Clinical and other Notes.

MILK IN INDIA.

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The military sanitarian and analyst practising in India is constantly confronted with problems which are unknown to his colleagues in temperate latitudes. Not the least of these is a lack of reliable standards by which to compare the various food supplies so frequently submitted to him for expert opinion and advice.

One of the commonest of the Indian foods sent to divisional laboratories is milk.

During the past seven months I have examined 326 samples and have found that whereas the cows' milk was uniformly up to requirements not one of the samples of buffaloes' milk conformed to the standard given by most of the various authorities quoted in the attached Table 2.

Dr. Simpson states that the standard adopted for cows' milk in Calcutta is :—

Constituents	Cows' milk	Buffaloes' milk
Water	88·5	83·5
Total solids	11·5	16·5
Non-fatty solids	8·5	10·5
Fat	3·0	6·7
Ash	0·7	0·7

Any cows' milk containing less than 11·5 total solids, 8·5 non-fatty solids and 3·0 milk fat was considered not to be genuine milk and the vendor was prosecuted.

This rule was in strict accordance with the Sale of Milk Regulations issued by the Board of Agriculture in 1901, which provide that fresh milk must contain not less than 3 per cent. of milk fat and 8·5 per cent. of milk solids other than fat.

Dr. Simpson gives it as his opinion that analyses establish the fact that the composition of cows' milk in Calcutta is the same as in England and that buffaloes' milk is twice as rich in fat and contains a larger amount of total solids than cows' milk.

In 1899 and 1900, Mr. Walter Leather made a number of analyses of milk of Indian cows and buffaloes in the Bombay Presidencies. His results differed from the Calcutta analyses only in the fact that the samples which he examined showed a uniformly higher specific gravity.

This is probably due, says Dr. Simpson, to the fact that Mr. Leather's analyses were all made in the cold and beginning of the hot season and not during the rains, when the milk is poorer. ("Principles of Hygiene as applied to Tropical and Sub-Tropical Climates," p. 182.)

From the results of my analyses it will be seen that the composition of the milk of cows in the sub-tropical Valley of Peshawar is very similar to that which obtains both in temperate climates and on the Delta of the Ganges.

Water is the chief adulterant of milk the world over, and experienced Indian analysts tell us that the extent varies from 20 to 60 per cent. in different parts of the country. In Bengal it is the recognised custom to dilute all milk with one-fourth of its bulk of water.

The samples which I have examined were, with thirteen exceptions, received from the military dairies at Peshawar and Cherat. My results are chiefly of interest with reference to buffaloes' milk.

Mr. Winter Blyth states that the milk of the buffalo (*Bos bubalus*) has been investigated somewhat minutely by A. Pappel and H. Droop Richmond (*Journal of the Chemical Society*, lvii., p. 752), but on the far-off Indian Frontier, I have not been able to turn up this reference. Mr. Blyth, however, quotes the results, and publishes them, together with those of Fleischman, the great German dairy expert, with which it will be seen they are in the sharpest contrast.

The figures given in Table II. are from the sixth edition of Mr. Blyth's valuable work, "Foods: Their Composition and Analysis," published in 1909. The other figures quoted are from the latest editions of Firth's "Theory and Practice of Hygiene," Parkes and Kenwood's "Hygiene," and Simpson's "Principles of Hygiene."

It will be seen from Table I. that the averages of 124 samples analysed in my laboratory between November, 1909, and June, 1910, were as follows:—

Specific gravity	Total solids	Fat	Solids, not fat
1,034·04 ..	15·98 ..	1·98 ..	10·0

In view of the uniformly low amounts of fat in the Peshawar buffalo milk, I communicated with the divisional farms officer and asked for reasons. He was unable to furnish me with any explanation, and suggested that it might be useful to ascertain the results obtained in military dairies in other parts of India. This has been done, and the results are shown in Tables III. and IV. It will be seen that the percentage of butter fat given by five out of six authorities in the standard analyses quoted in Table II., are not obtained in any Government dairy farm in India.

The procedure for the analysis of milk adopted in the laboratory of the first division is that taught in the Royal Army Medical College, and detailed in Firth's "Theory and Practice of Hygiene," p. 281, *et seq.*

The method used for determining the amount of fat is Leffman and Beam's centrifugal apparatus described in the *Analyst*, 1892, vol. xvii., pp. 83, 102, and 144. Colonel Firth says that "This method is subject to an error of ·1 per cent., but its rapidity and ease render it a valuable and reliable means of fat determination."

The method used in the Government dairies is Dr. Gerber's type of centrifugal apparatus driven by a strap.

I have compared the results with this apparatus with those obtained by the Leffman and Beam apparatus, and they agree fairly well.

The results of my investigations appear to establish the following facts:—

(1) The cows' milk supplied to the soldier by Government dairies in India is much above the standard laid down by the Sale of Food and Drugs Regulations of 1901.

(2) It will, moreover, compare favourably with the results obtained in English dairies.

(3) Buffalo milk obtained from Government dairies in India is, however, in its percentage of fat, much below the standards laid down by all the authorities consulted, with the exception of Richmond and Pappal, and at Peshawar the percentage of total solids has also been uniformly much below the amounts given in all but one of the analyses usually accepted as guides.

(4) The results of analyses of buffaloes' milk in various parts of India, as shown in Tables III. and IV., indicate that the amount of butter fat in buffalo milk is most in warm and moist climates such as Bengal, and least in hot or cold and dry climates such as Peshawar.

(5) The results obtained appear to indicate that no general standard can be fixed for the whole of India, and that the percentage of fat in buffalo milk given by most of the authorities hitherto accepted as standards requires reconsideration.

TABLE I.—ANALYSES OF MILK IN THE DIVISIONAL LABORATORY, FIRST PESHAWAR DIVISION. FROM NOVEMBER, 1909, TO JUNE, 1910.

Cows' Milk (Composition).

Month	Average	Number of analyses	Specific gravity	Total solids	Fat	Solids not fat
November	do.	14	1,033·57	13·09	3·85	9·24
December	do.	29	1,033·8	13·674	4·214	9·46
January	do.	27	1,032·8	13·7	4·5	9·2
February	do.	25	1,032·64	13·428	4·28	9·148
March	do.	25	1,033·64	14·412	4·552	9·86
April	do.	30	1,034·1	14·26	4·96	9·29
May	do.	23	1,030·1	12·33	3·67	8·66
June	do.	30	1,029·1	12·02	3·9	8·12
Average of 202 analyses ..			1,032·44	13·393	4·286	9·107

Buffaloes' Milk (Composition).

Month	Average	Number of analyses	Specific gravity	Total solids	Fat	Solids not fat
November	do.	5	1,034·4	14·5	4·8	9·7
December	do.	12	1,034·5	15·41	5·666	9·875
January	do.	28	1,034·9	15·8	5·75	10·05
February	do.	27	1,033·7	15·14	5·79	9·35
March	do.	23	1,035·8	16·38	6·15	10·23
April	do.	28	1,035·5	17·11	6·66	10·45
May	do.	1	1,034·0	15·8	4·5	11·3
Average of 124 analyses ..			1,034·04	15·98	5·98	10·0

TABLE II.—Standard Composition of Cow and Buffalo Milk, as stated by various Authorities.

Cows' milk	Firth's hygiene	Parkes' and Kenwood's hygiene	Stevenson and Simpson at Calcutta	Dutta and Chose at Calcutta	Cripper	Winter Blyth
Specific gravity ..	1032	1032·5	1032·6	Not stated	1029	1032
Total solids ..	12·83	12·5	14·67	12·84	13·8	12·8
Fat..	3·69	3·5	4·80	3·34	4·88	3·9
Solids-not-fat ..	9·14	9·0	9·87	9·5	8·92	8·9

Buffaloes' milk	Firth's hygiene	Richmond and Pappel	Stevenson and Simpson at Calcutta	Dutta and Chose at Calcutta	Cripper	Fleischman quoted in Blyth's food
Specific gravity ..	1032	Not stated	1033·3	1033	Not stated	Not stated
Total solids ..	18·60	15·86	18·88	18·7	17·38	17·07
Fat..	7·45	5·56	8·02	8·57	7·5	7·46
Solids-not-fat ..	11·15	10·30	10·86	10·13	9·88	9·53

TABLE III.—Showing the Average Monthly Percentage of Fat in Buffaloes' Milk Tested at Agra Military Dairy.

Month	Year	Morning	Evening
April	1909	7·22	6·92
May	1909	7·6	7·02
June	1909	7·92	7·48
July	1909	7·8	7·13
August	1909	7·8	7·1
September	1909	7·45	7·1
October	1909	7·2	7·0
November	1909	7·6	7·0
December	1909	7·2	7·0
January	1910	7·2	7·1
February	1910	7·3	7·1
March	1910	7·3	7·1

TABLE IV.—SHOWING THE AVERAGE PERCENTAGE OF FAT OF BUFFALOES' MILK AT VARIOUS MILITARY DAIRIES IN INDIA.

Serial No.	Name of Dairy	Fat per cent.
1	Lucknow	6·6
2	Cawnpore	7·8
3	Allahabad	7·31
4	Bangalore	6·8
5	Lahore Division	7·0
6	Belgaum	6·9
7	Poona-Kirkee	6·3
8	Rawalpindi	7·30
9	Sialkote	6·25
10	Jubbulpore	6·5
11	Mhow	6·57
12	Peshawar	5·98
13	Cherat	5·5
14	Rawalpindi (Contractor)	6·25

A MODIFIED EQUIPMENT FOR THE ROYAL ARMY MEDICAL CORPS.

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Now that the clothing and marching equipment of the soldier are occupying so much attention among officers of the Corps and others, is it not time that some steps were taken to alter or do away with the very clumsy and unscientific marching order equipment worn by the men of the Royal Army Medical and other Corps? The disadvantage of the present method of strapping the great-coat and mess-tin to the back of the belt without any counter-weight or supporting straps has long been recognised. The belt must be worn very tight, and even then the unbalanced weight of the coat and mess-tin cause them to sag down behind and rest on the buttocks, where they jolt about at every step, the belt buckle also presses into the epigastrium, embarrassing respiration, unduly fatiguing the man, and causing him to adopt a slouching and bent-up method of progression, which seriously impairs his marching efficiency.

It would be better to adopt the new Mills-Burrows equipment in a modified form; but, if this is impossible, a very serviceable kit might be made from the old "bandolier" equipment by attaching the web great-coat slings directly to the belt, as shown in fig. 3, after taking off the ammunition pockets.

If the web great-coat slings were attached well towards the side, and the haversack and water-bottle attached directly to the belt by broad metal hooks, as used in the Austrian Army (in the brown-leather bandolier equipment), or by the patent fastenings in the case of the Mills-Burrows,