2.5% could be used to increase the egg size.

## UK free range recommendations

Do not change until body weight has been achieved.

| Diet | Super Chick | Chick | Grower | Prelay[2] |
|---|---|---|---|---|
| Age (weeks) | 0 to 4 | 5 to 9 | 10 to 16 | 17 to 1st egg |
| Production % HD | | | | 1st egg |
| Feed intake (g/b/day)[1] | 32 | 54 | 80 | 101 |
| Body weight at change to next diet (g) | 275 | 720 | 1350 | 1555 |
| Crude Protein (%) | 20.0 | 18.0 | 61 | 16.5 |
| Crude Fibre (%) | 2.0-3.5 | 2.5-4.0 | 4.0-6.0 | 5.0-8.0 |
| ME (kcal/kg) | 2975 | 2875 | 2750 | 2750 |
| ME (MJ/kg) | 12.4 | 12.0 | 11.5 | 11.5 |
| Linoleic Acid | 1.50 | 1.25 | 1.25 | 1.25 |
| Methionine | 0.54 | 0.45 | 0.35 | 0.38 |
| Met + Cys | 0.92 | 0.79 | 0.63 | 0.68 |
| Lysine | 1.20 | 1.00 | 0.78 | 0.80 |
| Arginine | 1.20 | 1.10 | 1.00 | 0.95 |
| Tryptophan | 0.23 | 0.19 | 0.15 | 0.15 |
| Threonine | 0.78 | 0.65 | 0.51 | 0.52 |
| Ca | 1.00 | 0.95 | 0.90 | 2.20 |
| av Phosphorus | 0.50 | 0.48 | 0.45 | 0.42 |
| Sodium (%) | 0.16 | 0.15 | 0.15 | 0.15 |

| Diet | Early Lay | Layer 1[3] | Layer 2 |
|---|---|---|---|
| Age (weeks) | 1st egg to 26 | 26 to 45 | 45+ |
| Egg size at next diet | 58g | 64.7g | <80% |
| Body weight at change to next diet (g) | 1795 | 1885+ | |
| Crude Protein (%) | 17.5 | 17.0 | 16.25 |
| Crude Fibre (%) | 5.0-8.0 | 6.0-8.0 | 6.0-8.0 |
| ME (kcal/kg) | 2800 | 2800 | 2800 |
| ME (MJ/kg) | 11.7 | 11.7 | 11.7 |
| Linoleic Acid | 1.2 | 1 | 0.8 |
| Methionine | 0.43 | 0.41 | 0.38 |
| Met + Cys | 0.75 | 0.68 | 0.67 |
| Lysine | 0.86 | 0.85 | 0.80 |
| Arginine | 1.10 | 1.07 | 1.04 |
| Tryptophan | 0.19 | 0.18 | 0.17 |
| Threonine | 0.56 | 0.53 | 0.50 |
| Ca | 3.70 | 3.70-4.00 | 4.20 |
| av Phosphorus | 0.40 | 0.33 | 0.30 |
| Sodium (%) | 0.19 | 0.19 | 0.18 |

### Notes

1. Lower ambient temperatures increase feed consumption through greater energy requirement.
2. When birds start to lay early change to layer ration more quickly or do not use prelay.
3. Age of ration change is approximate and should be done in line with body weight, egg size requirements, egg mass output, environmental conditions and other management criteria.
4. Amino acids listed are in the form of total amino acid.
5. It is important to look at floor system flock energy requirements particularly in extreme weather and in cases of poor feathering.
6. Further in-depth guidance on nutritional programmes can be obtained from your breed representative.
7. Linoleic acid has to be adjusted according to the target egg size. Level close to 2.5% could be used to increase the egg size.

## Suggested premix composition for commercial layers

| For Commercial Layers | | Rearing Period | | Laying Period |
|---|---|---|---|---|
| | | 0 6 10 Weeks | 10 Wks – 2% Lay | |
| **Added trace elements mg per kg of diet** | | | | |
| Manganese (Mn) | ppm | 60 | 60 | 70 |
| Zinc (Zn) | ppm | 60 | 60 | 60 |
| Iron (Fe) | ppm | 60 | 60 | 60 |
| Iodine (I) | ppm | 1 | 1 | 1 |
| Copper (Cu) | ppm | 8 | 6 | 8 |
| Selenium (Se) | ppm | 0.25 | 0.25 | 0.25 |
| Cobalt (Co) | ppm | 0.25 | 0.15 | 0.15 |
| **Added vitamins per kg of diet in IU or mg** | | | | |
| Vitamin A | IU | 13.000 | 10.000 | 10.000 |
| Vitamin D3 | IU | 3.000 | 2.000 | 2.500 |
| Vitamin E | mg | 25 | 25 | 20 |
| Vitamin K3 | mg | 3 | 3 | 3 |
| Vitamin B1 (Thiamine) | mg | 2 | 2 | 2 |
| Vitamin B2 (Riboflavin) | mg | 5 | 5 | 5 |
| Vitamin B6 (Pyridoxine) | mg | 5 | 5 | 5 |
| Vitamin B12 | mg | 0.02 | 0.01 | 0.015 |
| Nicotinic Acid (Niacin) | mg | 60 | 40 | 40 |
| Pantothenic Acid | mg | 15 | 12 | 12 |
| Folic Acid | mg | 0.75 | 0.75 | 0.75 |
| Biotin | mg | 0.2 | 0.1 | 0.05 |
| Vitamin C in hot climate or during summer time | mg | | | 100 |
| **Total Choline requirement per kg of diet (raw materials included) mg** | | | | |
| Choline | mg/kg | 1600 | 1400 | 1400 |
| Choline | mg/day | - | - | 160 |
| Add antioxidant | | | | |

### Mixing

Trace elements and vitamins should be correctly mixed before being added to the raw materials. Premixes have to be mixed at a minimum level of 3kg per tonne. Improper mixing or handling can be checked by dosing Manganese as a tracer.

### Toxicity of some minerals

Maximum admissible levels for different minerals could be estimated as followed:

| | |
|---|---|
| Manganese | 1000 ppm |
| Zinc | 2000 ppm |
| Iron | 500 ppm |
| Iodine | 300-500 ppm |
| Copper | 300-500 ppm |
| Selenium | 10 ppm |
| Potassium | 2000 ppm |
| Magnesium | 5000 ppm |
| Sodium | 5000 ppm |
| Chlorine | 5000 ppm |
| Vanadium | 10 ppm due to contamination from rock phosphates |

# Management

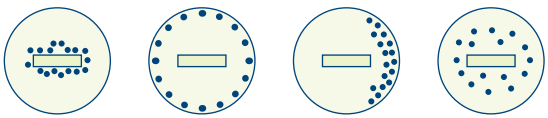
## Rearing period

### Brooding temperature

| Age Chick level temperature | |
|---|---|
| Age | Chick level temperature |
| first 5 hours | 32°C |
| 5 hrs – 7 days | 32°C to 30°C |
| 2nd week | 30°C to 28°C |
| 3rd week | 28°C to 26°C |
| 4th week | 26°C to 24°C |
| 5th week | 24°C to 22°C |
| 6th week | 22°C to 20°C |

### Key Points

- Do not reduce air temperature by more than 0.5°C per day.
- The rearing environment should be clean and well disinfected. All material from the previous flock should have been removed. We recommend dusting down the unit before taking out of the litter. The wet cleaning of the house and equipment is advisable and this should be allowed to dry before disinfection. Vermin and problem insects such as mite should be controlled.
- Restrict access of personnel and equipment to the rearing house, especially if they have been in recent contact with adult or older birds. This is especially important in the first few weeks of rear. Good bio-security and hygiene should be maintained at all times.
- Raise house temperature at least 24 hours before chick arrival to 29-31°C to ensure that the equipment and floor are warm.
- Watch the behaviour of the chicks and adapt temperature accordingly to that behaviour.




- Supplementary drinkers are recommended for the first few days. The water should be in the drinkers before the chicks arrive to allow it to reach ambient temperature.
- Ensure all water cleaning producers are thoroughly flushed before placement.

### Beak Treatment

The removal of the hooked part of the upper beak is recommended to reduce the risk of cannibalism. This is permitted under animal welfare legislation, to be carried out at the hatchery using IR technology.

### Relative Humidity

A relative humidity of 60-70% is advised.

### Optimum light intensity

| Age | Lux | Watts/m² |
|---|---|---|
| 0 – 7 days | Min. 20 | Min. 4 |
| 7 days – 4 weeks | 10 | 3.2 |
| 4 –17 weeks | 6 | 2 |
| 17 – 26 weeks | 10 | 3.2 |
| beyond 26 weeks | 6 | 2 |

## Lighting programmes and other management techniques

The lighting programme should be suitable for the production goals, system of production, condition of the flock and time of housing (see suggested light programmes page 28). In general the step down should be slow enough to allow good early body weight development.

The timing and amount of the first step up in day length is critical and should be judged on a flock by flock basis, taking account of the flock's health, body weight development, uniformity, age of movement to laying house, season, system of production and production goals. The closer to 12 weeks and the bigger the day length increase, the greater the effect on maturity. Egg size is influenced by the weight at first egg but can also be effectively controlled by nutrition.

Flocks pushed into lay too early risk later production problems. We would recommend producers not to give a light increase before the following criteria are met:

- 1260g body weight
- 80% uniformity

Fundamental to all poultry (including layers) is that we should never change the time of "lights off" in production. The practical implication is that you should decide when you fill a production house when the lights come off. Once determined, you do not change it anymore.

## Seasonal variation

In a controlled environment house (lightproof) the seasonal fluctuations of day length still interfere with the flock performance.

Therefore, for a windowless house, it is also necessary to adapt the standard lighting programme to the hatch season. Flocks hatched in the 'off season', with reduced day length should be light stimulated earlier than those reared in the increasing day length season.

**In houses where light control is not possible,** the minimum day length should not be less than the natural day length between 8 and 18 weeks of age.

## Body weight development

- Good early growth is critical and by 5 weeks body weight should be as high as possible since frame and internal organ development take place in this period. The birds should be monitored for weekly growth from delivery and any negative variation to standard should be looked into. In particular the first few days of life are crucial to obtaining good development and later uniformity. Brooding temperatures, provision of ample water and fresh feed, good bio-security are all important. If necessary the stepping down of the day length should be slowed.
- 5 to 14 weeks. When the body weight is on or above the standard then try to obtain the same growth per week as the given standard. When body weight on 5 weeks of age is lower than our standard it is important to achieve standard body weight as quickly as possible.
- From 14 weeks onwards try to achieve a body weight as high as possible.

## Uniformity

- Uniformity of body weight (+/–10%) should be at least 75% at 10 weeks of age and at least 80% from 15 weeks onwards.

## Feeding

- The best possible diets should be fed in the first few weeks of life – financial input here will be rewarded with better production later in life.
- Crumbs/pelleted feed can be useful in maximising early body weight. After 6 weeks, mash is the favourable feed presentation.
- Clean water should be available at all times and care should be taken that there is provision for demand at peak times. Thorough cleaning after depletion and continuous dosing/periodic cleansing with a suitable product to maintain water standard are good practice to reduce bacterial challenge on the birds. After clean out any chemicals used to clean the water system must be thoroughly flushed through. Care should also be taken when vaccinating and no chemicals or residue should be present at this time.
- The habit of cleaning up feed in the tracks or pans should be started in the latter half of the rear (by week seven).

## Vaccination

This too is crucial to a successful flock. Consult with your veterinary surgeon as to what vaccinations will be necessary to protect your flock in rear and lay. Apply the vaccine with care to ensure that all birds receive a dose of active vaccine. Managers and staff should be given professional training. The use of proportioners and water buffers is advised. Monitor the blood titre levels of important vaccines such as IB. If the priming levels are poor, birds should be re-vaccinated at least 14 days prior to receiving inactivated (injected) vaccines. It is a good idea to store sera taken 3 weeks after housing so base line titres can be obtained in case of a suspected challenge of field virus.

# Laying period

## Start of lay key results

In general, good performance will be obtained when the following key results are achieved.

| Body Weight (g) | Approx age (weeks) | | Day length (hrs) | Feed Intake (g/bird/day) (colony) |
|---|---|---|---|---|
| 1265-1425 | 15-17 | start light stimulation pre-lay diet | 11 | 80 |
| 1475 | 18 | start layer diet | 12 | 84 |
| 1555 | 19 | first egg | 13 | 92 |
| 1605 | 20 | ±35% production | 14 | 101 |
| 1660 | 21 | 65% production | 14-16 | 108 |
| 1715 | 22 | 85% production | 14-16 | 111 |
| 1780 | 26 | Peak production | 14-16 | 114 |

- If the projected production start is to be brought forward by stimulating closer to 1300g body weight, increases in both day length and feed amount should also be correspondingly brought forward accordingly to obtain the desired body weight, at the start of production.
- We advise to increase the day length until 16 hrs per day for floor system and 14-16 hours for intensive.

## Body weight development

- After 16 weeks body weight development is critical for a good start to production; avoid unnecessary stress during this time; house the birds before 17 weeks.
- Give a pre-lay diet but ensure the birds on the layer feed before production starts.
- Changes in diet are dependent on the production level, body weight and feed intake and not on age.

## Feeding

- Deviation from body weights and feed amounts given on page 7 may occur due to season, housing system, feed composition, transport and health status of the flock.
- The feeding programme should be synchronised with the lighting programme to bring the flock into production in a good condition and at the desired age.
- From 16 to 21 weeks it is critical that the feed intake increases, in order to let the birds grow to achieve target body weight.
- It is good practice to empty the feeders during the middle part of the day. This encourages good feeding behaviour, allowing a good crop of feed to be consumed before the dark period and ensures the whole ration is consumed. Care should be taken to avoid restriction – the birds should be working for the last bit of feed in the pan, track or trough rather but not to the point it is bare. Uniform feed distribution is important in this respect and it may be necessary to feed twice in quick succession after the feeding gap.
- Ideally changes in diet, including raw materials used, should not be made between peak and 40 weeks. Ensure the flock is on a suitable diet to take them through to post 40 weeks by the time peak is reached.
- After 6 weeks, mash is the favoured feed presentation rather than crumbs or pellets. It also allows more granular forms of calcium which help provide this nutrient at the right time for shell formation.
- Insoluble fibre such as lignin and cellulose are an important part of the hen's diet and are thought to help reduce the incidence of feather pecking. Materials such as sunflower meal may be used to boost levels.
- Clean water should be available at all times and care should be taken that there is provision for demand at peak times. Thorough cleaning after depletion and continuous dosing/periodic cleansing with a suitable product to maintain water standard are good practice to reduce bacterial challenge on the birds.

## Temperature

Although the laying hen can tolerate a wide range of temperature variation and still perform well, excessive fluctuations in environmental temperatures are detrimental to productivity and efficiency. At the beginning of production period the ideal house temperature is between 21-24°C, slowly increasing as the bird ages.

Temperatures below 12°C and above 28°C will negatively affect performance. Lower house temperatures will increase feed consumption and lead to larger egg size. Higher house temperatures, can slow egg size increase and limit feed consumption early in lay. Higher house temperature can be utilised later in lay to control feed consumption and prevent excessive egg size.

## Air quality

It is necessary to maintain good air quality – minimum ventilation rates should be maintained at all times. All areas of the house should have some level of air movement. A minimum ventilation rate of 1.5$m^3$/hour/kg of body weight should be maintained.

## Light Intensity

A uniform distribution of light is recommended.

Floor system flocks may be reduced to 6 lux once peak lay has been reached.

## Collecting floor eggs

It is important to start collecting floor eggs as soon as the lights in the house are switched on. This reduces the number of floor eggs and trains the birds to lay in the nest boxes.

To reduce the number of floor eggs it is also crucial to have a good nest box.

- The nest box should be free of draught.
- Entrance of the nest should be clearly visible to the birds.
- Nest boxes should be easily accessible and preferable be located in the centre of the house.
- To prevent floor eggs a water line should be located in front of the nest boxes.
- Open the nest boxes with nest box lights switched on 7-10 days before start of production. Do not disturb the birds during the main laying period.
- When floor eggs are found just after lights go on, open the nest boxes earlier, or place small light bulbs in the centre of the house and light these light bulbs ½ hour until 1 hour before normal lights go on.
- Collect floor eggs frequently, and several times per day.
- Do not disturb the birds during laying. Minimise feeding times from between 3-6 hours after lights go on.
- Diminish the number of dark spots in the house, because dark spots can increase the number of floor eggs.
- Place obstacles in places where birds continue to lay floor eggs.

## General Management

Good bio-security practices should be maintained at all times. Visitors should be restricted and those that are necessary should be provided with clean boots and overalls. Hand washing should be enforced before and after contact with the livestock. Feed spills should be cleaned up promptly and the site should generally remain tidy and free from vermin refuges. Houses should be wild bird proof and pets kept from contact with the poultry.

Floor system birds should be regularly wormed. Red mite, flies and other vermin should be monitored and populations kept under control.

Management of the ranging area for free range and organic flocks is a wide and complex subject but it is crucial to success. In particular the area of close proximity to the house should be well drained and its use rotated. Between crops it should be ideally turned and re-seeded. Fencing should be maintained in order to prevent losses to predators.

# ISA Brown Lighting Programme

## System: Floor

| Age (weeks) | Age (days) | Day length at start of week (hours) | Light Intensity | Temp °C |
|---|---|---|---|---|
| 0 | 0 | 23 | 20 | 32 |
| 1 | 7 | 20 | 10 | 30 |
| 2 | 14 | 18 | | 28 |
| 3 | 21 | 16 | | 26 |
| 4 | 28 | 14 | 6 | 24 |
| 5 | 35 | 12 | | 22 |
| 6 | 42 | 10 | | 21 |
| 7 | 49 | 10 | | 21 |
| 8 | 56 | 10 | | 21 |
| 9 | 63 | 10 | | 21 |
| 10 | 70 | 10 | | 21 |
| 11 | 77 | 10 | | 21 |
| 12 | 84 | 10 | | 21 |
| 13 | 91 | 10 | | 21 |
| 14 | 98 | 10 | | 21 |
| 15 | 105 | 10 | | 21 |
| 16 | 112 | 10 | 10 | 21 |
| 17 | 119 | 11 | | 21 |
| 18 | 126 | 12 | | 21 |
| 19 | 133 | 13 | | 21 |
| 20 | 140 | 14 | | 21 |
| 21 | 147 | 15 | | 21 |
| 22 | 154 | 16 | | 21 |
| 23 | 161 | 16 | | 21 |
| 24 | 168 | 16 | | 21 |
| 25 | 175 | 16 | 6 | 21 |

**NB:** This is a sample programme only and lighting programme should be matched to time of year, body weight and egg size requirements.

Lighting programmes are only effective in light controlled environments.

Please consult your local breed representative for further advice.

Only increase daylength (stimulate on body weight) based on the following **Egg Size (ES)** requirements:

**Small ES: 1300g – 1350g**
**Standard ES: 1400g – 1450g**
**Large ES: 1500g – 1550g**

Increase and continue when body weight has been achieved.

## System: Intensive

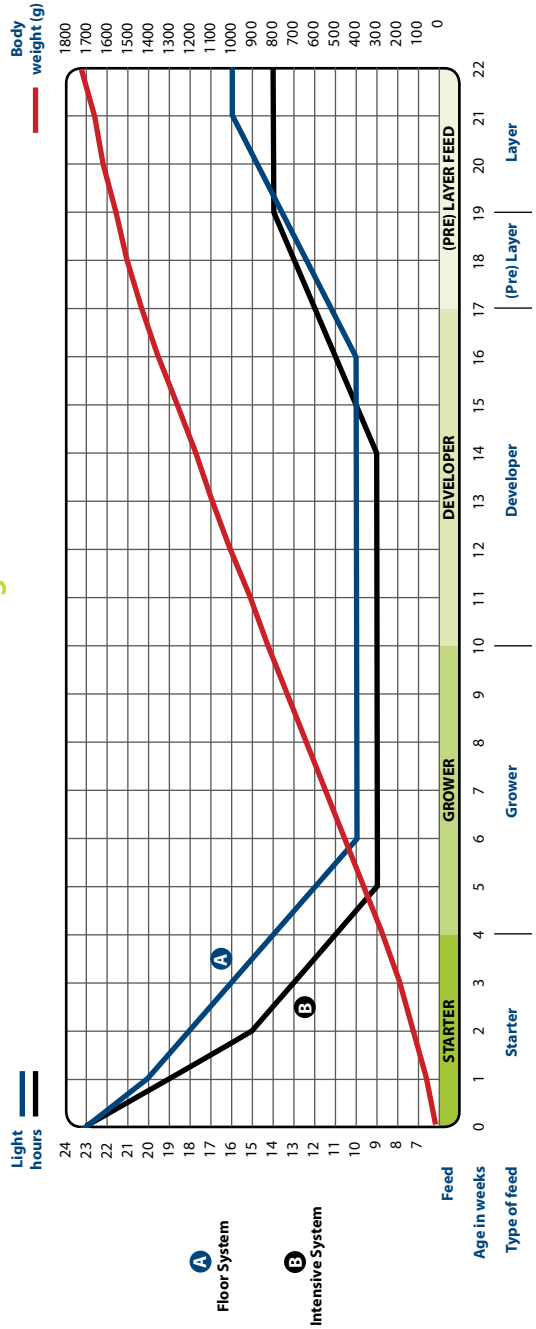
| Age (weeks) | Age (days) | Day length at start of week (hours) | Stocking Density (sq cm per bird) | Temp °C |
|---|---|---|---|---|
| 0 | 0 | 23 | 125 | 32 |
| 1 | 7 | 19 | | 30 |
| 2 | 14 | 15 | | 28 |
| 3 | 21 | 13 | 220 | 26 |
| 4 | 28 | 11 | | 24 |
| 5 | 35 | 9 | | 22 |
| 6 | 42 | 9 | | 21 |
| 7 | 49 | 9 | | 21 |
| 8 | 56 | 9 | | 21 |
| 9 | 63 | 9 | | 21 |
| 10 | 70 | 9 | 350 | 21 |
| 11 | 77 | 9 | | 21 |
| 12 | 84 | 9 | | 21 |
| 13 | 91 | 9 | | 21 |
| 14 | 98 | 9 | | 21 |
| 15 | 105 | 10 | | 21 |
| 16 | 112 | 11 | 750 | 21 |
| 17 | 119 | 12 | | 21 |
| 18 | 126 | 13 | | 21 |
| 19 | 133 | 14 | | 21 |
| 20 | 140 | 14 | | 21 |
| 21 | 147 | 14 | | 21 |
| 22 | 154 | 14 | | 21 |
| 23 | 161 | 14 | | 21 |
| 24 | 168 | 14 | | 21 |
| 25 | 175 | 14 | | 21 |

**NB:** Light and feed schedule should be linked to body weight, uniformity and egg size requirements.

Uneven or poor body weight flocks should be stimulated a little later and possibly fed a higher density diet for the first 4 weeks after housing.

Lighting programmes are only effective in light controlled environments.

# Rearing Chart




# Conversion Table

| | | | |
|---|---|---|---|
| 1 mtr | = 3.282 feet | 1 foot | = 0.305 mtr |
| 1 sq mtr | = 10.76 sq feet | 1 sq foot | = 0.093 sq mtr |
| 1 cub mtr | = 35.316 cub feet | 1 cub foot | = 0.028317 cub mtr |
| 1 cm | = 0.394 inches | 1 inch | = 2.54 cm |
| 1 sq cm | = 0.155 sq inch | 1 sq inch | = 6.45 sq cm |
| 1 kg | = 2.205 lbs | 1 lb | = 0.454 kg |
| 1 g | = 0.035 ozs | 1 oz | = 28.35 g |
| 1 ltr | = 0.22 gallons | 1 gallon | = 4.54 ltr |

| | |
|---|---|
| 1 bird per square metre | = 10.76 square feet per bird |
| 3 bird per square metre | = 3.59 square feet per bird |
| 4 bird per square metre | = 2.69 square feet per bird |
| 5 bird per square metre | = 2.15 square feet per bird |
| 7 bird per square metre | = 1.54 square feet per bird |
| 11 bird per square metre | = 0.98 square feet per bird |
| 13 bird per square metre | = 0.83 square feet per bird |

| | |
|---|---|
| 1 cubic metre/kilogram/hour | = 16.016 cubic feet/lb/hour |
| 1 cubic foot/lb/hour | = 0.0624 cubic meter/kilogram/hour |

| | | | | | |
|---|---|---|---|---|---|
| F | = 9/5C + 32 | C | = 5/9 (F-32) | | |
| 45 C | = 113 F | 22 C | = 72 F | 10 C | = 50 F |
| 40 C | = 104 F | 20 C | = 68 F | 8 C | = 46 F |
| 35 C | = 95 F | 18 C | = 64 F | 6 C | = 43 F |
| 30 C | = 86 F | 16 C | = 61 F | 4 C | = 39 F |
| 27 C | = 81 F | 14 C | = 57 F | 2 C | = 36 F |
| 24 C | = 75F | 12 C | = 54 F | 0 C | =32 F |

1 Joule per second = 1 Watt = Volt x Ampere

| | |
|---|---|
| 1KJ | = 1000 J |
| 1 MJ | = 1000 KJ |
| 1 MJ | = 239 Kcal |
| 1 Kcal | = 4.2 KJ |
| 1 KWh | = 3.6 MJ – 860 Kcal |
| 1 BTU | = 1055 J |

# Notes

# Notes

# Notes