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## DEPARTMENT OF AGRICULTURE

## OFFICE OF THE DAIRY COMMISSIONER

Ottawa, September 5, 1919.

## Yield and Relative Value of Some Dairy Products

## TABLE I

Showing approximate yield of different products from 100 pounds of milk containing 3.5 per cent of fat and 12.5 per cent of total milk solids.

| Product. | Pounds. | - | Pounds. |
| :---: | :---: | :---: | :---: |
| Cheese. | $9 \cdot 30$ | and Whey | 90 |
| Butter. | $4 \cdot 20$ | and Skim milk | 90 |
| Evaporated Milk (Unsweetened) | $39 \cdot 68$ * |  |  |
| Condensed Milk (Sweetened).. | $39 \cdot 68{ }^{*}$ |  |  |
| Milk Powder... | $12 \cdot 75$ |  |  |
| Cream Powder. | $4 \cdot 77$ | and Skim milk Powder | $7 \cdot 62$ |
| Skim milk Powder....... | $8 \cdot 23$ | and Butter | $4 \cdot 20$ |

*The yield indicated is obtained from condensing 100 pounds of milk to which a certain quantity of cane sugar (usually 17 to 19 pounds) has been added before the condensing process is started.

## TABLE II

Showing approximate yield of Canadian cheddar cheese and butter from 100 pounds of milk containing different percentages of fat.

| Per Cent of Fat <br> in Milk. | Pounds of Cheese <br> from 100 Pounds of Milk. | Pounds of Butter <br> from 100 Pounds of Milk. |
| :---: | :---: | :---: |
| $3 \cdot 0$ | $8 \cdot 52$ | $3 \cdot 60$ |
| $3 \cdot 1$ | $8 \cdot 73$ | $3 \cdot 72$ |
| $3 \cdot 2$ | $9 \cdot 02$ | $3 \cdot 84$ |
| $3 \cdot 3$ | $9 \cdot 14$ | $3 \cdot 96$ |
| $\cdot 3.4$ | $9 \cdot 21$ | $4 \cdot 08$ |
| $3 \cdot 5$ | $9 \cdot 30$ | $4 \cdot 20$ |
| $3 \cdot 6$ | $9 \cdot 39$ | $4 \cdot 32$ |
| $3 \cdot 7$ | $9 \cdot 72$ | $4 \cdot 44$ |
| $3 \cdot 8$ | $9 \cdot 90$ | $4 \cdot 56$ |
| $3 \cdot 9$ | $10 \cdot 08$ | $4 \cdot 68$ |
| $4 \cdot 0$ |  | $4 \cdot 80$ |

## TABLE III

Showing the prices which must be obtained for cheese and butter to give the same net return for one hundred pounds of milk testing $3 \cdot 5$ per cent of fat, or for one pound of fat or for one pound of "fat and casein" (fat +2 ).

| (1) <br> Price of Cheese. | (2) <br> Net Return for 100 <br> Pounds Milk. | $\stackrel{(3)}{\text { Equivalent }}$ of of Butter. | (4) <br> Net Return for 1 <br> Pound Fat. | (5) <br> Net Return for 1 <br> Pound "Fat and <br> Casein". (Fat + 2). |
| :---: | :---: | :---: | :---: | :---: |
| cts. | \$ | cts. | cts. | cts. |
| $12 \cdot 00$ | 0.91 | $25 \cdot 75$ | 26.00 | $16 \cdot 54$ |
| $12 \cdot 25$ | 0.93 | $26 \cdot 25$ | $26 \cdot 57$ | 16.90 |
| $12 \cdot 50$ | 0.95 | $26 \cdot 75$ | $27 \cdot 14$ | $17 \cdot 27$ |
| $12 \cdot 75$ | 0.98 | $27 \cdot 25$ | 28.00 | $17 \cdot 81$ |
| $13 \cdot 00$ | 1.00 | $27 \cdot 75$ | $28 \cdot 57$ | $18 \cdot 18$ |


| $\begin{gathered} \text { (1) } \\ \text { Price } \\ \text { of } \\ \text { Cheese. } \end{gathered}$ | $\begin{aligned} & (2) \\ & \text { Net Return } \\ & \text { for } 100 \end{aligned}$ | $\begin{gathered} (3) \\ \text { Equivalent Price } \\ \text { of } \\ \text { Butter. } \end{gathered}$ | (4) <br> Net Return for 1 Pound Fat. | Net (5) urn for 1 Pound "Fat and Casein". (Fat + 2) |
| :---: | :---: | :---: | :---: | :---: |
| cts. | \$ | cts. | cts. | cts. |
| 13.25 | 1.02 | 28.25 | 29.14 | 18.54 |
| 13.50 | 1.05 | 29.00 | 30.00 | 19.09 |
| 13.75 | 1.07 | 29.50 | 30.57 | 19.45 |
| 14.00 | 1.09 | 30.00 | $31 \cdot 14$ | 19.81 |
| 14.25 | 1-12 | 30.75 | 32.00 | 20.36 |
| 14.50 | 1-14 | 31.25 | 32.57 | 20.72 |
| 14.75 | $1 \cdot 16$ | 31.75 | 33.14 | 21.09 |
| 15.00 | 1-19 | 32.25 | 34.00 | 21.63 |
| 15.25 | $1 \cdot 21$ | 32.75 | 34.57 | 22.00 |
| 15.50 | $1 \cdot 23$ | 33.25 | $35 \cdot 14$ | $22 \cdot 36$ |
| 15.75 | $1 \cdot 26$ | 34.00 | 36.00 | 22.90 |
| 16.00 | $1 \cdot 28$ | 34.50 | 36.57 | 23.27 |
| 16.25 | $1 \cdot 30$ | 35.00 | 37.14 | 23.63 |
| 16.50 | $1 \cdot 33$ | 35.75 | 38.00 | $24 \cdot 18$ |
| 16.75 | 1.35 | 36.25 | 38.57 | 24.54 |
| 17.00 | $1 \cdot 37$ | 36.75 | $39 \cdot 14$ | 24.90 |
| 17.25 | 1.40 | 37.25 | 40.00 | $25 \cdot 45$ |
| 17.50 | $1 \cdot 42$ | 37.75 | 40.57 | 25.81 |
| 17.75 | $1 \cdot 44$ | 38.25 | $41 \cdot 14$ | $26 \cdot 18$ |
| 18.00 | $1 \cdot 47$ | 39.00 | 42.00 | 26.72 |
| 18.25 | 1-49 | 39.50 | 42.57 | 27.09 |
| 18.50 | 1.51 | 40.00 | $43 \cdot 14$ | 27.45 |
| 18.75 | 1.53 | 40.50 | 43.71 | 27.81 |
| 19.00 | 1.56 | 41.25 | 44.57 | 28.36 |
| 19.25 | 1. 58 | 41.75 | $45 \cdot 14$ | 28.72 |
| 19.56 | $1 \cdot 60$ | 42.25 | 45.71 | 29.09 |
| 19.75 | 1.63 | 42.75 | 46.57 | 29.63 |
| 20.06 | $1 \cdot 65$ | 43.25 | $47 \cdot 14$ | 30.00 |
| 20.25 | $1 \cdot 67$ | 43.75 | 47.71 | $30 \cdot 36$ |
| 20.50 | 1.70 | 44.50 | 48.57 | 30.90 |
| 20.75 | 1.72 | 45.00 | 49.14 | 31.27 |
| 21.00 | 1,74 | 45.50 | 49.71 | 31.63 |
| 21.25 | 1.77 | 46.25 | 50.57 | $32 \cdot 18$ |
| 21.50 | 1.79 | 46.50 | $51 \cdot 14$ | 32.54 |
| 21.75 | 1.81 | 47.00 | 51.71 | 32.90 |
| 22.00 | 1.84 | 47.75 | 52.57 | 33.45 |
| 22.25 | 1.86 | 48.25 | $53 \cdot 14$ | 33.81 |
| $22 \cdot 50$ | 1.88 | 48.75 | 53.71 | $34 \cdot 18$ |
|  |  | 2 |  |  |


| (1) <br> Price of Cheese. | (2) <br> Net Return for 100 <br> Pounds Milk. | $\begin{aligned} & \text { Equivalent Price } \\ & \text { of } \\ & \text { Butter. } \end{aligned}$ | (4) <br> Net Return for 1 Pound Fat. | (5) <br> Net Return for 1 <br> Pound "Fat and <br> Casein". (Fat + 2). |
| :---: | :---: | :---: | :---: | :---: |
| cts. | \$ | cts. | cts. | cts. |
| $22 \cdot 75$ | 1.91 | 49-50 | $54 \cdot 57$ | 34.72 |
| 23.00 | 1.93 | $50 \cdot 00$ | $55 \cdot 14$ | $35 \cdot 09$ |
| $23 \cdot 25$ | 1.95 | $50 \cdot 50$ | $55 \cdot 71$ | $35 \cdot 45$ |
| $23 \cdot 50$ | 1.98 | 51.25 | $56 \cdot 57$ | 36.00 |
| 23.75 | $2 \cdot 00$ | 51.50 | $57 \cdot 14$ | $36 \cdot 36$ |
| 24.00 | $2 \cdot 02$ | $52 \cdot 00$ | 57.71 | $36 \cdot 72$ |
| $24 \cdot 25$ | 2.05 | $52 \cdot 75$ | $58 \cdot 57$ | 37.27 |
| $24 \cdot 50$ | $2 \cdot 07$ | 53.25 | $59 \cdot 14$ | $37 \cdot 63$ |
| $24 \cdot 75$ | $2 \cdot 09$ | $53 \cdot 75$ | $59 \cdot 71$ | 38.00 |
| $25 \cdot 00$ | $2 \cdot 12$ | $54 \cdot 50$ | $60 \cdot 57$ | $38 \cdot 54$ |
| $25 \cdot 25$ | $2 \cdot 14$ | $55 \cdot 00$ | $61 \cdot 14$ | 38.90 |
| $25 \cdot 50$ | $2 \cdot 16$ | $55 \cdot 50$ | $61 \cdot 71$ | 39.27 |
| $25 \cdot 75$ | $2 \cdot 19$ | $56 \cdot 25$ | $62 \cdot 57$ | $39 \cdot 81$ |
| 26.00 | $2 \cdot 21$ | 56.75 | $63 \cdot 14$ | $40 \cdot 18$ |
| $26 \cdot 25$ | $2 \cdot 23$ | 57.00 | $63 \cdot 71$ | $40 \cdot 54$ |
| $26 \cdot 50$ | $2 \cdot 26$ | $57 \cdot 75$ | $64 \cdot 57$ | $41 \cdot 09$ |
| $26 \cdot 75$ | $2 \cdot 28$ | $58 \cdot 25$ | $65 \cdot 14$ | 41.45 |
| 27.00 | $2 \cdot 30$ | 58.75 | $65 \cdot 71$ | 41.81 |
| $27 \cdot 25$ | $2 \cdot 33$ | 59.50 | $66 \cdot 57$ | $42 \cdot 36$ |
| $27 \cdot 50$ | $2 \cdot 35$ | $60 \cdot 00$ | $67 \cdot 14$ | $42 \cdot 72$ |
| 27.75 | $2 \cdot 37$ | $60 \cdot 50$ | 67.71 | $43 \cdot 09$ |
| 28.00 | $2 \cdot 40$ | $61 \cdot 25$ | $68 \cdot 57$ | $43 \cdot 63$ |
| 28.25 | $2 \cdot 42$ | 61.75 | $69 \cdot 14$ | 44.00 |
| $28 \cdot 50$ | $2 \cdot 44$ | 62.00 | $69 \cdot 71$ | $44 \cdot 36$ |
| 28.75 | $2 \cdot 47$ | $62 \cdot 75$ | $70 \cdot 57$ | 44.90 |
| 29.00 | $2 \cdot 49$ | $63 \cdot 25$ | $71 \cdot 14$ | $45 \cdot 27$ |
| 29.25 | $2 \cdot 51$ | 63.75 | $71 \cdot 71$ | $45 \cdot 63$ |
| 29.50 | $2 \cdot 54$ | $64 \cdot 50$ | $72 \cdot 57$ | $46 \cdot 18$ |
| 29.75 | $2 \cdot 56$ | 65.00 | $73 \cdot 14$ | $45 \cdot 54$ |
| 30.00 | $2 \cdot 58$ | $65 \cdot 50$ | $73 \cdot 71$ | 46.90 |
| $30 \cdot 25$ | $2 \cdot 61$ | $66 \cdot 25$ | 7457 | $47 \cdot 45$ |
| $30 \cdot 50$ | $2 \cdot 63$ | $66 \cdot 75$ | $75 \cdot 14$ | 47.81 |
| 30.75 | $2 \cdot 65$ | 67.00 | $75 \cdot 71$ | $48 \cdot 18$ |
| 31.00 | $2 \cdot 68$ | $67 \cdot 75$ | $76 \cdot 57$ | $48 \cdot 72$ |
| 31.25 | $2 \cdot 70$ | $68 \cdot 25$ | $77 \cdot 14$ | $49 \cdot 09$ |
| 31.50 | $2 \cdot 72$ | -68.75 | $77 \cdot 71$ | $49 \cdot 45$ |
| 31.75 | $2 \cdot 75$ | $69 \cdot 50$ | $78 \cdot 57$ | $50 \cdot 00$ |
| 32.00 | $2 \cdot 77$ | $70 \cdot 00$ | $79 \cdot 14$ | 50.36 |

The figures in Table III are worked out on the following basis:-

|  | Cheese. | Butter. |
| :---: | :---: | :---: |
| 1 pound fat produces. | $2 \cdot 65$ pounds | $1 \cdot 20$ pounds |
| 100 pounds $3 \cdot 5$ per cent milk produces | $9 \cdot 30$ " | $4 \cdot 20$ " |
| Cost of making per pound........... | $2 \frac{1}{4}$ cents | 4 cents |

If 100 pounds of milk testing $3 \cdot 5$ per cent of fat produces $9 \cdot 3$ pounds of cheese, which is sold at the prices indicated in column 1, with a manufacturing charge of $2 \frac{1}{4}$ cents per pound of cheese deducted, and the value of the whey not taken into consideration:-

Column 2 shows the net return for 100 pounds of milk;
Column 4 shows the net return for 1 pound of fat;
Column 5 shows the net return for one pound of "fat and casein," if the proceeds are divided according to the "Fat +2 " method.

If 100 pounds of milk testing $3 \cdot 5$ per cent of fat produces $4 \cdot 2$ pounds of butter, for which a manufacturing charge of 4 cents per pound is deducted and the value of the skim milk is not taken into consideration:-

Column 3 shows the price at which the butter must be sold to realize the same net return 100 pounds of milk or per pound of fat or per pound of "fat and casein" sa is shown in columns 3,4 and 5 , respectively.

If a producer knows what net price he can realize for 100 pounds of milk or for one pound of "fat and casein," as the case may be, this net return may be located in column 3 or column 5, and the same line in column 4 will indicate the net price which must be obtained for 1 pound of fat to equalize the price being obtained by either of the other two methods.

The value of the by-products (whey and skim milk) varies, since at times it is impossible for the producer to feed all of the by-products, and since their value depends also on the probable market value of the stock to which they are fed. Consequently, the value of the by-products is not taken into consideration in Table III. Each producer may estimate the value of the by-products in his own particular case and add the estimated value of the by-products to the value of the milk as shown in this Table. Table I shows the pounds of by-products from 100 pounds of milk.

In order to ascertain the net return of milk testing other than 3.5 per cent of fat, the net value per pound of the cheese or butter must be determined by subtracting the cost per pound of manufacturing from the selling value per pound of the product. This net price per pound, multiplied by the yield of the product per 100 pounds of milk as shown in Table II will give the net return for 100 pounds of milk. The net return for 100 pounds of milk divided by the per cent of fat in the milk will give the net return for one pound of fat.

For example:-If milk tests $3 \cdot 8$ per cent of fat while cheese sells for $24 \frac{1}{2}$ cents per pound and the cost of manufacturing is $2 \frac{1}{4}$ cents per pound, the net value to the producer of 1 pound of cheese is $24 \frac{1}{2}$ cents $-2 \frac{1}{4}$ cents $=22 \frac{1}{4}$ cents. Referring to Table II, 100 pounds of milk testing $3 \cdot 8$ per cent of fat will produce approximately 9.72 pounds of cheese. Therefore the net return of 100 pounds of milk is $9.72 \times 22 \frac{1}{4}$ cents $=\$ 2.16$. The net return for 1 pound of fat is determined by dividing $\$ 2.16$ by $3 \cdot 8$, which gives $56 \cdot 84$ cents. The value of the same milk manufactured into butter may be determined in a similar way if the market value of butter is known. If the cost of manufacturing differs from the figures used in the table, the correct figures may be substituted.

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