ESTIMATING THE PRICE OF MILK ACCORDING TO THE PERCENT OF FOOD NUTRIENTS AVAILABLE.

Minor Thesis in Dairy Husbandry

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By

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ESTIMATING THE PRICE OF MILK ACCORDING TO THE PERCENT OF FOOD NUTRIENTS AVAILABLE.

Milk contains all the ingredients needed for nourishment. It contains these ingredients in just the right proportion, as shown by experience and science, to furnish a well-balanced ration. Thus it contains proteins, which furnish the materials for building up the body and to keep it in repair; and it contains fats and carbohydrates, which are the fuel to keep the body warm and to furnish power needed to do work. Further, it contains the necessary amount of water needed by the body and also the inorganic salts, without which life cannot exist.

It is ofttimes said that milk is a perfect food. This statement is somewhat misleading, for while milk is a perfect food for the suckling it does not necessarily meet all the demands of the adult. Even with all the required elements for the growth and maintenance of the young mammal, yet it lacks certain properties which make it suitable as a sole nourishment for an adult individual.

To most people milk is milk. About the only preference shown is toward the thickest, creamiest milk that they can get. Because of its cream they have a feeling that it is more desirable, possessing more nourishment, and being, therefore, of greater value. This erroneous idea is also reflected in some of the standards adopted for the regulation of milk supplied to the people. In thoroughly praiseworthy attempts to protect the public health, misguided

officials have helped to perpetuate a mistaken idea that Food Chemists and Physicians have proved repeatedly to be entirely opposed to the truth. It is this very cream,-really the fat in the milk from which butter is made- that contains the elements of greatest danger to the digestive organs of infants and adult invalids. It is not the fat, but the proteins,(the tissue, muscle, bone and blood makers), that form the ingredients of greatest value in milk.

In the past, milk has been bought and sold at arbitrary prices, fixed, in most cases, by the dealer and to a more or less degree irrespective of its composition or food value. However, since the introduction of the Babcock test for determining the percent of fat in milk, the price of milk has, more or less, been governed by the fat content.

It is a well established fact, that the other ingredients of milk, viz; casein, sugar, albumin, and ash, play an important role in making up the food nutrients of milk. These ingredients, like that of fat, vary in percentage composition but not to the extent as that of fat. The casein and sugar vary considerably, and these should be considered when milk is to be marketed. In fact, the market price of milk should be based on the percent of food nutrients rather than that of the fat content alone.

In order that milk may be bought and sold from a standpoint of the percent of available food nutrients, it is very necessary that some means be devised by which the percentages of the different ingredients found in milk may be determined. In this particular case the following methods were used in determining the

percent of (1) Fat, (2) Casein, (3) Albumin, (4) Ash, (5) Solids not Fat, (6) Sugar.

The Determination of Fat by Babcock Test.

I. The method of operating the Babcock test when determining the percent of fat in milk is given in the following brief outline: Obtain representative sample from milk to be tested.

1. Mix thoroughly sample of milk, which is at 60° to 70° F.
2. Quickly fill pipette to mark with milk.
3. Run milk into test bottle.
4. Fill acid-measure to mark with acid and pour into test-bottle.
5. Mix milk and acid thoroughly by rotary motion;
   (a) let stand 2 to 5 minutes; mix again.
6. Put test-bottles in tester (centrifuge) and whirl for 5 minutes at proper speed.
7. (a) Add water 140° F. up to neck of bottles;
   (b) Whirl two minutes.
   (c) Add hot water to 8 or 9 percent mark;
   (d) Whirl one minute.
8. Read results at a temperature of about 140° F.

In order to make this test it is necessary to have the following apparatus, Babcock tester, milk test bottles, mixing bottles, pipette, acid measurer, sulfuric acid 1.82-1.83

II. The Determination of Casein.

II. The method used in determining the percent of casein was that worked out by Van Slyke and Bosworth. In outline, the method is as follows: Into a 200 cc. flask measure 17.5 cc (18 grams) of milk, add 80 cc. water (distilled) and 1 cc of Phenolphthalein and then

run into flask sodium hydroxide which has been especially prepared for this particular test, (Using a normal solution take 29.5 cc. NAOH and add to 1000 cc. distilled water and thus the solution is prepared), until the contents of the flask are alkaline. Acetic acid standardized so that 1 cc. will neutralize 1 cc of the NaOH is then added until the casein is completely precipitated, after which the volume of the entire mass is made up to 200 cc by the addition of distilled H_2O. It is shaken vigorously for a few seconds and the whole mixture is then filtered. Into 100 cc. of the clear filtrate, the standardized NaOH solution is run until neutral. The solutions are so standardized that 1 cc is equivalent to 1 per cent of casein in the milk examined. Therefore, the number of cubic centimeters of standard acid used, divided by 2, less the amount of standard alkali used in the final titration, gives the percent of casein in milk.

For example; if it takes 24 cc. standard acid to precipitate the casein in a sample of milk when neutral and 9 cc of standard alkali to neutralize the excess acid in 100 cc. of clear filtrate, the percent of casein will be - 24 ÷ 2 = 12; 12 - 9 = 3 percent.

The apparatus necessary for making this test is such as is in common use in dairy work for running acid tests, viz; two 50 cc. burettes (accurately graduated), 200 cc. flasks, pipettes (17.5 cc), (100 cc) (1 cc) cups- funnels, filter papers and measuring cylinders.

III and IV. A constant value of .7 percent is given albumin and ash, due to the fact that there is so little variation in the percentage of these constituents in normal milks.

V. For the determination of S.N.F. the following procedure was used:

1. The sample of milk is thoroughly mixed and poured into lactometer jar. A Quvenne lactometer is at once lowered into the milk, the reading and temperature noted. The temperature must be 60° F. or corrections made accordingly. Thus for every degree above 60° F. .1 is added for each degree above or .1 subtracted for each degree below. The fat is determined by means of the Babcock test previously described. Now, with the temperature and lactometer reading and fat content known, the percent of solids-not-fat can, by the use of the following formula, Solids-not-Fat = 1/4 L + .2 F, be determined. In the formula L. represents the lactometer R and F. the fat, thus for example, if the following data were given:

Temp.	L.R.	Cor.L.R.	Fat
58	32	31.8	4 %

the percent of Solids-not-Fat could very easily be determined by substituting in the formula the values given for L. and F.-

S.N.F. = 1/4 (31.8) + .2(4)
= 7.95 + .8
= 8.75 %

Apparatus

Testing outfit, lactometer, lactometer jar, thermometer, mixing bottles.

VI For this particular work, the percent of sugar was determined by difference. Hence, the following formula; Sugar = S.N.F. - (Casein + Albumin + Ash). For example, if a milk has the following percentage composition - S.N.F. 8.50%, Casein 3.0%, Ash .7%, and Albumin .7%, the percent of sugar would be,

Sugar = 8.5 - (3+ .7 + .7) or 4.1 %.

Having shown the methods used for the determination of the fat, casein, albumin, ash and sugar found in any sample of milk, it now becomes necessary to show just how these ingredients may be brought

to a common value. This is done by finding the value in therms of the digestible protein, carbohydrates, and fats. With the extremely high percentage of total digestible nutrients found in milk, it is assumed here that these nutrients are 100% digestible. As taken from Henry & Morrison's "Feeds and Feeding", 1 pound of digestible protein gives 2.63 therms; 1 pound digestible carbohydrates gives 1.86 therms; and 1 pound digestible fat gives 4.22 therms.

With an indication as how the milk constituents we propose to deal with can be brought to a common value, it becomes necessary to take a milk of a given composition, the percentage composition of which is supposed to have been derived by the methods already described, and determine its value, in therms, of each of the constituents with which we have to deal. Thus for convenience, 100 pounds of milk is taken, which has the following percentage composition: S.N.F. 8.7%; fat 3.5%; casein 2.5%; albumin .7%; Ash .7%; and sugar 4.8%; in the 100 pounds of milk taken there is, 3.5 pounds of fat; 2.5 pounds casein; .7 pounds albumin; and 4.8 pounds of sugar - with the amounts of the different ingredients calculated and the value per pound in therms, of each ingredient known, the number of therms in the above mentioned 100 pounds of milk can very easily be determined.

Thus from the data given ~~here~~ the following is obtained:

		therms		therms
For Fat, 3.5 pounds	X	4.22	=	14.770
For Casein, 2.5 "	X	2.63	=	6.575
For Albumin, .7 "	X	2.63	=	1.841
For Sugar , 4.8 "	X	1.86	=	8.928
		Total		32.114

After calculating the value in therms of the fat, casein, sugar and albumin in the 100 pounds of milk in question, it is found that the fat constitutes 46 per cent of the energy value of milk, casein 20.5 percent, albumin 5.7 percent, and sugar 27.8 percent. Assuming the price for 100 pounds of the above mentioned milk to be $3.50, the unit value of fat, casein, albumin and sugar can be determined. With the foregoing information it is found that the price for fat would be 46 cents per pound; casein 28.8 cents per pound; albumin 28.8 cents per pound; and sugar 20.3 cents per pound, thereby giving to the 100 pounds taken the following value for the different nutrients:

For fat, 3.5 lbs. @ 46 ¢ = 1.61
For casein, 2.5 " @ 28.8¢= .72
For albumin, .70 " @ 28.8¢= .20
For sugar, 4.8 " @ 20.3¢= .97

Total price for the 100 pounds $3.50 or 30.2 cents per gallon. Using 8.6 pounds for a gallon the corresponding price per gallon may be obtained which in this particular case is 30.2 cents.

The value of any milk consists in obtaining the perfentages of the different food nutrients present and afterwards applying to these the values already calculated.

Milk from each milking individual of both the college and Virginia Experiment Station herds furnished the source for the data that is to follow. For the sake of convenience the cows were divided into three groups. These groups are handled separately all the way. Prices and variations of the different groups are compared.By so doing the data could be more satisfactorily obtained. Therefore, in Group I, only cows of the Virginia Experiment

Station will be found; in Group II only cows of the Virginia Polytechnic Institute Dairy, milking morning and night, will be found; while in Group III only cows milking morning, noon and night will be found. In procuring this data first of all, a representative sample was taken from each milking of the different animals and these cooled to about 60° F. They were then poured together and thoroughly mixed. After which samples for the fat and casein tests were taken, and in the meantime the exact temperature and L.R. was obtained for the determination of Solids-not-Fat.

Using the procedure as previously described for the determination of the different constituents, the following data was obtained from the Virginia Experiment Station herd.

Experiment Station Herd August 28, 1922.

Name of Cow	Milk Lbs. A.M.	Milk Lbs. P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N.F.	% Sug.	$ per 100 #	cts per gal	Albumin & Ash.	
Tempest	18.8	14.7	3.4	64	32	32.4	2.50	8.78	4.88	3.47	29.84	.7	.7
Daisy II	13.4	10.5	3.0	64	29	29.4	2.10	7.95	4.45	3.08	26.49		
Winters	16.2	12.4	3.7	62	30	30.2	2.60	8.29	4.29	3.52	30.27		
Silver	14.0	10.7	4.0	62	32	32.2	2.40	8.85	5.05	3.76	32.33		
Johanna Daisy	12.3	12.0	3.8	62	32.	32.2	2.50	8.81	4.91	3.67	31.56		
Dione Daughter	16.4	10.0	3.0	62	30	30.2	2.05	8.15	4.70	3.12	26.83		
Va.Daisy	9.2	4.0	6.2	62	30	30.2	2.25	8.79	5.14	4.74	40.76		
Rose DeKol	10.5	8.7	3.4	62	31	31.2	2.40	8.48	4.68	3.40	29.24		
Tih II	10.5	9.0	4.0	64	32	32.4	2.40	8.90	5.10	3.77	32.42		
Rose Korn	7.9	4.7	3.4	64	31	31.4	2.50	8.53	4.63	3.42	29.41		
Daisy Belle	18.6	12.8	3.0	64	30	30.4	2.40	8.20	4.40	3.16	27.17		
Virginia Pauline	19.0	15.5	3.1	64	30	30.4	2.60	8.22	4.22	3.23	27.78		
Va.Buck-eye Kit	11.7	8.0	3.4	64	30	30.4	2.30	8.28	4.58	3.35	28.81		
Lyra Korn	3.0	2.0	4.8	64	35	35.4	4.40	9.81	4.01	4.49	38.61		
Va.Silver Belle	11.0	13.2	2.6	66	32	32.6	1.95	8.67	5.32	3.03	26.06		

Experiment Herd August 31, 1922

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash	
Tempest	18.4	13.5	2.8	68	28	28.8	2.00	7.76	4.36	2.95	25.37	.7	.7
Daisy II	12.4	10.0	3.1	67	28	28.7	2.20	7.80	4.20	3.11	26.75		
Winters	15.6	11.6	3.7	66	28.	28.6	2.65	7.89	3.84	3.44	29.58		
Silver	13.8	10.0	3.8	66	30	30.6	2.50	8.41	4.51	3.59	30.87		
Johanna Daisy	14.0	12.0	3.8	66	31	31.6	2.60	8.66	4.66	3.65	31.39		
Dione Daughter	15.2	8.5	2.6	66	30	30.6	1.95	8.17	4.82	2.93	25.20		
Virginia Daisy	7.5	7.0	4.2	66	30	30.6	2.60	8.49	4.49	3.79	32.59		
Rose DeKol	11.7	8.0	3.0	67	31	31.7	2.40	8.52	4.72	3.23	27.78		
Tih II	12.0	9.5	3.7	68	30	30.8	2.45	8.44	4.59	3.54	30.44		
Rose Korn.	9.0	6.3	3.6	68	30	30.8	3.00	8.42	4.02	3.53	30.36		
Daisy Belle,	18.2	13.5	3.6	68	30	30.8	2.25	8.42	4.77	3.48	29.92		
Virginia Pauline	20.0	15.9	3.0	68	29	29.8	2.30	8.05	4.35	3.12	26.83		
Va.Buck-eye Kit	11.0	8.5	3.8	68	28	28.8	2.20	7.96	4.36	3.46	29.75		
Lyra Korn.	2.4	2.0	5.2	68	33	33.8	2.70	9.49	5.39	4.46	38.36		
Virginia Silver Belle	14.3	12.7	3.4	70	30	31.0	2.20	8.43	4.83	3.37	29.98		

Experiment Herd. September 11, 1922.

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash.	
Tempest	18.0	12.1	3.4	66	31	31.6	3.00	8.58	4.18	3.47	29.84	.7	.7
Daisy II	11.0	10.0	3.0	66	29	29.6	2.50	8.00	4.10	3.13	26.92		
Winters	14.7	10.5	3.5	66	30	30.6	2.50	8.35	4.45	3.43	29.60		
Silver	13.2	9.4	3.8	66	32	32.6	3.10	8.91	4.41	3.74	32.16		
Johanna Daisy	12.6	10.2	3.7	66	31	31.6	3.20	8.64	4.04	3.64	31.30		
Diene Daughter	15.2	10.8	3.6	66	30	30.6	2.70	8.37	4.27	3.49	30.01		
Virginia Daisy	7.1	5.2	4.1	66	31	31.6	3.10	8.72	4.22	3.83	32.93		
Rose DeKol	10.5	7.4	3.4	66	31	31.6	3.50	8.58	3.68	3.52	30.27		
Tih II	12.0	9.9	3.4	68	31	31.8	2.80	8.63	4.43	3.46	29.75		
Rose Korn	8.6	6.3	3.0	66	30	30.6	3.00	8.25	3.85	3.22	27.69		
Daisy Belle	16.0	13.0	3.4	66	31	31.6	2.60	8.58	4.58	3.44	29.58		
Virginia Pauline	17.0	12.2	3.6	66	29	29.6	3.10	8.12	3.62	3.47	29.84		
Va. Buck-eye Kit	11.5	9.0	3.2	66	30	30.6	2.55	8.29	4.34	3.28	28.21		
Va. Silver Belle	12.7	11.6	3.2	68	31	31.8	2.80	8.59	4.39	3.36	28.90		

Experiment Herd October 1, 1922.

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash.	
Tempest	13.7	9.1	3.9	58	31	30.8	2.55	8.48	4.53	3.64	31.30	.7	.7
Daisy II	12.2	8.5	3.6	58	30	29.8	2.20	8.17	4.57	3.41	29.32		
Winters	12.1	9.3	4.2	58	30	29.8	2.30	8.29	4.59	3.72	31.99		
Silver	10.7	8.4	4.6	57	32	31.7	2.45	8.84	4.99	4.03	34.65		
Johanna Daisy	10.3	9.0	4.1	58	32	31.8	2.45	8.77	4.92	3.78	32.50		
Dione Daughter	10.4	8.4	3.0	58	31	30.8	1.80	8.30	5.10	3.13	26.92		
Virginia Daisy	7.2	6.5	4.6	58	33	32.8	2.85	9.12	4.87	4.13	35.52		
Rose DeKol	8.0	6.7	3.8	58	31	30.8	2.30	8.46	4.76	3.57	30.70		
Tih II	9.7	8.5	3.6	56	32	31.6	2.00	8.62	5.22	3.48	29.93		
Rose Korn	6.8	5.0	3.8	58	31	30.8	2.45	8.46	4.61	3.59	30.87		
Daisy Belle	14.3	9.3	4.0	58	31	30.8	2.25	8.50	4.85	3.67	31.56		
Virginia Pauline	12.3	9.5	3.6	58	28	27.8	2.40	7.67	3.87	3.33	28.64		
Va. Buck eye Kit	10.4	9.5	3.8	57	31	30.7	2.10	8.46	4.96	3.56	30.62		
Virginia Silver Belle	12.0	10.0	3.8	58	31	30.8	2.00	8.46	5.06	3.55	30.53		

Name of COW	Aug. 28th	Aug. 31st	Sept. 11th	Oct. 1st	% Highest price over lowest.
Tempe st	29.84	25.37	29.84	31.30	23 %
Daisy II	26.49	26.75	26.92	29.32	10.7 %
Winters	30.27	29.58	29.60	31.99	8.2 %
Silver	32.33	30.87	32.16	34.65	12.2 %
Johanna Daisy	31.56	31.39	31.30	32.50	3.8 %
Diene Daughter	26.83	25.20	30.01	26.92	19.1 %
Virginia Daisy	40.76	32.59	32.93	35.52	25.1 %
Rose DeKol	29.24	27.78	30.27	30.70	10.5 %
Tih II	32.42	30.44	29.75	29.93	2.3 %
Rose Korn	29.41	30.36	27.69	30.87	11.5 %
Daisy Belle	27.17	29.92	29.58	31.56	16.2 %
Virginia Pauline	27.78	26.83	29.84	28.64	11.2 %
Virginia Buckeye Kit	28.81	29.75	28.21	30.62	8.5 %
Lyra Korn.	38.61	38.36	00.00	00.00	———
Virginia Silver Belle	26.06	28.98	28.90	30.53	17.1 %

In order to obtain the data as already given, four days, covering a period of more than a month, were consumed. In this way, it seems probable that a fair average of the food nutrients present in the milk of each milking individual should be fully derived.

In the tables listed the following information is given: Owner of herd, dates of tests, names of cows, pounds of milk obtained from each milking, butter fat test, temperature, lactometer reading, corrected lactometer reading, percent casein, percent solids not fat, percent sugar, percent ash, percent albumin. Price per 100 pounds, and price per gallon. Now with the foregoing information it is possible to make a comparison of milk low in food nutrients with that containing the average or even a higher percentage of food nutrients. In making such a comparison the milk from Dione Daughter, on August 13, 1922, giving the following composition;

Fat, 2.6 or 25.20 pounds per gallon.
Casein 1.95
Albumin .7
Sugar 4.82

As against that of Virginia Daisy on August 28, 1922, with the following percentage composition:

Fat 6.2
Casein 2.25
Albumin .7
Sugar 5.14

or 40.76 cents per gallon.was taken.

In this particular case the difference in price per gallon is 15.56 cents or 61.7 percent in favor of the better milk. Here Dione Daughter must produce 13.9 pounds of milk as compared to 8.6 pounds for Virginia Daisy, the cow producing the higher priced milk. From the data in the tables listed a comparison of prices and how much one individual will have to produce in order to be worth as much,from the standpoint of milk production, as her next

door neighbor.

For the four tables as already listed it is found that the percent of fat varied from 2.6 - 6.2 or 138.4 percent; casein from 1.8 - 3.5 or 94.4 percent; and sugar from 3.62 - 5.22 or 44.2 percent. Thereby, showing that the variation found in casein and sugar is not so great as that of fat and yet sufficient to warrant consideration in the buying and selling of milk.

In table V of group I, is found the prices of the milk from each milking individual on the dates given and from this data the percent of variation in the highest and lowest priced milk for every animal was figured. Here it is noticed that a variation from 2.3% - 25.1 % exists.

With the data as given here, showing, from time to time, how the price of any individual cow's milk will vary, it seems safe to state that really no fixed price per gallon or per pound of butter fat can be used as a fair means by which milk may be bought or sold.

Group II

In this group only the cows of the V.P.I. Dairy, which were being milked at morning and night are listed. For this group the same procedure as used in Group I was used to give the data as listed for each animal whose name appears in the following tables:

V.P.I. Dairy Barn Herd (Cows milked morning and night) Sept. 12, 1922

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash.	
Mona's Golden Narci	8.2	5.3	7.4	62	31	31.2	2.50	9.28	5.38	5.41	46.52	.7	.7
Golden Bess	9.3	6.6	6.0	62	35	35.2	2.75	10.12	5.97	4.96	42.66		
V.P.I. Mona's Lass	6.3	6.1	5.8	61	35	35.1	2.80	9.93	5.73	4.83	41.54		
V.P.I. Gay Lad's Helen	11.0	12.0	5.4	60	33	33.0	2.20	9.33	5.73	4.47	38.44		
V.P.I. Gay Lad's Marion	9.5	6.7	7.6	60	30	30.0	2.60	9.02	5.02	5.46	46.96		
Gay Lad's Marion	7.9	5.7	6.8	60	35	35.0	3.70	10.11	5.01	5.40	46.44		
V.P.I. Lucy Raymond	9.4	8.0	4.2	60	34	34.0	3.20	9.34	4.74	4.01	34.49		
V.P.I. Dione DeKol	16.6	11.0	3.8	60	29	29.0	2.30	8.01	4.31	3.48	29.92		
Dione Dekol	14.7	12.2	3.2	60	30	30.0	2.10	8.14	4.64	3.21	27.60		
V.P.I. Korn Butter Girl	18.2	13.0	3.6	60	30	30.0	2.10	8.22	4.72	3.41	29.33		
V.P.I. Javaca Dekol	10.0	8.3	4.4	60	30	30.0	2.35	8.38	4.63	3.84	33.02		
V.P.I. Veeman Johanna Dekol	15.3	15.4	3.7	60	31	31.0	2.25	8.49	4.84	3.53	30.36		
V.P.I. Javaca Kekol II	22.6	15.0	3.7	60	26	26.0	2.40	7.24	3.44	3.29	28.29		

V.P.I.Dairy Barn Herd. (Cows milked Morning and Night) Oct. 3, 1922

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal	Albumin & Ash	
Mona's GOlden Narci	12.0	10.5	4.0	64	34	34.4	2.70	9.40	5.30	3.88	33.37	.7	.7
Golden Bess	7.5	6.2	6.5	64	35	35.4	3.10	10.15	5.65	5.22	44.89		
V.P.I. Mona's Lass	4.3	4.0	5.6	66	33	33.6	2.45	9.52	5.67	4.62	39.73		
V.P.I. Gay Lad's Helen	10.6	9.7	5.7	66	32	32.6	2.50	9.29	5.39	4.63	39.82		
V.P.I. Gay Lad's Marion	7.7	6.2	7.1	66	32	32.6	2.60	9.57	5.57	5.34	45.92		
Gay Lad's Marion					Dry								
V.P.I. Lucy Raymond	7.7	7.0	5.6	60	35	35.0	2.60	9.87	5.87	4.71	40.51		
V.P.I. Dione Dekol	9.8	9.1	3.9	66	29	29.6	2.60	8.18	4.18	3.59	30.87		
Dione Dek-ol	13.7	10.2	3.0	66	30	30.6	2.40	8.25	4.45	3.17	27.26		
V.P.I. Korn Butter girl	15.6	12.9	3.5	66	28	28.6	2.00	7.85	4.45	3.28	28.21		
V.P.I.Javoca Dekol	8.2	7.0	3.8	66	31	31.6	2.40	8.66	4.86	3.62	31.13		
V.P.I. Veeman Johanna Dekol	14.1	11.0	3.9	66	31	31.6	2.70	8.68	4.58	3.69	31.73		
V.P.I. Javoca Dekol II	18.7	14.9	3.0	66	30	30.6	2.40	8.25	4.45	3.17	27.26		

V.P.I. Dairy Barn Herd. (Cows milked morning and night) Oct. 8, 1922.

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor. L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal	Albumin & Ash.
Mona's Golden Narci	12.2	9.9	4.1	62	34	34.2	2.40	9.37	5.57	3.90	33.54	.7 .7
Golden Bess	6.7	6.0	5.8	60	36	36.0	2.05	10.16	6.71	4.81	41.36	
V.P.I. Gay Lad's Helen	10.5	8.3	4.5	60	33	33.0	2.05	9.15	5.70	4.02	34.57	
V.P.I. Gay Lad's Marion	6.7	6.0	7.1	60	31	31.0	2.95	9.17	4.82	5.29	45.49	
Gay Lad's Marion			Dry.									
V.P.I. Lucy Raymond	7.8	5.6	6.4	60	33	33.0	3.20	9.53	4.93	5.06	43.52	
V.P.I. Mona's Lass	3.3	3.5	5.0	62	35	35.2	2.45	9.80	5.95	4.41	37.93	
V.P.I. Dione Dekol	8.5	6.2	3.5	60	30	30.0	3.10	8.20	3.70	3.32	28.55	
Dione Dekol	11.9	9.5	3.4	60	30	30.0	2.50	8.18	4.28	3.35	28.81	
V.P.I. Korn Butter-girl	17.0	13.1	3.4	60	30	30.0	1.85	8.18	4.93	3.29	28.29	
V.P.I. Javoca Dekol	16.0	7.0	3.0	60	31	31.0	2.10	8.35	4.85	3.16	27.17	
V.P.I. Veeman Johanna Dekol	11.5	8.5	4.4	60	32	32.0	2.50	8.88	4.98	3.95	33.97	
V.P.I. Javoca Dekol II	9.9	14.8	3.1	62	31	31.2	1.80	8.42	5.22	3.20	27.52	

V.P.I. Dairy Barn Herd. (Cows milked morning and night) Oct. 16, 1922

Name of Cow	Lbs. Milk A.M.	P.M.	Fat Test	Tem.	L.R.	Cor. L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal	Albumin & Ash.	
Mona's Golden Narci	12.2	9.9	4.0	64	32	32.4	2.50	8.90	5.00	3.77	32.42	.7	.7
Golden Bess	6.3	6.1	7.0	64	33	33.4	3.50	9.75	4.85	5.41	46.53		
V.P.I. Gay Lad's Helen	9.9	8.3	4.6	64	33	33.4	2.30	9.27	5.57	4.10	35.26		
V.P.I. Gay Lad's Marion	6.3	5.2	6.0	64	31	31.4	3.90	9.05	3.75	4.84	41.62		
Gay Lad's Marion	Dry.												
V.P.I. Lucy Raymond	5.1	6.7	4.6	64	33	33.4	3.30	9.27	4.57	4.19	36.03		
V.P.I.Mona's Lass	Dry.												
V.P.I.Dione Dekol	6.1	4.1	3.6	64	29	29.4	2.15	8.07	4.52	3.39	29.15		
Dione Dekol	9.5	8.9	3.7	64	28	28.4	2.50	7.84	3.94	3.42	29.41		
V.P.I. Korn. Butter girl	14.9	13.5	3.4	64	28	28.4	2.30	7.78	4.08	3.25	27.95		
V.P.I. Javoca Dekol	6.6	5.4	4.6	64	29	29.4	2.60	8.27	4.27	3.93	33.80		
V.P.I. Veeman Johanna Dekol	9.2	6.9	4.0	64	31	31.4	2.80	8.65	4.45	3.74	32.16		
V.P.I. Javoca Kedol II	19.5	10.5	3.2	64	28	28.4	2.50	7.74	3.84	3.17	27.26		

Name of Cow	Sept. 12th	Oct. 3d.	Oct.8th	Oct.16th	% highest price over lowest.
Mona's Golden Narci	46.52	33.37	33.54	32.42	43.5 %
Golden Bess	42.66	44.89	41.36	46.53	12.5 %
V.P.I. Mona's Lass	41.54	39.73	37.93	00.00	9.5 %
V.P.I.Gay Lads Helen	38.44	39.82	34.57	35.26	12.9 %
V.P.I.Gay Lads Marion	46.96	45.92	45.49	41.62	12.8 %
Gay Lad's Marion	46.44	00.00	00.00	00.00	00.00
V.P.I. Lucy Raymond	34.49	40.51	43.52	36.03	26.2 %
V.P.I.Dione Dekol	29.92	30.87	28.55	29.15	8.1 %
Dione Dekol	27.40	27.26	28.81	29.41	7.8 %
V.P.I. Korn.Butter girl	29.33	28.21	28.29	27.95	5.0%
V.P.Javoca Dekol	33.02	31.13	27.17	33.80	24.4 %
V.P.I.Veeman Johanna Dekol	30.36	31.73	33.97	32.16	11.9 %
V.P.I. Javoca Dekol II	28.29	27.26	27.52	27.26	3.8 %

In making a comparison of the lowest and highest priced milk found in the tables listed in this group the milk of V.P.I. Javoca Dekol on October 8, 1922 with the following composition:

Fat 3.0
Casein 2.1
Albumin .7 or 27.17 per gallon
Sugar 4.85

is compared to that of V.P.I. Gay Lad's Marion, on September 12, 1922, which has the following percentage composition:

Fat 7.6
Casein 2.6
Albumin .7 or 46.96 cents per gallon.
Sugar 5.02

In this particular case there is a difference of 19.79 cents or 72.8 percent in favor of the milk richer in fat casein and sugar. Similar comparisonsfor the different individuals can be obtained but they would only coraborate that which has already been brought out.

The variations noted in this group are as follows: Fat from 3.0 - 7.6 or 153.3 percent; casein from 1.8-3.9 or 116.6 %; Sugar from 3.44 - 6.71 or 95. percent. In comparing the percent of variations found in fat, casein and sugar for the two groups already listed; it is noticed at once that group II shows quite an increase over group I. This is due, however, to the fact that there were a number of Jerseys and Guernseys as well as Holsteins in that particular group. It is found in group II, that the percent of fat, casein and sugar of the Jerseys and Guernseys given is higher than that of the Holsteins. This being true, it will, of course, increase the average price per gallon for the milk produced by this group as well as show a greater percentage of variation in fat, casein and sugar as already indicated.

Table V of this group gives the price of each individual's milk as figured from the food nutrients obtained on the dates heading this table. With these prices per gallon given it is not a very difficult task to find the variation in percent of the highest priced milk over that of the lowest. For group II as shown in table V it is plainly demonstrated that the variation in percent is from 3.8 percent - 43.5 percent, thus pointing out to us, that within a month, the variation in a cow's milk can be sufficient to warrant a change of from 3.8 percent - 43.5 percent in the price paid per gallon or per hundred-weight. Here, as brought out in group I, it seems that the most plausible way of buying milk would be according to its food value and not one particular ingredient alone.

Just here, it seems that the importance of getting away from a price for milk by the gallon should be emphasized. The data already given favors the production of milk containing the maximum percentage of food nutrients. In order to produce such milk, the dairyman must have encouragement or else the trend will be merely to meet requirements. If the price paid depended more on the food nutrients rather than merely the fat content or some value per gallon, irrespective of contents, the dairyman would have an incentive for the production of a milk containing a greater percentage of food nutrients.

The cows whose names appear in this group are those of the V.P.I.Dairy which were milked at morning, noon and night. It might be of further interest to note that,there were as in group I, nothing but Holsteins.

V.P.I.Dairy Herd (Cows milked, morning,noon and night) Sept.14,1922

Name of Cow	Lbs.Milk A.M.	N.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash.
V.P.I.Lady Korn. Dekol	17.1	16.2	13.8	3.2	68	33	33.8	2.40	9.09	5.29	3.43	29.50	.7 .7
V.P.I. Veeman Korn Dekol	25.8	23.8	21.6	3.5	68	29	29.8	2.20	8.15	4.55	3.36	28.90	
V.P.I. Korn Javoca Dekol	17.3	16.7	14.6	3.8	66	31	31.6	2.25	8.66	5.01	3.61	31.05	
V.P.I.Javoca Korn Girl	20.6	10.0	27.7	3.2	66	32	32.6	2.00	8.79	5.39	3.34	28.72	
V.P.I. Johanna Butter Girl 2nd	10.6	8.7	10.3	3.9	66	32	32.6	2.30	8.94	5.24	3.71	31.90	
V.P.I.Countess of Tech	9.0	9.0	5.9	3.6	68	33	33.8	3.20	9.17	4.57	3.70	31.82	
Juliet Dekol	12.0	14.1	12.0	3.8	68	32	32.8	2.15	8.96	5.41	3.66	31.47	
V.P.I. Korn Dione Dekol	13.6	16.5	13.5	2.8	68	32	32.8	1.75	8.76	5.61	3.12	26.83	
V.P.I.Dione Korn Girl	18.4	19.0	17.7	3.0	68	29	29.8	1.70	8.05	4.95	3.07	26.40	
V.P.I. Johanna Korn.	15.9	16.4	15.0	3.6	68	31	31.8	2.00	8.67	5.27	3.50	30.10	
V.P.I.Buckeye Vinly Veeman	12.2	15.1	14.9	3.2	68	30	30.8	2.30	8.34	4.64	3.27	28.12	
V.P.I.Buckeye Vinly	20.3	21.8	17.7	3.2	70	30	31.0	1.70	8.14	5.04	3.18	27.35	

V.P.I. Dairy Herd (Cows milked, morning,noon and night) Oct. 5, 1922

Name of Cow	Lbs.Milk A.M.	N.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Albumin & Ash.
V.P.I. Lady Korn Dekol	13.0	13.0	12.2	3.7	64	32	32.4	2.25	8.84	5.19	3.60	30.96	.7 .7
V.P.I. Veeman Korn Dekol	20.4	21.1	16.3	3.4	62	30	30.2	2.00	8.19	4.79	3.31	28.46	
V.P.I.Korn Javoca Dekol	15.0	14.9	12.7	3.8	62	32	32.2	2.45	8.81	4.96	3.66	31.48	
V.P.I. Javoca Korn Girl	17.8	11.0	19.8	3.0	62	33	33.2	2.00	8.90	5.50	3.27	28.12	
V.P.I.Johanna Butter Girl 2d	8.4	8.9	7.0	4.3	62	33	33.2	2.40	9.16	5.36	3.95	33.97	
V.P.I.Countess of Tech	2.8	2.6	2.5	4.4	62	32	32.2	2.45	8.93	5.08	3.96	34.05	
Juliet Dekol	14.5	10.0	7.6	4.3	62	33	33.2	1.95	9.16	5.81	3.92	33.71	
V.P.I.Korn.Dione Dekol	8.9	12.0	11.4	3.6	62	32	32.2	1.35	8.77	6.02	3.46	29.75	
V.P.I. Dione Korn Girl	16.8	13.5	12.7	3.0	62	30	30.2	2.00	8.15	4.75	3.12	26.83	
V.P.I.Johanna Korn	9.0	10.5	10.5	4.1	62	34	34.2	2.50	9.37	5.47	3.91	33.63	
V.P.I. Buckeye Viney Veeman	13.0	14.0	9.9	3.4	62	32	32.2	2.00	8.69	5.29	3.41	29.32	
V.P.I.Buckeye Viney	19.3	17.0	15.4	3.1	62	32	32.2	1.70	8.67	5.57	3.24	27.86	
V.P.I.Buckeye Javoca Dekol Jelkje	13.8	16.3	16.0	3.6	62	37	37.2	1.05	10.02	7.57			

V.P.I. Dairy Herd (Cows milked, morning,noon and night) Oct. 9, 1922

Name of Cow	Lbs.Milk A.M.	N.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal.	Album in & Ash
V.P.I.Eady Korn Dekol	13.1	10.2	13.7	3.7	60	34	34.0	2.50	9.24	5.34	3.70	31.82	.7 .7
V.P.I.Veeman Korn, Dekol	18.2	20.4	14.7	3.5	58	30	29.8	2.20	8.15	4.55	3.36	28.90	
V.P.I.Korn Javoca Dekol	12.1	14.0	10.5	3.4	58	33	32.8	1.55	8.84	5.89	3.40	29.24	
V.P.I. Javoca Korn, Girl	14.3	15.6	13.6	3.7	58	32	31.8	2.20	8.69	5.09	3.56	30.61	
V.P.I. Johanna Butter Girl 2d	9.9	9.0	6.7	4.0	58	32	31.8	2.10	8.75	5.25	3.70	31.82	
V.P.I. Countess of Tech.	3.5	1.5	1.8	2.6	58	33	32.8	2.35	8.72	4.97	3.07	26.40	
Juliet De-kol	10.1	7.3	8.3	4.0	58	34	33.8	2.35	9.25	5.50	3.83	32.94	
V.P.I. Korn Dione Dekol	9.5	11.5	10.4	3.4	58	33	32.8	2.05	8.88	5.43	3.45	29.67	
V.P.I.Dione Korn Girl	14.1	14.8	11.6	3.4	58	31	30.8	1.55	8.38	5.43	3.31	28.46	
V.P.I.Johanna Korn	7.5	10.2	10.3	4.0	58	35	34.8	2.05	9.50	6.05	3.86	33.20	
V.P.I.Buckeye Viney Veeman	13.5	15.0	10.5	3.6	58	33	32.8	2.10	8.92	5.42	3.55	30.53	
V.P.I.Buckeye Viney	21.2	16.0	19.1	2.7	58	35	34.8	1.85	9.24	5.99	3.18	27.35	
Buckeye Javaca Dekol Jelkje	14.8	16.5	14.7	3.6	58	36	35.8	1.85	9.67	6.24	3.63	31.22	

V.P.I. Dairy Herd(Cows milked, morning,noon and night) Oct. 18, 1922

Name of Cow	Lbs. Milk A.M.	N.	P.M.	Fat Test	Tem.	L.R.	Cor L.R.	% Ca.	% S.N. F.	% Sug.	$ per 100 #	Cts Per Gal	Albu-min & Ash
V.P.I. Lady Korn Dekol	13.6	13.3	13.4	3.6	56	33	32.6	2.50	8.87	4.97	3.58	30.79	.7 .7
V.P.I.Veeman Korn Dekol	21.1	19.4	21.0	3.2	54	30	29.4	3.20	7.99	3.39	3.28	28.21	
V.P.I.Korn Javoca Dekol	15.4	12.0	13.5	3.5	54	33	32.4	2.70	8.80	4.70	3.53	30.35	
V.P.I.Javoca Korn Girl	21.4	11.0	18.9	3.5	54	32	31.4	2.50	8.55	4.65	3.47	29.84	
V.P.I.Johanna Butter Girl 2d	9.1	8.5	7.6	4.6	56	33	32.6	2.70	9.07	4.97	4.10	35.26	
V.P.I.Countess of Tech Juliet Dekol	10.8	13.3	9.0	4.2	Dry 54	33	32.4	2.60	8.94	4.94	3.88	33.37	
V.P.I.Korn Dione Dekol	11.9	11.0	10.3	3.7	54	32	31.4	2.65	8.59	4.54	3.58	30.79	
V.P.I.Dione Korn Girl	16.3	13.1	14.7	3.0	54	30	29.4	2.55	7.95	4.00	3.12	26.83	
V.P.I.Johanna Korn	11.8	10.0	9.5	4.0	54	34	33.4	2.50	9.15	5.25	3.82	32.85	
V.P.I.Buckeye Viney Veeman	12.7	13.4	11.6	3.2	54	32	31.4	3.25	8.49	3.84	3.38	29.07	
V.P.I.Buckeye Vin-ey	22.3	18.9	15.6	3.0	54	32	31.4	2.90	8.45	4.15	3.25	27.95	
Buckeye Javoca Dekol Jelkje	13.7	14.2	16.9	3.6	54	34	33.4	2.40	9.07	5.27	3.61	31.04	

Name of COW	Sept.14	Oct. 5	Oct. 9	Oct.18	% highest price over lowest
V.P.I.Lady Korn Dekol	29.50	30.96	31.82	30.79	7.8%
V.P.I.Beeman Korn Dekol	28.90	28.46	28.90	29.21	2.4%
V.P.I.Korn Javoca Dekol	31.05	31.48	29.24	30.35	7.7%
V.P.I.Javoca Korn Girl	28.72	28.12	30.61	29.84	8.9%
V.P.I. Johanna Butter Girl II	31.90	33.97	31.82	35.26	10.8%
V.P.I. Countess of Tech	31.82	34.05	26.40	00.00	29.0%
Juliet Dekol	31.47	33.71	32.94	33.37	7.1%
V.P.I.Korn Dione Dekol	26.83	29.75	29.67	30.79	14.8%
V.P.I.Dione Korn Girl	26.40	26.83	28.46	26.83	7.8%
V.P.I.Johanna Korn	30.10	33.63	33.20	32.85	10.3%
V.P.I.Buckeye Viney Veeman	28.12	29.32	30.53	29.07	8.5%
V.P.I. Buckeye Viney	27.35	27.86	27.35	27.95	2.2%
V.P.I.Buckeye Javoca Dekol Jelkje			31.22	31.04	0.6%

Table VI

Price per G.	Daily Yield lbs.	Price per G.	Daily Yield lbs.	Price per G.	Daily Yield lbs.	Price per G.	Daily Yield lbs.	Price per G.	Daily Yield lbs.
25.20	23.7	27.69	14.9	29.07	37.7	30.01	12.6	31.30	22.8
25.37	31.9	27.78	19.7	29.15	10.6	30.10	47.3	31.39	26.0
26.06	24.2	27.78	34.5	29.24	36.6	30.27	28.6	31.47	38.1
26.40	6.0	27.86	51.7	29.24	22.6	30.27	17.9	31.48	42.6
26.40	55.1	27.95	28.4	29.32	36.9	30.35	40.9	31.56	24.3
26.49	23.9	27.95	56.8	29.32	20.7	30.36	15.3	31.56	23.6
26.75	22.4	28.12	42.2	29.33	31.2	30.36	30.7	31.73	25.1
26.83	43.6	28.12	48.6	29.41	12.6	30.44	21.5	31.82	23.9
26.83	43.0	28.21	20.5	29.50	47.1	30.53	22.0	31.82	37.0
26.83	26.4	28.21	28.5	29.58	27.2	30.53	39.0	31.82	25.6
26.83	35.9	28.21	61.5	29.58	29.0	30.61	43.5	31.90	29.6
26.83	30.1	28.29	37.6	29.60	25.2	30.62	19.9	31.99	21.4
26.83	44.1	28.29	30.1	29.67	31.4	30.70	14.7	32.16	22.6
26.92	21.0	28.46	57.8	29.75	31.4	30.79	40.3	32.16	16.1
26.92	18.8	28.46	40.5	29.75	21.9	30.79	33.2	32.33	24.7
27.17	31.4	28.55	14.7	29.75	19.5	30.87	23.8	32.42	19.5
27.17	23.1	28.64	21.8	29.84	33.5	30.87	11.8	32.42	21.4
27.26	23.9	28.72	58.3	29.84	30.1	30.87	18.9	32.50	19.3
27.26	33.6	28.81	19.7	29.84	51.3	30.96	38.2	32.59	14.5
27.26	30.0	28.81	21.4	29.84	29.2	31.04	44.8	32.85	31.3
27.35	60.3	28.90	71.2	29.92	31.7	31.05	48.6	32.93	12.3
27.35	56.3	28.90	24.3	29.92	27.6	31.13	15.2	32.94	25.7
27.52	24.7	28.90	53.3	29.93	18.2	31.22	46.0	33.02	18.3
27.60	26.9	28.98	27.0			31.30	22.8	33.20	28.0

Table VI Continued.

Price per gallon	Daily Yield lbs.	Price per gallon	Daily Yield lbs.
33.37	22.5	41.36	12.7
33.37	33.1	41.54	12.4
35.40	17.4	41.62	11.5
33.54	22.1	42.66	15.9
33.63	30.0	43.52	13.4
33.71	32.1	44.89	13.7
33.80	12.0	45.49	12.7
33.97	20.0	45.92	13.9
33.97	24.3	46.44	13.6
34.05	7.9	46.52	13.5
34.65	19.1	46.53	12.4
35.26	18.2	46.96	16.2
35.26	25.2		
35.52	13.7		
36.03	11.8		
37.93	6.8		
38.36	6.8		
38.36	4.4		
38.44	23.0		
38.61	5.0		
39.73	8.3		
39.82	20.5		
40.51	14.7		
40.76	13.2		

The same kind of data for each individual listed, as shown in groups I and II, is given. The methods used for finding the percent of the different ingredients are the same as previously described. In this group because of an increase in times milked per day, as well as in the number of pounds of milk produced, there seemed to be no appreciable change in the percent, of variation found among the food nutrients. Here, the price per gallon varies from 26.40-35.26, giving a difference of 8.86 cents or 33.5 percent in favor of the better milk, from the standpoint of food nutrients. The percent of fat varies from 2.6 - 4.6 or 76.9 percent; casein from 1.35 - 3.25 or 140.7 percent; sugar from 3.39 - 6.05 or 78.4 percent. Again comes table V giving the prices per gallon for the milk produced on the dates indicated at the top of the table. These prices do not show quite so much variation as shown by groups I and II. However, there is from .6 percent - 29.0 percent variation in the prices given for the group. Here, again, the idea of buying and selling of milk according to its food value is clearly and forceably brought to mind.

In table VI, is found the daily yield and price per gallon of the milk from every animal used in obtaining the data for this particular piece of work. Furthermore, the yield and price covers four different tests for each milking individual. This table was arranged according to the estimated price, beginning with the lowest priced milk. As noted in the table, the price per gallon varies from 25.20 - 46.96 cents or 86.3 percent in favor of the richer milk when it comes to comparing every individual involved. Of the 38 cows involved in this work, 32 were Holsteins, 3 Jerseys

and 3 Guernseys . In comparing the three breeds with regard to variations in the percentage of fat, casein and sugar, it is found that Holsteins varied in fat from 2.6 - 6.2, casein 1.35 - 3.5 percent, sugar 3.3 - 6.05, Jerseys varied in fat from 4.0 - 7.4, casein from 2.05 - 3.5 percent, sugar from 4.85 - 6.71 percent, Guernseys varied in fat from 4.2 - 7.6 percent, casein from 2.05 - 3.9 percent, sugar from 3.75 - 5.87 percent. The differences in variations for fat are as follows: Holsteins 3.6 percent, Jerseys, 3.4 percent, Guernseys 3.4; For casein, Holsteins 2.15 percent, Jerseys 1.45 percent; Guernseys 1.85 percent; For sugar Holsteins 2.66 percent; Jerseys 1.86 percent, and Guernseys 2.12 percent. The figures as given in this paragraph go to show that for the three breeds mentioned the variations for fat, casein and sugar are very closely related.

In conclusion a comparison of the price of total food nutrients against the price of fat alone is made. Going back to the 100 pounds of milk already used for an illustration at a price of $3.50 per hundred pounds, we find that from the standpoint of total food nutrients the fat would sell for $1.61; casein .72 cents; albumin 20 cents; and sugar 97 cents, making up the total selling price of $3.50. Now, if only the fat of the milk mentioned was taken into consideration, the price per pound of fat would be $1.00 or more than double the price already given in order that the same value per one hundred pounds of milk may be obtained.

A similar comparison can be obtained from the data taken from the individual cows used in this work which would only go to substantiate what has already been given. With this point of issue in view, it seems very probable that in order to obtain an aver-

age price for milk, the total food nutrients must have consideration and not the fat alone.