University of Kentucky---College of Agriculture

I. Standardizing Milk and Cream.

II. Use of the Lactometer.

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I. STANDARDIZING MILK AND CREAM.

It is easy to standardize or modify the richness of milk or
cream to suit any requirement, by following the method outlined
below.

Draw a rectangle and place in the center the percentage of
fat desired. Place at left-hand corners the percentages of fat
in materials to be mixed. Subtract number in center from larger
number at left of rectangle. Place remainder on diagonally op-
posite right-hand corner. Subtract smaller number of left-
hand corner from number in center and place remainder on
diagonally opposite right-hand corner.

The two numbers on right-hand corners represent the num-
ber of pounds of material required. If these two numbers are
added they will express number of pounds of the mixture, which
will contain a percentage of fat expressed by number in center.
In each case the number on right-hand corner corresponds in fat
test to the number on left-hand corner directly opposite.

Example: Given a quantity of 3-per-cent milk to be mixed
with 6-per-cent milk to produce 4-per-cent milk. How much of
the 3% and how much of the 6% milk must be used to produce
the standardized 4-per-cent milk?

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6  ┌─────────┐  1 pound of 6% milk
   │    4    │
3  └─────────┘  2 pounds of 3% milk.
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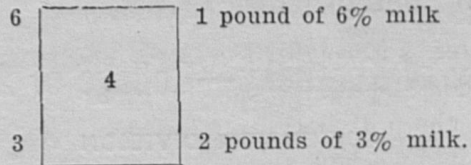
Mix 1 pound of 6% milk and 2 pounds of 3% milk and you will have 3 pounds of 4% milk.

Example: How shall 3% milk be raised to 5% milk by adding 30% cream to the 3% milk?

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30  ┌─────────┐  2 pounds of 30% cream
    │    5    │
3   └─────────┘  25 pounds of 3% milk.
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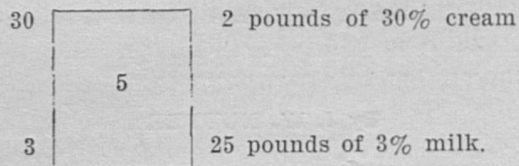
Mix 25 pounds of 3 per cent milk with 2 pounds of 30 per cent cream and you will have 27 pounds of 5 per cent milk.

WEIGHT AND COMPOSITION OF DAIRY PRODUCTS.

Weight of milk.. 8.6 lbs. per gallon
Weight of 10% cream.. 8.54 lbs. per gallon
Weight of 20% cream.. 8.44 lbs. per gallon
Weight of 30% cream.. 8.36 lbs. per gallon
Weight of 40% cream.. 8.29 lbs. per gallon

Average composition of:	Water	Fat	Casein and Albumen	Milk Sugar	Ash
Milk	87.10	3.90	3.40	4.85	.75
Cream	68.82	22.66	3.76	4.23	.53
Butter	13.08	84.26	.81	.66	1.19
Cream cheese	36.33	40.71	18.84	1.02	3.10
Skim cheese	50.5	1.20	43.10	—	5.20
Condensed milk	58.9	12.42	11.92	14.49	2.18

(No sugar added)

II. USE OF THE LACTOMETER.

The lactometer is a weighted glass bulb with a long stem at the top, graduated to show the specific gravity by the depth to which it sinks in the milk. It sinks until it displaces a volume of milk equal to its own weight; the lighter the milk the deeper it sinks. The butter fat in milk is light, while the solids not fat, like casein, albumen, sugar and ash, are heavier. Consequently, the removal of fat would increase the weight of the milk, unless water were added. But the test for butter fat (the Babcock test) which is used in conjunction with the lactometer will help to show whether the milk has been adulterated.

Warm milk is lighter than cold milk; therefore, to get a correct reading of the lactometer, the milk must be at 60 degrees F, or the reading must be corrected to that temperature. It is best to have the temperature within 5 degrees of 60 degrees F. The lactometer will vary .1 lactometer degree from its correct reading with each degree above or below 60 degrees F. The reading is too low, if the milk is warmer than 60° F, and too high if it is colder.

The average composition of milk is as follows:

Water		87.1
Solids not fat		9.0
	Casein and albumen	3.40
	Milk sugar	4.85
	Ash	.75
		9.00
Fat		3.9
		100.0

The formula for the lactometer is as follows:
¼ Lactometer plus ⅕ fat = Solids not fat.

Problem: If lactometer reads 30 degrees at 63 degrees F. and Babcock test reads 5%, is the milk good?

30 degrees at 63 degrees F.	=	30.3 Lactometer at 60 degrees F.
¼ of 30.3 L.	=	7.57
⅕ of fat (5)	=	1.00
Solids not fat	=	8.57

This is a good sample of milk for the fat and the solids not fat are both normal.

Problem: If lactometer reads 25 degrees at 57 degrees F. and Babcock test reads 4, is the milk good?

25 degrees L. at 57	=	24.7 Lactometer at 60 degrees F.
¼ of 24.7 L	=	6.17
⅕ of fat (4)	=	.80
Solids not fat	=	6.97

In this sample the fat is high enough, but solids not fat are low, as they should approximate 8½% or more. Probably water has been added to rich milk in this instance.