Repert on Chemical Study of Human Milk (2)

Kazutomo Imahori, Nobuyoshi Hirai, Taeko Moriwaki
(今堀和友) (平井信義) (森脇多恵子)
Sumiko Suzuki, Kiyoko Chiba
(鈴木純子) (千羽喜代子)

I. Introduction:

We have already published the report "Chemical study of human milk (1)" in Ochanomizu Science Report Vol. 5, No. 2, 1955, in which we have researched many factors which have influence on pH of human milk in the city, but we have got only few results.

So we have continued follow-up the study on pH of breast milk of five wives, who live in a rural district and take not only the poor proteins and poor fats in their food, but live in the bad conditions of general hygiene and are disturbed by bad customs or superstitions, therefore the body conditions of these wives are different from those of the town wives.

Indeed, we have confronted with more difficulty to get the human milk from wives in rural district than we expected, because they have refused it often. But we have caught the hapiness to get five wives who have cooperated with us.

II. Method of the Research:

(1) Date:

1st research.

K.M.	the Febr. 1955, from 2nd to 21st
K.T.	〃 〃 〃 〃 〃 〃 20th
Y.T.	〃 〃 〃 〃 〃 〃 〃

2nd research.

I.T.	the March 1955, from 2nd to 21st
K.M.	〃 〃 〃 〃 〃 〃 〃

(2) Place of Object:
In Imaizumi, Hatano-city, Kanagawa prefecture.

(3) Object of Study:

	Mother			Infant			Occupation of father
	Name	Age	Delivery number	Infant age (month)	Nutrition	At birth body weight	
1st	K.M.	28	2	2	only human milk	3.075 kg.	railway officer
	K.Y.	34	3	2	〃 〃	2.960 kg.	farmer
	Y.T.	26	1	4	〃 〃	3.110 kg.	officer
2nd	I.M.	27	2	7	〃 〃	0.110 kg.	officer
	K.M.	28	2	2	〃 〃	3.075 kg.	railway officer

(4) Measuring instrument:

"DG Type Glass Electrode pH Measuring"
made by Denkishiki Kagakukeiki Co.

(5) Methods of milking:

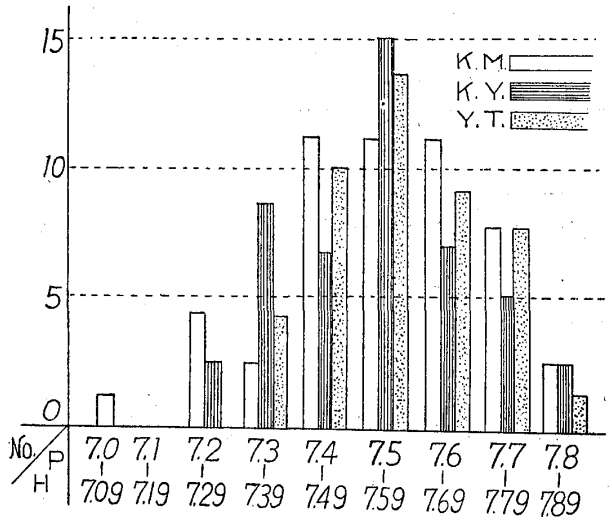
After that we have cleand with cotton dipped distilled water the mamilla, we have placed a test tube directly on her breast, which has been sterilized in the dry-heat method, and have milked it.

(6) Items which we have selected:

1. Follow up studies diary.
2. The variation of milk pH.
3. Differences of milk pH between right breast and left breast.
4. Differences of milk pH by interval from the sucking to the next sucking.
5. Relation between milk pH and sleeping hours of the mother.
6. Relation between milk pH and frequency of sucking.
7. Relation between milk pH and the protein, the fat, the food calories of food which the mother took in the day before.

III. Results:

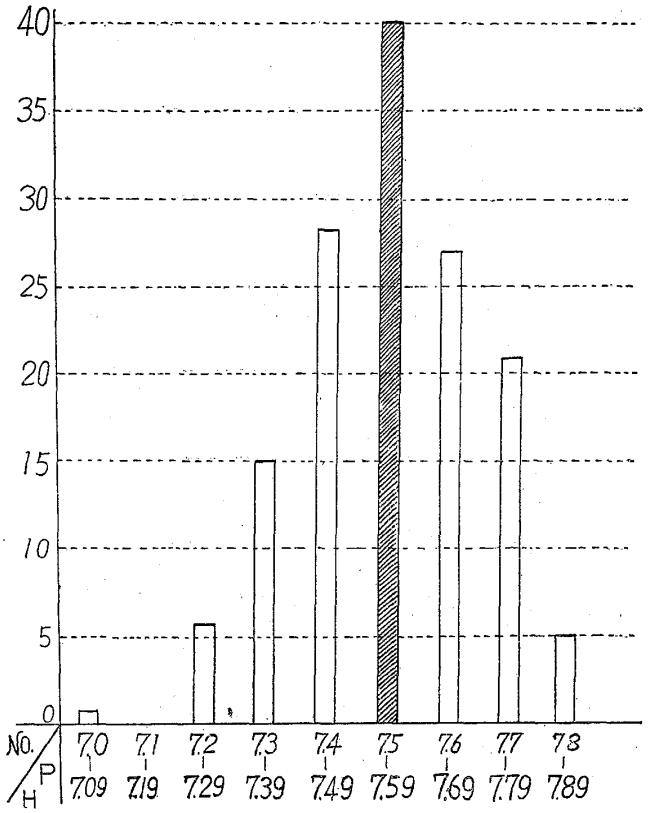
(1) The distribution of milk pH by each individual cases.



K.M. pH=7.557±0.156
K.Y. pH=7.527±0.443
Y.T. pH=7.572±0.123

(Fig. 1)

(2) The distribution of milk pH.



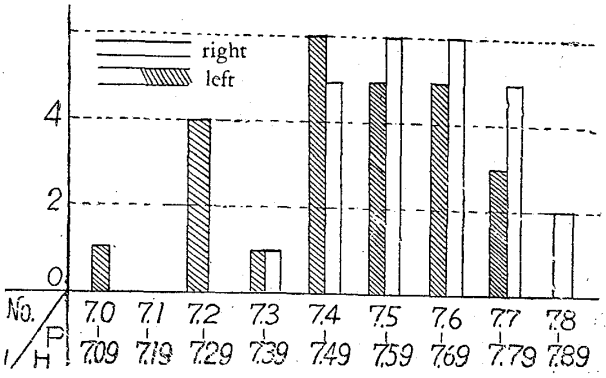
Average milk pH=7.552±0.24
(the highest=7.85
the lowest=7.09)

Average (pH=7.552) is higher than the results which has been studied before.

(Fig. 2)

(3) The distribution of milk pH from right and left breasts.
(i)

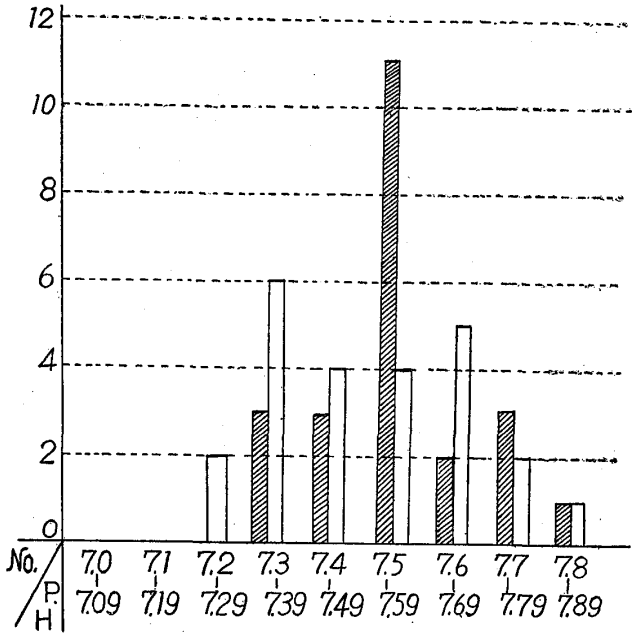
Case K.M.



(Fig. 3)

Right breast pH=7.49±0.171
Left breast pH=7.60±0.135
t=2.4564>

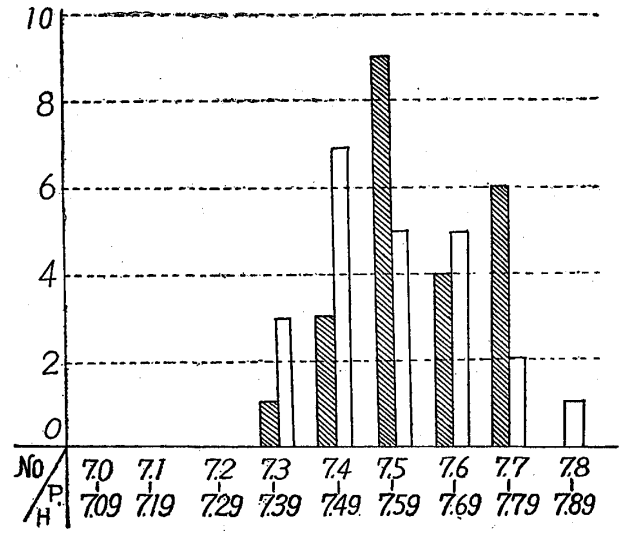
Case K.Y.



(Fig. 4)

Right breast pH=7.54±0.132
Left breast pH=7.41±0.159
t=3.1663<
p=5%

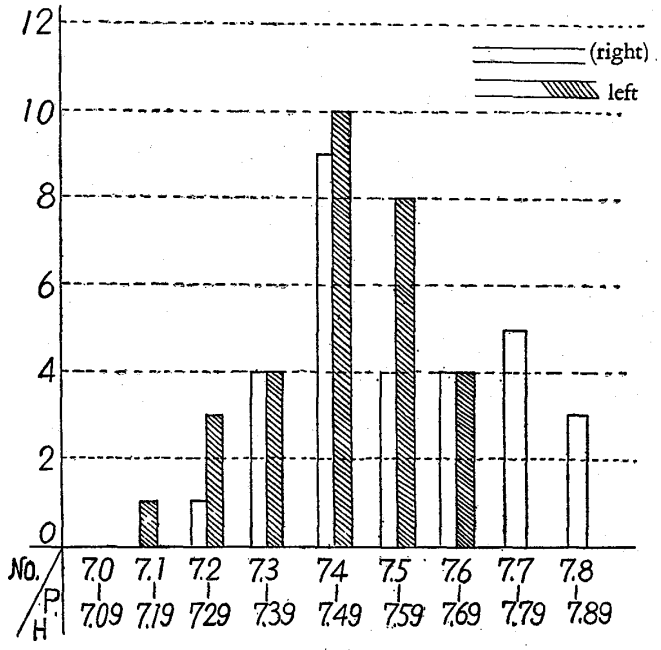
Case Y.T.



(Fig. 5)

Right breast pH=7.59±0.111
Left breast pH=7.54±0.114
t=1.1427>

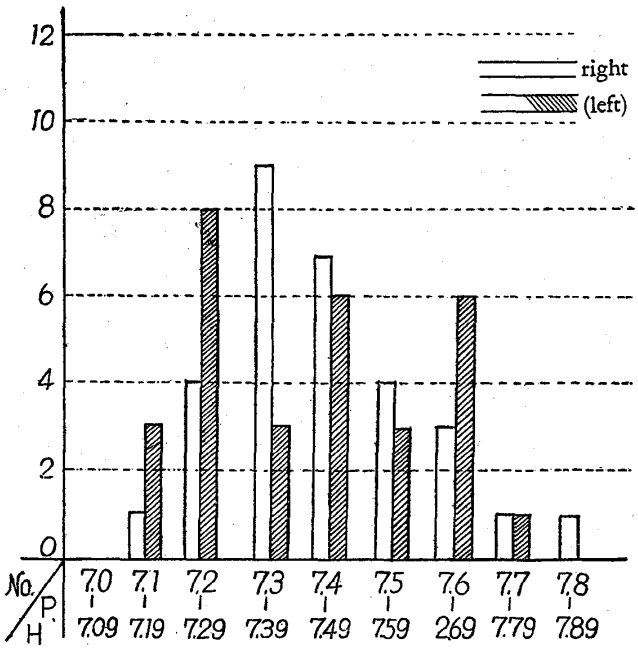
Case I.T.



(Fig. 6)

Right breast pH=7.56±0.18
Left breast pH=7.45±0.12
t=3.385<
p=5%

Case K.M.



(Fig. 7)

Right breast pH=7.43±0.61
Left breast pH=7.42±0.13
t=0.293>

We find in 2 cases of 5 that milk pH from right breast has higher value than left.

(ii) Among pH value of milk which has been sucked from right and left breasts at the same time, there are difference as followed.

Table 1. Case K.M.

Right	Difference	Left
7.41	−0.02	7.43
7.50	−0.06	7.56
7.59	+0.27	7.32
7.25	−0.31	7.56
7.70	−0.06	7.76
7.44	−0.14	7.58
7.66	−0.04	7.70
7.28	−0.36	7.64
7.43	−0.06	7.49
7.61	−0.02	7.63
7.46	−0.36	7.82
7.54	−0.18	7.72
7.60	−0.01	7.61
7.77	+0.18	7.95
7.74	−0.08	7.82
7.69	0	7.69
7.43	−0.1	7.53
7.55	−0.22	7.77
7.63	−0.13	7.76
7.36	−0.18	7.54
7.29	−0.13	7.42
7.28	−0.39	7.67
7.55	+0.12	7.43
7.09	−0.4	7.49
7.44	−0.25	7.69
Average 7.49	−0.12	7.61

Right breast pH=7.48±0.185
Left breast pH=7.57±0.135
t=2.19<
p=5%

Table 2. Case K.T.

Right	Difference	Left
7.41	+0.04	7.37
7.31	−0.14	7.45
7.34	−0.3	7.64
7.64	−0.1	7.74
7.51	−0.16	7.67
7.54	−0.06	7.60
7.70	+0.24	7.46
7.54	+0.03	7.51
7.54	+0.18	7.36
7.56	+0.18	7.38
7.54	+0.01	7.53
7.77	+0.31	7.46
7.57	+0.06	7.51
7.46	−0.37	7.83
7.62	+0.09	7.53
7.79	+0.15	7.64
7.81	+0.43	7.38
7.54	+0.34	7.20
7.54	+0.22	7.32
7.59	−0.09	7.68
7.50	−0.26	7.76
7.46	+0.19	7.27
7.32	−0.13	7.45
Average 7.51	± 0	7.51

pH=7.54±0.133
pH=7.53±0.156
t=0.22>

Table 3. Case Y.T.

Right	Difference	Left
7.67	+0.07	7.60
7.74	+0.24	7.50
7.51	−0.34	7.85
7.46	−0.19	7.65
7.76	+0.1	7.66
7.74	−0.02	7.76
7.51	+0.07	7.44
7.51	+0.12	7.39
7.56	+0.09	7.47
7.68	+0.31	7.37
7.48	−0.16	7.64
7.00	+0.24	7.46
7.57	0	7.57
7.76	+0.32	7.44
7.48	+0.04	7.44
7.64	−0.06	7.70
7.55	+0.05	7.50
7.53	−0.05	7.58
7.77	+0.3	7.47
7.52	+0.08	7.44
7.64	0	7.64
7.36	−0.2	7.56
7.50	+0.13	7.73
Average 7.60	+0.01	7.59

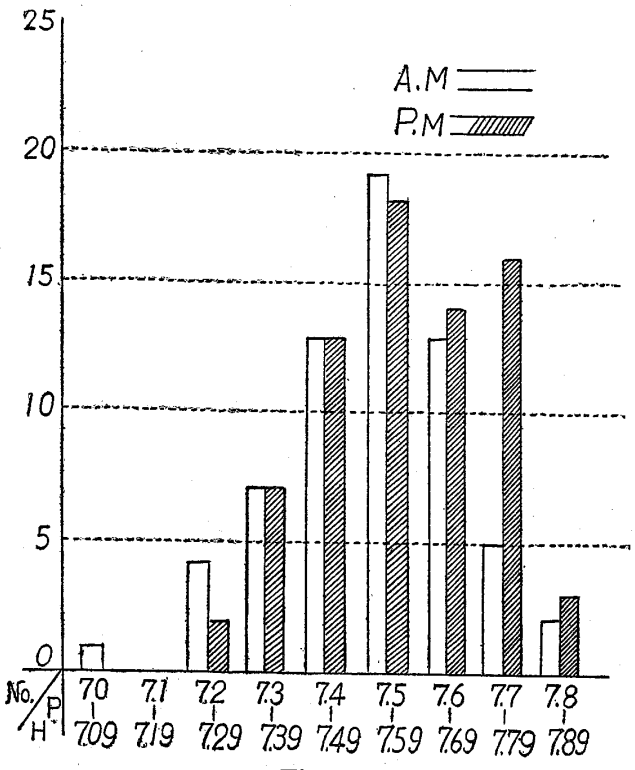
pH=7.49±0.111
pH=7.54±0.134
t=1.12>

In case K.M., milk average pH rate from left breast shows higher than right.

From above mentioned two results, we have not found the remarkable tendencies among the five cases.

(4) Milk pH in the morning and in the afternoon.

(i) Total average of the five cases.

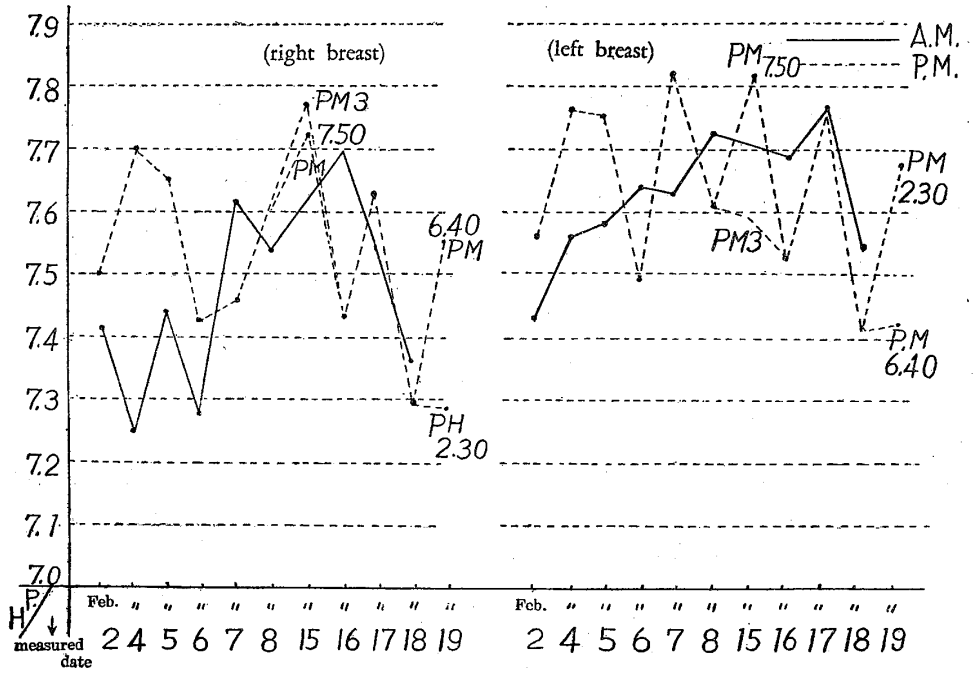


(Fig. 8)

A.M. pH=7.52±0.143 P.M. pH=7.54±0.150

(ii) Individual cases.

Case K.M.

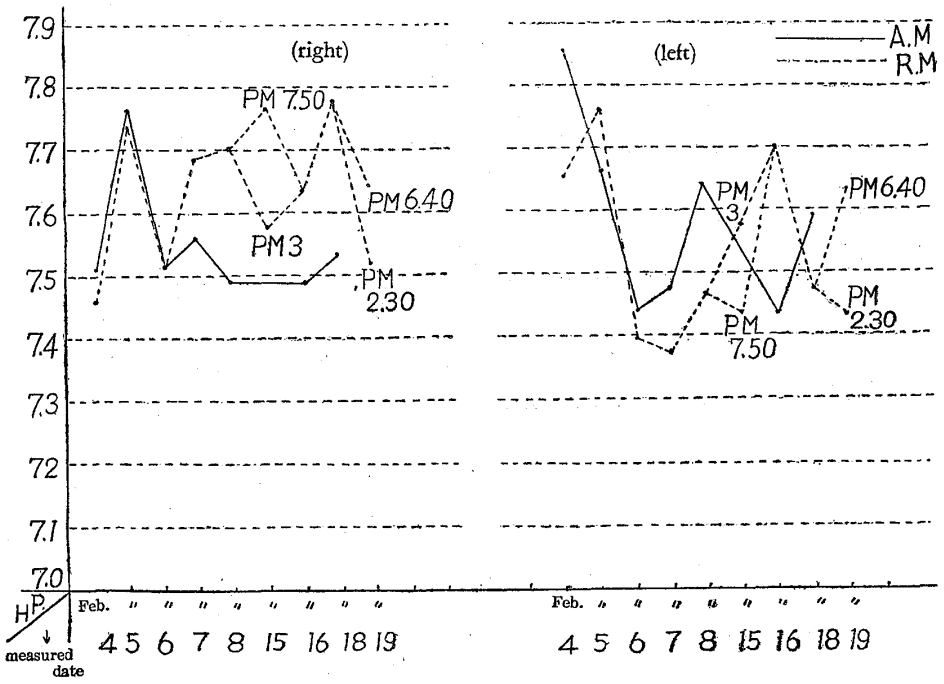


(Fig. 9)

A.M. pH=7.52±0.17 P.M. pH=7.59±0.16

t=1.466>

Case K.Y.

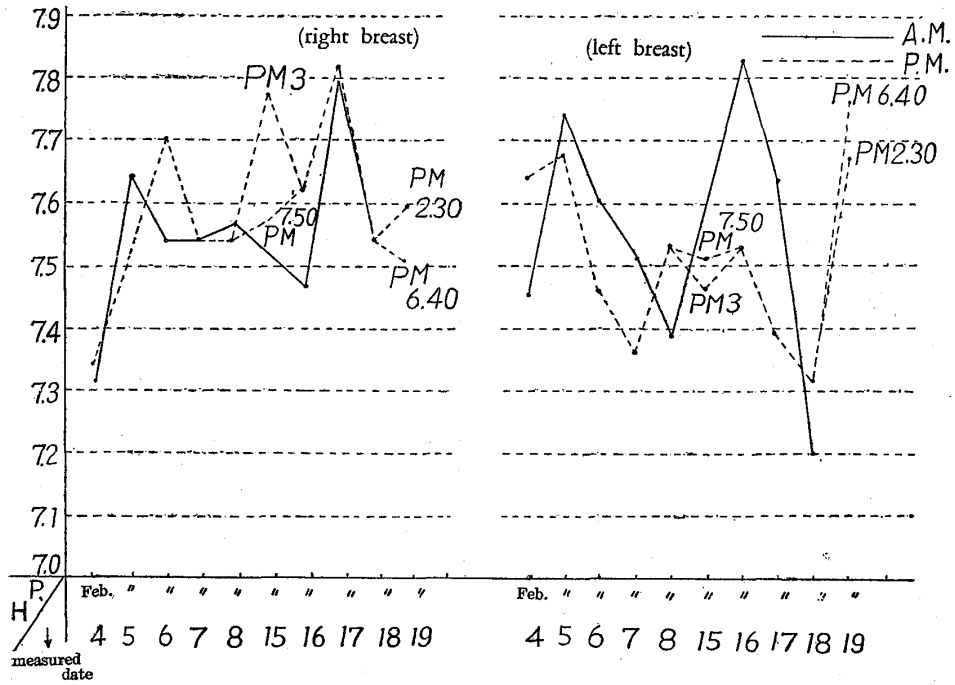


(Fig. 10)

A.M. pH=7.50±0.114 P.M. pH=7.5±0.142

t=0.957>

Case Y.T.



(Fig. 11)

A.M. pH=7.55±0.119 P.M. pH=7.59±0.149

t=0.783>

No significant relation between milk pH suckled in the morning and milk pH in the afternoon was recognized, but it shows a tendency which milk pH suckled in the morning is lower than that in the afternoon.

(5) Relation between milk pH and sucking interval (See Table 4~8).

No general inclination among them are recognized, but we presume that the milk pH has a inclination which its value lowers as sucking interval get longer.

(6) Relation between milk pH and the sleeping hours of the mother (See Table 9~13).

It is not recognized on any relation between them.

(7) Relation between milk pH and the suckling frequency the day before (See Table 14~18).

Although we counted pH average in the morning, it is not shown that sucking frequency have influence on the milk pH in the next morning.

(8) Relation between milk pH and the proteins in foods which the mother took in the day before (See Table 19~23).

We have recognized no tendency among them.

(9) Relation between milk pH and the fat in foods which the mother took in the day before (See Table 24~28).

(10) Relation between milk pH and the calorie of food which the mother took the day before (See Table 29~33).

Although we thought in the beginning that the calorie of food which the mother took the day before has influencies on the milk pH in the next morning and we compared with milk pH in the morning and in the afternoon, we had no intention.

IV. Summary:

As above mentioned, we must say that the pH of human milk shows the remarkable differences in five mothers. Though we cannot find regular tendency distinctly in those cases, yet, there remains some possibility of finding ont some tendency in the case of no. 4 as well as of no. 5. We will continue our works to clarify these points.

(*Received Aug. 31, 1955*)

Table 4. Case K.M.

P.H \ Interval	0 ~ 30m	31m ~ 1h	1.01h ~ 1.30h	1.31h ~ 2h	2.01h ~ 2.30h	2.31h ~ 3h	3.01h ~ 3.30h	3.31h ~ 4h	4.01h ~ 4.30h	4.31h ~ 5h	5.01h ~ 5.30h	5.31h ~ 6h	6.01h ~ 6.30h	6.31h ~ 7h
7.0 ~ 7.09									•					
7.1 ~ 7.19														
7.2 ~ 7.29				•	•									•
7.3 ~ 7.39						•								
7.4 ~ 7.49	• •	•	• •	•			•							
7.5 ~ 7.59	•	• •	•			• •		•		•				
7.6 ~ 7.69	• • •	• • •		• •	•									
7.7 ~ 7.79	• • •	• •	• •							•				
7.8 ~ 7.89			• •											
Average	7.63	7.67	7.61	7.49	7.46	7.49	7.44	7.55	7.09	7.63				7.28

Table 5. Case K.Y.

P.H \ Interval	0 ~ 30m	31m ~ 1h	1.01h ~ 1.30h	1.31h ~ 2h	2.01h ~ 2.30h	2.31h ~ 3h	3.01h ~ 3.30h	3.31h ~ 4h	4.01h ~ 4.30h	4.31h ~ 5h	5.01h ~ 5.30h	5.31h ~ 6h	6.01h ~ 6.30h	6.31h ~ 7h
7.0 ~ 7.09														
7.1 ~ 7.19														
7.2 ~ 7.29							•	•						
7.3 ~ 7.39	• •	•		•			•							
7.4 ~ 7.49	• • •			•			•							
7.5 ~ 7.59	• • • • •	• • • •	• •	•	•	•		•						
7.6 ~ 7.69	• • • •			•		•								
7,7 ~ 7.79	• • •			• •										
7.8 ~ 7.89	• •													
Average	7.59	7.49	7.54	7.58	7.50	7.59	7.36	7.37						

Table 6. Case Y.T.

Interval / P.H	0 ~ 30m	31m ~ 1h	1.01h ~ 1.30h	1.31h ~ 2h	2.01h ~ 2.30h	2.31h ~ 3h	3.01h ~ 3.30h	3.31h ~ 4h	4.01h ~ 4.30h	4.31h ~ 5h	5.01h ~ 5.30h	5.31h ~ 6h	6.01h ~ 6.30h	6.31h ~ 7h
7.0 ~ 7.09														
7.1 ~ 7.19														
7.2 ~ 7.29														
7.3 ~ 7.39	•	•		•				•						
7.4 ~ 7.49	• •			•	•					• • •	•	•		
7.5 ~ 7.59	• •	•		• • • •	• • •			•	•					
7.6 ~ 7.69	• •		•	• •		•								
7.7 ~ 7.79	• • • • •	•			•									
7.8 ~ 7.89														
Average	7.60	7.55	7.64	7.54	7.56	7.66		7.45	7.45	7.47	7.47	7.44		

Table 7. Case I.T.

Interval / P.H	0 ~ .30m	.31h ~ 1h	1.01h ~ 1.30h	1.31h ~ 2h	2.01h ~ 2.30h	2.31h ~ 3h	3.01h ~ 3.30h	3.31h ~ 4h	4.01h ~ 4.30h	4.31h ~ 5h	5.01h ~ 5.30h
7.0 ~ 7.09											
7.1 ~ 7.19											
7.2 ~ 7.29					•					•	
7.3 ~ 7.39			•	•	•		•				
9.4 ~ 7.49	•	•	• •	• • •		• •	•	•			•
7.5 ~ 7.59	• •	•		• • •	• •						
7.6 ~ 7.69	•	•	•	• •							
7.7 ~ 7.79				•	•		•				
7.8 ~ 7.89	•				•						
Average	7.50	7.56	7.48	7.51	7.53	7.43	7.51	7.40		7.26	7.47

Table 8. Case K.M.

Interval / P.H	0 ⟩ 30m	31m ⟩ 1h	1.01h ⟩ 1.30h	1.31h ⟩ 2h	2.01h ⟩ 2.30h	2.31h ⟩ 3h	3.01h ⟩ 3.30h	3.31h ⟩ 4h	4.01h ⟩ 4.30h	4.31h ⟩ 5h	5.01h ⟩ 5.30h
7.0 ⟩ 7.09											
7.1 ⟩ 7.19	•				•	•					
7.2 ⟩ 7.29	• •			• •	• •			•			
7.3 ⟩ 7.39	•			• •	• •				•		
7.4 ⟩ 7.49			• •	•	• •	•		• •			
7.5 ⟩ 7.59	•			• • •							
7.6 ⟩ 7.69	• • •		• •	• • •	•						
7.7 ⟩ 7.79	•		•								
7.8 ⟩ 7.89											
Average	7.48		7.58	7.48	7.35	7.30		7.37	7.32		

Table 9. Case K.M.

Sleeping hours / P.H	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.79	Average (A.M.)	Total
5.											
5.30											
6.			• ×		× × × ×	×	• • • ×		×	7.72	12
6.30											
7.					×	• × ×	• • × ×	• ×		7.66	10
7.30					•	•	×	×		7.51	4
8.	•		×	•	• • ×	• • ×	• ×	• × × ×	×	7.43	16
8.30											
9.											
3.30											
Total	1		3	1	9	8	11	7	2		40

Table 10. Case K.Y.

P.H / Sleeping hours	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.89	Average (A.M.)	Total
5.					×	• ×	• • ×	• ×		7.63	8
5.30											
6.				• ×	•		×			7.36	4
6.30											
7.			•	• ×	• •	• • • ××××	×		•	7.50	14
7.30											
8.			•	××	×	• ×××	• ×	• ××	×	7.54	16
						××					
8.30											
9.											
9.30											
Total			2	6	5	15	7	5	2		42

Table 11. Case K.T.

P.H / Sleeping hours	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.89	Average (A.M.)	Total
5.											
5.30											
6.											
6.30											
7.					×	×	××				4
7.30											
8.				××	• • • •	• • • • • ×	××	×		7.49	14
8.30											
9.				• •	• ××	• • • •	•	××		7.50	12
9.30											
Total				4	8	10	5	3			30

Table 12. Case I.T.

Sleeping hours / P.H	5	5.30	6	6.30	7	7.30	8	
7.0 ┐ 7.09								
7.1 ┐ 7.19			•					1
7.2 ┐ 7.29			• •					2
7.3 ┐ 7.39			• • •				• ×	5
7.4 ┐ 7.49		× ×	• • • • × × ×		• ×		• • × • •	17
7.5 ┐ 7.59		×	• ×	• • •	• ×		• ×	10
7.6 ┐ 7.69			• • ×		• • ×		×	7
7.7 ┐ 7.79			• • ×		×			4
7.8 ┐ 7.89		×		•				2
Average (A.M.)			7.46	7.61	7.58		7.43	48

Table 13. Case K.M.

Sleeping hours / P.H	5	5.30	6	6.30	7	7.30	8	
7.0 ┐ 7.09								
7.1 ┐ 7.19					• ×			2
7.2 ┐ 7.29	• •				• ×	• •	• • × × ×	11
7.3 ┐ 7.39				• • • •	• × × ×		• • ×	11
7.4 ┐ 7.49				•	• × × ×	• ×	× ×	9
7.5 ┐ 7.59				• • •	×			4
7.6 ┐ 7.69				• •	• ×	× × ×	×	8
7.7 ┐ 7.79					•	•		2
7.8 ┐ 7.89							×	1
Average (A.M.)	7.26			7.47	7.44	7.42	7.29	48

Table 14. Case K.M.

Suckling frequency \ P.H	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.89	Average (A.M.)	Total
5											
6											
7			•		• ×××	•	•••• ××	•	×	7.57	14
8	•		×		• ×	• ×	××	• ×		7.48	10
9			×	•	××	• ×	••			7.59	8
10											
Total	1		3	1	8	5	10	3	1		32

Table 15. Case K.Y.

Suckling frequency \ P.H	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.89	Average (A.M.)	Total
5											
6											
7				×	×	••• ××	•• ×	• ×		7.6	12
8				•		• ××				7.47	4
9			•	××	•	• ××××	× ××	• ×	• ×	7.58	16
10			•	•	••					7.38	4
Total			2	5	4	13	6	4	2		36

Table 16. Case Y.T.

P.H / Suckling frequency	7.0 ⟩ 7.09	7.1 ⟩ 7.19	7.2 ⟩ 7.29	7.3 ⟩ 7.39	7.4 ⟩ 7.49	7.5 ⟩ 7.59	7.6 ⟩ 7.69	7.7 ⟩ 7.79	7.8 ⟩ 7.89	Average (A.M.)	Total
5				• • × ×	• • • • • • × × × ×	• • • • • • • • • × × × ×	• × × × ×	× × × ×		5.7	34
6											
7											
8											
9											
10											
Total				4	9	12	5	4			34

Table 17. Case I.T.

Suckling frequency / P.H	5	6	7	8	9	Total
7.0 ⟩ 7.09						
7.1 ⟩ 7.19	•					1
7.2 ⟩ 7.29	•	•				2
7.3 ⟩ 7.39	• •	×	• •			5
7.4 ⟩ 7.49	× × × ×	• • •	• • • × × × × ×			15
7.5 ⟩ 7.59	• × × ×		• • • ×	• •		10
7.6 ⟩ 7.69	• × ×	×	•			5
7.7 ⟩ 7.79	• • × ×					4
7.8 ⟩ 7.89	×		•			5
Average (A.M.)	7.47	7.41	7.51	7.51		44

Table 18. Case K.M.

Suckling frequency / P.H	5	6	7	8	9	Total
7.0 ⌋ 7.09						
7.1 ⌋ 7.19				•	• ×	3
7.2 ⌋ 7.29			• •	• ×	× × × ×	8
7.3 ⌋ 7.39			• • •	× × × ×	• × × ×	11
7.4 ⌋ 7.49			• × ×	• • × × × × ×	× ×	12
7.5 ⌋ 7.59			×	• ×	•	4
7.6 ⌋ 7.69			• ×	• ×	• ×	6
7.7 ⌋ 7.79			•			1
7.8 ⌋ 7.89					×	1
Average (A.M.)			7.41	7.42	7.43	46

Table 19. Case K.M.

Protein g / P.H	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109	110 ⌇ 119	120 ⌇ 129	130 ⌇ 139
7.0 ⌋ 7.09					•				
7.1 ⌋ 7.19									
7.2 ⌋ 7.29	×	×	•						
7.3 ⌋ 7.39	•								
7.4 ⌋ 7.49	×	×	× ×	×	• ×		•		
7.5 ⌋ 4.59	•	×		• •	×				
7.6 ⌋ 7.69		×	•	• • × × ×	• •		•		
7.7 ⌋ 7.79				• • ×					
7.8 ⌋ 7.89				×					
Average (A.M.)	7.45		7.46	7.64	7.49		7.57		

Table 20. Case K.Y.

P.H \ Protein g	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109	110 ⌇ 119	120 ⌇ 129	130 ⌇ 139
7.0 ⌊ 7.09									
7.1 ⌊ 7.19									
7.2 ⌊ 7.29			• •						
7.3 ⌊ 7.39			×	× ×	•	•			
7.4 ⌊ 7.49			•			×		• ×	
7.5 ⌊ 7.59			• ×	• • ×	• × ×	× ×	×	• ×	
7.6 ⌊ 7.69				•		×	• ×	• ×	
7.7 ⌊ 7.79				•		×	•	×	
7.8 ⌊ 7.89				×				•	
Average (A.M.)			7.27	7.62	7.47	7.39	7.69	7.61	

Table 21. Case Y.T.

P.H \ Protein g	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109	110 ⌇ 119	120 ⌇ 129	130 ⌇ 139
7.0 ⌊ 7.09									
7.1 ⌊ 7.19									
7.2 ⌊ 7.29									
7.3 ⌊ 7.39				•		× ×	•		
7.4 ⌊ 7.49				• •		• •		× ×	• ×
7.5 ⌊ 7.59				• • •		• • ×	•	• • ×	
7.6 ⌊ 7.69				×		×		× ×	•
7.7 ⌊ 4.79				×				×	×
8.8 ⌊ 8.89									
Average (A.M.)				7.31		7.50	7.46	7.56	7.56

Table 22. Case I.T.

P.H \ Protein g	40 ~ 49	50 ~ 59	60 ~ 69	70 ~ 79	80 ~ 89	90 ~ 99	100 ~ 109	110 ~ 119	120 ~ 129	Total
7.0 | 7.09										
7.1 | 7.19					•					1
7.2 | 7.29				•	•					2
7.3 | 7.39		•		•	• • ×					5
7.4 | 7.49	× ×	• • • × ×	×	• •	• × × ×		×			15
7.5 | 7.59	×	• • •	×	•	• ×	•	×			10
7.6 | 7.69			×	•	×	•	×			5
7.7 | 7.79			×			• •	×			4
7.8 | 7.89	×	•								2
Average (A.M.)		7.52		7.45	7.33	7.69				Total

Table 23. Case K.M.

P.H \ Protein g	40 ~ 49	50 ~ 59	60 ~ 69	70 ~ 79	80 ~ 89	90 ~ 99	100 ~ 109	110 ~ 119	120 ~ 129	Total
7.0 | 7.09										
7.1 | 7.19				• ×		•	×			4
7.2 | 7.29			×	• •	• × × ×		×			8
7.3 | 7.39			×	• • • • • •	• ×		× ×			11
7.4 | 7.49		×	• • × × × ×		• × × ×			•		12
7.5 | 7.59				• ×	×			•	•	5
7.6 | 7.69		×	•		• ×	•			•	6
7.7 | 7.89			•							1
7.8 | 7.89					×					1
Average (A.M.)			7.53	7.33	7.40	7.51		7.50	7.58	48

Table 24. Case K.M.

Fat g / P.H	0 ⌇ 9	10 ⌇ 19	20 ⌇ 29	30 ⌇ 39	40 ⌇ 49	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109
7.0 ⌊ 7.09			•								
7.1 ⌊ 7.19											
7.2 ⌊ 7.29		•	××								
7.3 ⌊ 7.39			•								
7.4 ⌊ 7.49		××	• ×××			• ×					
7.5 ⌊ 7.59			• ×			• • ×					
7.6 ⌊ 7.69		•	• • ×			• • • ×××					
7.7 ⌊ 7.79						• • ×					
8.8 ⌊ 7.89			×								
Average (A.M.)		7.46	7.45			7.64					

Table 25. Case K.Y.

Fat g / P.H	0 ⌇ 9	10 ⌇ 19	20 ⌇ 29	30 ⌇ 39	40 ⌇ 49	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109
7.0 ⌊ 7.09											
7.1 ⌊ 7.19											
7.2 ⌊ 7.29	•				•						
7.3 ⌊ 7.39	×	×			• ×		•				
7.4 ⌊ 7.49	•				• ×	•					
7.5 ⌊ 7.59	• • ×			××	• • ×	×	• ××				•
7.6 ⌊ 7.69		•		×	•	×					• ×
7.7 ⌊ 7.79		•		×	×						•
7.8 ⌊ 7.89		×				•					
Average (A.M.)	7.45	7.72			7.44	7.65	7.47				7.71

Table 26. Case Y.T.

Fat g / P.H	0 ⌇ 9	10 ⌇ 19	20 ⌇ 29	30 ⌇ 39	40 ⌇ 49	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	90 ⌇ 99	100 ⌇ 109
7.0 ⌊ 9.09											
7.1 ⌊ 7.19											
7.2 ⌊ 7.29											
7.3 ⌊ 7.39			×	• •	×						
7.4 ⌊ 7.49			• • • ×	×	•			• ×			
7.5 ⌊ 7.59			• × ×	• • • •	•		• •				
7.6 ⌊ 7.69			× × ×		×			•			
7.7 ⌊ 7.79			×	×				×			
7.8 ⌊ 7.89											
Average (A.M.)			7.47	7.48	7.52		7.53	7.56			

Table 27. Case I.T.

Fat g / P.H	0 ⌇ 9	10 ⌇ 19	20 ⌇ 29	30 ⌇ 39	40 ⌇ 49	50 ⌇ 59	60 ⌇ 69	70 ⌇ 79	80 ⌇ 89	Total
7.0 ⌊ 7.09										
7.1 ⌊ 7.19				•						1
7.2 ⌊ 7.29			•	•						2
7.3 ⌊ 7.39		×	•	• •	•					5
7.4 ⌊ 7.49	× ×	• • ×	• • • × × × ×	×	•					15
4.5 ⌊ 7.59	×	• • ×	• • • ×	• ×						10
7.6 ⌊ 7.69		• × ×	×	•						5
7.7 ⌊ 7.79		×	×	• •						4
7.8 ⌊ 7.89	×	•								2
Average (A.M.)		7.59	7.44	7.47	7.39					44

Table 28. Case K.M.

P.H \ Fat g	0 ≀ 9	10 ≀ 19	20 ≀ 29	30 ≀ 39	40 ≀ 49	50 ≀ 59	60 ≀ 69	70 ≀ 79	80 ≀ 89	Total
7.0 | 7.09										
7.1 | 7.19		• ××				•				4
7.2 | 7.29		• • • ×× ×××								8
7.3 | 7.39		• • • ×××	• • • •						×	11
7.4 | 7.49		• • ×× ×××	• • ×						××	12
7.5 | 7.59		• ×	• •	•						5
7.6 | 7.69		×	• ×	•		•			×	6
7.7 | 7.79			•							1
7.8 | 7.89		×								1
Average (A.M.)		7.33	7.47	7.58		7.43				48

Table 29. Case K.M.

P.H \ Cal	2000 ≀ 2199	2200 ≀ 2399	2400 ≀ 2599	2600 ≀ 2799	2800 ≀ 2999	3000 ≀ 3199	3200 ≀ 3399	3400 ≀ 3599	3600 ≀ 3799	3800 ≀ 3999	4000 ≀ 4199	4200 ≀ 4399
7.0 | 7.09				•								
7.1 | 7.19												
7.2 | 7.29		• ×		×								
7.3 | 7.39				•								
7.4 | 7.49	×	×××	×	• ×			•					
7.5 | 7.59		×	• ×	• •								
7.6 | 7.69	• •	• ×	• • ×	××			•					
7.7 | 7.79			• ×	•								
7.8 | 7.89	×											
Average (A.M.)	7.62	7.46	7.68	7.46			7.57					

Table 30. Case K.Y.

P.H \ Cal	2000 ~ 2199	2200 ~ 2399	2400 ~ 2599	2600 ~ 2799	2800 ~ 2999	3000 ~ 3199	3200 ~ 3399	3400 ~ 3599	3600 ~ 3799	3800 ~ 3999	4000 ~ 4199	4200 ~ 4399
7.0 | 7.09												
7.1 | 7.19												
7.2 | 7.29						•	•					
7.3 | 7.39					×	×			• ×	•		
7.4 | 7.49							•		•	•		×
7.5 | 7.59						• ×	× × ×		• • • × × × ×			•
7.6 | 7.69					•		• • •		×			•
7.7 | 7.79					•		• ×					×
7.8 | 7.89					×				•			
Average (A.M.)					7.72	7.37	7.53		7.55	7.39		7.58

Table 31. Case Y.T.

P.H \ Cal	2000 ~ 2199	2200 ~ 2399	2400 ~ 2599	2600 ~ 2799	2800 ~ 2999	3000 ~ 3199	3200 ~ 3399	3400 ~ 3599	3600 ~ 3799	3800 ~ 3999	4000 ~ 4199	4200 ~ 4399
7.0 | 7.09												
7.1 | 7.19												
7.2 | 7.29												
7.3 | 7.39		•				×	•	×				
7.4 | 7.49					• • ×	• • × ×		•				
7.5 | 7.59		•		• •	• •	• ×	•	• ×				
7.6 | 7.69					×	• × × ×						
7.7 | 7.79					× ×	×						
7.8 | 7.89												
Average (A.M.)		7.44		7.53	7.51	7.54	7.46	7.48				

Table 32. Case I.T.

Cal / P.H	1400 ⟩ 1599	1600 ⟩ 1799	1800 ⟩ 1999	2000 ⟩ 2199	2200 ⟩ 2399	2400 ⟩ 2599	2600 ⟩ 2799	2800 ⟩ 2999	3000 ⟩ 3199	Total
7.0 ⟩ 7.09										
7.1 ⟩ 7.19			•							1
7.2 ⟩ 7.29			•					•		2
7.3 ⟩ 7.39			• •	×	•					5
7.4 ⟩ 7.49		• • × ×	• × ×		• • × × ×			• ×	×	15
7.5 ⟩ 7.59		×		• •	• • • ×			×	×	10
7.6 ⟩ 7.69				• ×	• ×			×		5
7.7 ⟩ 7.79					• • ×			×		4
7.8 ⟩ 7.89		×	×	•						2
Average (A.M.)		7.46	7.31	7.55	7.55			7.36		44

Table 33. Case K.M.

Cal / P.H	1400 ⟩ 1599	1600 ⟩ 1799	1800 ⟩ 1999	2000 ⟩ 2199	2200 ⟩ 2399	2400 ⟩ 2599	2600 ⟩ 2799	2800 ⟩ 2999	3000 ⟩ 3199	Total
7.0 ⟩ 7.09										
7.1 ⟩ 7.19		• ×		•			×			4
7.2 ⟩ 7.29		• •	× × ×	• ×			×			8
7.3 ⟩ 7.39	•	• • • ×	×				• • • × ×			11
7.4 ⟩ 7.49		• • × ×	× ×	• × × ×					•	12
7.5 ⟩ 7.59		• ×		•			•		•	5
7.6 ⟩ 7.69	•	×	× ×	• •						6
7.7 ⟩ 7.79		•								1
7.8 ⟩ 7.89			×							1
Average (A.M.)	7.46	7.38		7.45			7.40		7.50	48