

Dairy produce in India / by P. W. O'Gorman.

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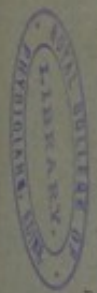
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DAIRY PRO
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P. W.
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of the author.

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DAIRY PRODUCE IN INDIA.

Read at the Indian Medical Congress 1894)



BY

P. W. O'GORMAN,

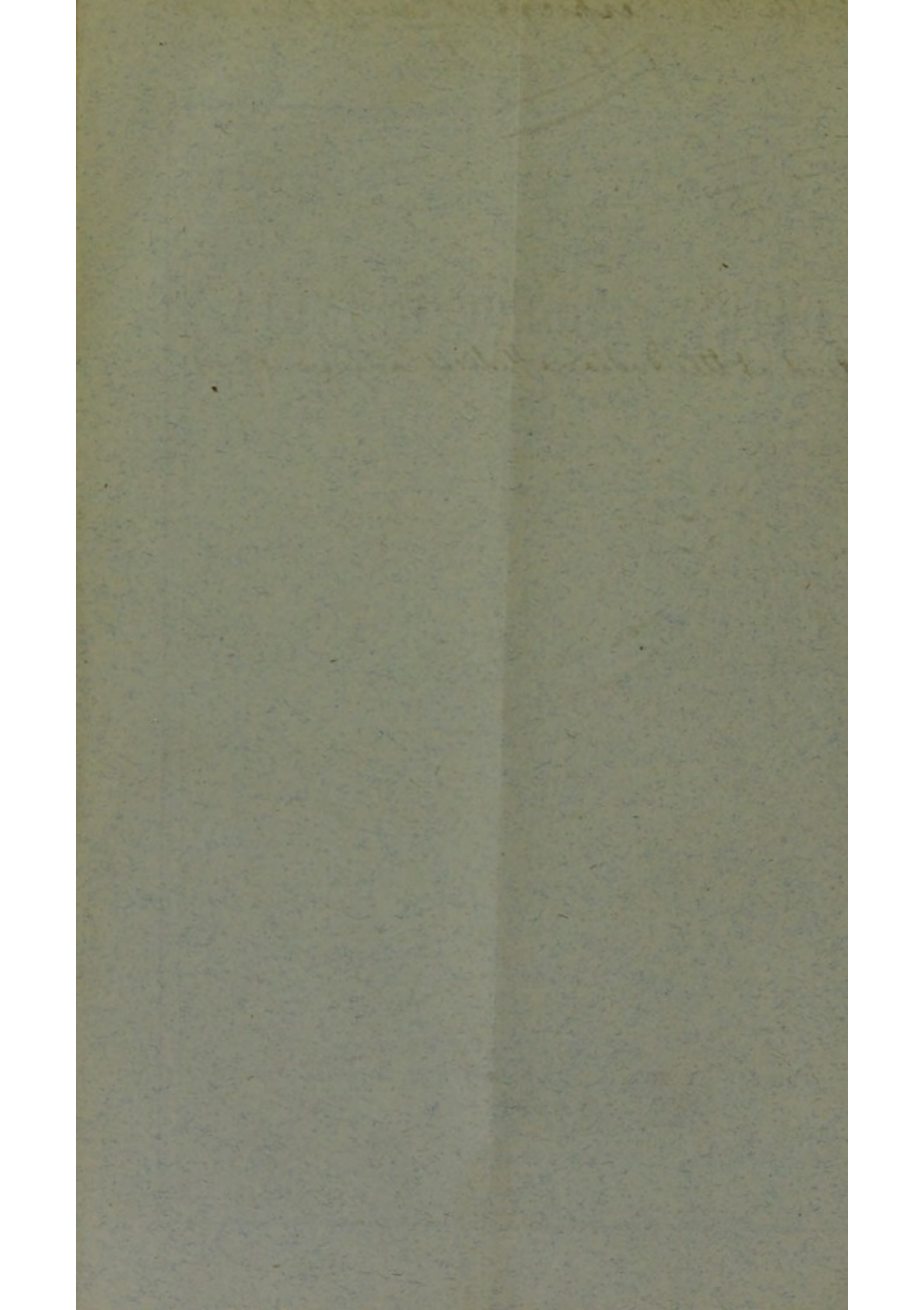
Surgeon-Captain, I. M. S.

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DAIRY PRODUCE IN INDIA.

BY P. W. O'GORMAN,

Surgeon-Captain, I. M. S.

WE LIVE in a land of phenomenal apathy and somnolence, and, where the neglect of the necessaries of life are concerned, unparalleled by probably that of any other country in the world. We eat and we drink and are merry according to our wont ; but who troubles himself to enquire what he eats or drinks, or wherewithal he is merry ? Both Hindus and Mahomedans pride themselves on their superior personal cleanliness, but on closer inspection, among the vast majority of the population, we are alarmed to discover this to be not only a stupendous sham but an abomination.

If there be one thing more than another which is revered, held sacred, worshipped, and quite justly loved in this country, surely, it is the cow. Religious societies have been established for her protection, the "*gow kasam*" rules as a sacred oath, Brahmins do her *pooja* and adore her, turmoil and riots in her behalf are common, and even that bloodiest and most fatal of catastrophes to the British occupation of India, the never-to-be-forgotten Mutiny, is indebted to her. And yet, astounding to relate, she is among the most miserable and most cruelly treated helots in all this land. Life to the Hindu would be unbearable, unliveable without her : her milk gives life to the starving infant, is the sole food of the growing child, the aged, the sick ; while many a poor coolie or wayfarer, in

the form of sweatmeats, has often but little other sustenance ; for, it must be remembered, that milk and its products (alternately with dall or lentils) take the place of meat as staple articles of diet among a large proportion of the community. In no other land is every particle of milk so varied and utilized as in India ; indeed, in no other land is the cow herself made so thoroughly useful to the householder. The urine of the horse, mule and donkey (and even of man) is employed by *dhobies* for washing or bleaching clothes, blankets, &c. ; but that of cows is chiefly so used. The solid and fluid excreta are not merely used as the most valuable of manures, but the former, intermixed with clay, yield the necessary consistence to build the walls of huts, to plaster them when finished, and to aid in the daily so-called "cleansing" process (*leeping*) of these and the room floors, especially round the cooking places. Caked and dried, they constitute the common and often the only fuel. But they are both considered even more precious than this. They are employed not uncommonly as cheap domestic remedies in the form of liniments, dry frictions (ashes), counter-irritants (hot urine), poultices or dressings for external ailments, as well as occasionally (dung ashes) for internal disorders of stomach or liver, or (urine and dung) for leprosy and skin eruptions. And yet more precious still (in combination with milk, curds and ghee, thus constituting the *Páncha-mritha*, Bengali, or five nectars of the cow),* as purifying agents are they administered, in pills, at numerous ceremonies, among others to girl-wives at their second marriage celebrations (*panabe*, Bengali) ; and what is more, to the most enlightened and intelligent of the nation, who, after having drunk of the cup of European knowledge and

* Also known as *Pancha gobbo*—the five products of the cow. It is usually mixed with Ganges water and honey. When administered to purify from out-caste it is called *Pancha-mritha*, also when given in the fifth month of pregnancy. When given in the eighth month of pregnancy it is known as *Osta-mritha*, the honey of the eighth month.

civilisation, finds, on his recrossing the *kala panee*, that this purging pill offers the only salvation from excommunication and social ostracism. In all these extraordinary customs we have very suggestive hints as to the causation of disease, especially consumption. And yet, in the face of all these wide-embracing benefits, gratitude to the cow is practically unknown. Her treatment, lodging, feeding and drinking are a scandal and a crying shame calling loudly for legislation.

If there be any article of diet in India that needs more than any other the earliest and most stringent regulations to be enforced against disease and adulteration, I claim them for our Dairy produce—produce on which by far the largest proportion of our population, European and Native, of all castes and classes—infants, children, invalids—subsist for long periods together, and these the most helpless and voiceless. Time after time is disease being specially traced to this produce; lives are being sacrificed every day, and outcries arise from every station in India against the present *regimé*. The time is, therefore, ripe for legislation. All European countries have laws in force against adulteration of food, and the last were passed by the Senate of the United States in 1892, under the name of the “Pure Food Bill.” That India also needs a Pure Food Act, at least so far as Dairy produce is concerned, is the object of this paper. I propose to discuss it under four several heads :—

I. MILK AND ITS PREPARATIONS.—The preparations from milk are very numerous—some dozen direct products and numberless indirect—and their liability to contamination and adulteration naturally very easy. The preparations are best studied in the following table :—

DAIRY PRODUCE: PREPARATION AND USES.

PRODUCTS.	PREPARATION.	USES.
Whole Milk (<i>Nirala dūdh</i> , <i>Nikhali dūdh</i>).	{ Supplied by cows, buffaloes, goats, sheep, asses, camels, mares. { Sold fresh or boiled (by <i>Hulwais</i>).	{ Sweetmeats, very various. Puddings and custards, sauces and soups. Ice Creams. { Fermented drinks: Koumiss, kephir, and others.
Condensed Milk (<i>Khoa</i>)	{ (1.) By condensation in vacuum pans (Europe). { (2.) By prolonged boiling while stirring in open <i>kurahis</i> (by <i>Hulwais</i>).	{ Eaten as such. Confectionery, puddings, &c., substitute for fresh milk and cream.
Cream (<i>Malai</i>). Skimmed Milk (Creamed Milk, <i>Nikhala hua dūdh</i> , <i>Kream ka dūdh</i> , <i>Mauha dūdh</i>).	{ (1.) By skimming from unboiled milk (old European method). { (2.) By skimming from boiled milk (Devonshire or clotted cream, the <i>malai</i> of the bazaars.) { (3.) By separator machinery process direct from fresh milk (modern European method).	{ For manufacturing butter. Culinary and confectionery. Real cream cheese. { IV. Sold as pure whole milk. Culinary and confectionery. For making <i>khoa</i> . For cheeses, feeding animals.
Cream Cheese ...	{ (1.) By curdling cream with salt or otherwise. { (2.) By curdling milk with sour <i>dahi</i> or butter-milk. { (3.) By boiling milk with <i>dahi</i> , &c. (see <i>chhena</i> or curds). { (4.) From <i>dahi</i> alone.	{ Real cream cheese. { False cream cheese. { Dacca cheese, Abbottabad or Panjaub cheese.

I. Butter (<i>Makhun</i>).	(1.) By addition of <i>dahi</i> to boiled milk, 12—24 hours before churning (Indian method).	As such. Making ghee. Culinary and confectionery.
II. Butter-milk (<i>Mattha</i> , <i>Ghol</i> , <i>Lussee</i>)—	(2.) By ripening of cream alone (European method).	Butter-milk as a nourishing drink for men, calves, cows, pigs, poultry, &c.
(a) Sweet butter: milk. (<i>Mouha dūdh</i> .)	(4.) By direct churning from fresh milk. (Indian method.)	The fresh milk butter-milk (<i>mouha dūdh</i>), sold commonly, alone or mixed, for pure whole milk, especially when boiled.
(b) Sour butter-milk.	(5.) By special combined separating and churning machinery (unknown in India).	Culinary purposes (next to milk, the most extensively used in India). Confectionery.
III. Ghee (Clarified Butter, French Butter).	By boiling ordinary butter till all water evaporates and on setting becomes granular.	Anointing head and body. As medicine (old ghee). Extensively eaten as such. Dressing for the hair (by Sikhs). Used beaten up as false cream for culinary purposes; ice cream; confectionery; cheese.
IV. <i>Dahi</i> , or Tyre (Coagulated sour boiled milk).	By addition of <i>dahi</i> , or sour butter-milk to boiled milk. <i>Bacillus dahi</i> of Dr. Hankin.	Culinary and confectionery. Whew, butter, cheeses.
Curds (<i>Chhena</i>).	(1.) By addition to boiling milk of salt, sour <i>dahi</i> , vinegar, tamarind, or other acid.	Used as such or culinary.
V. Whey (<i>Chhena ka pani</i>)	(2.) By rennet or fruit of <i>Withania coagulans</i> (<i>Danal</i>) <i>Koknaj</i> (making clotted milk or junket).	
VI. Cheeses (<i>Paneer</i>) ...	(1.) By curdling whole milk with rennet or fruit of <i>Withania coagulans</i> (<i>Danal</i>) <i>Koknaj</i> (plain, salted, colored). Do. do. mouldied (special varieties of fungi) and salted Do. skimmed milk or half skim, half whole milk.	
		Cheddar, Chester, &c. Gorgonzola, &c. Cheap cheeses

II. IS DISEASE COMMUNICABLE BY DAIRY PRODUCE?—This is a question that has now been well threshed out as well in the United Kingdom as on the Continent, in America, and in this country, and much valuable information has accrued from several important recent investigations.

(1). *Bacteriology*.—From the labours of Pasteur, Koch, Klein and others much light has been thrown on the bacteriology of milk products. Schenk* describes 25 pathogenic and saprophytic micro-organisms, but several others can be added. Milk may be contaminated either during milking or in the subsequent manipulation, and may exhale an odour owing to the substances so acquired (*Bacillus fœtidus lactis*), or become slimy or stringy (*Bacillus lactis viscosus*), or take on a bitter or an acid (*B. dahii*, Hankin), sweetish, putrid taste (*Bacillus fœtidus lactis*), or its color may turn yellow, blue (*B. cyanogenus*), or red (*B. lactis erythrogenes*). Moreover various pathogenic micro-organisms (parasitic) may be imparted to milk from the diseased animal furnishing it. Many dangerous organisms, however, may exist in it or in its products without exciting notice.

(2). *Diseases*.—The following 13 diseases have been discovered to be due to milk contaminated, either directly or indirectly, by specific germs, *viz.* :—

Tuberculosis.†

* Schenk's Manual of Bacteriology.

† See, among recent contributions, Discussions on Tuberculosis; Transactions International Congress, Hygiene and Demography, London, 1891, Vol. II; Papers by Burdon-Sanderson (p. 192), and McFadyean and Sims Woodhead (p. 197). The Society of Medical Officers of Health at their annual meeting at Newcastle, in August 1893, approved of the memorandum on the Prevention of Consumption drawn up by the North-Western branch of their Society, which, among other practical precautions, affirms: (a) "A mother who is suffering from consumption should on no account be allowed to suckle her child. (b) All cow's milk, *especially that for the use of children*, should be thoroughly boiled before being drunk. There is no sort of legitimate doubt that tuberculosis in children is largely caused by the use of unboiled milk from consumptive cows. There is no truth in the belief that boiled milk loses its strength or is less easily digestible." (See Priestley's article

Typhoid or Enteric Fever*.

Cholera†.

Diarrhoea (Enteritis)‡.

"Sanitary Science," in *Medical Annual*, 1894). Dr. Ernest and three Veterinary Surgeons, Peters, Jackson, and Frothingham (Massachusetts, U. S.) found at least 31.5% of cows had Koch's tubercle bacilli in their milk. *American Journal of Med. Sciences*: See *Indian Medical Gazette*, December 1889.

* See an interesting and important account of an outbreak of cholera and enteric on board ship "Ardenclutha" in March, 1887, investigated by Dr. Simpson, Health Officer, Calcutta, in *Journal of Calcutta Health Society*, 1888. (b) Surgeon Manifold, 4th B. C., 1887-88, and Brigade-Surgeon Hamilton: Hamilton's "Enteric Fever in India," p. 21. (c) An account by a correspondent in *Pioneer* of 22nd July 1891 of an epidemic in 1884-85, at Largs (300 or 400 cases), Ayrshire, Scotland, where the County Sanitary Officer traced it to a dairy with fouled cattle water-supply. (d) Mr. Hankin's reports on two outbreaks in the East Surrey Regiment, Agra, traced to *Dahii*—*Indian Medical Gazette*, August 1894, and *Civil and Military Gazette*, 1894. (e) The Renfrewshire epidemic: see "Ice Cream and Typhoid," *Brit. Med. Journal*, October 1894, p. 829. (f) Dr. Michael Taylor, Penrith, was the first to trace enteric to milk in 1857. Since then (g) Dr. Ernest Hart (*Ed. B. Med. Journal*) has tabulated 50 outbreaks with 3,500 cases due to milk, up to the year 1881. (h) In 1889 Professor Davies, Netley, added 19 more such epidemics, with 400 cases. (i) Dr. Russel, Health Officer, Glasgow, investigated eight of these epidemics. (Lecture to Glasgow and West of Scotland Agricultural Discussion Society) See *Indian Medical Gazette* 'Dairy Farms and Health,' August 1890.

† Dr. C. N. Macnamara's cases in Chowringhee, Calcutta.—*Indian Medical Gazette*, March 1872, (see also Article 'Cholera,' pp 374 and 406; Davidson's *Hygiene and Diseases of Warm Climates*, 1893). (b) Dr. D. D. Cunningham, Part V, *Scientific Memoirs by Medical Officers, India*; Editorial on "Cholera and Milk," *Indian Medical Gazette*, March 1890. (c) Cholera Report on outbreak at Dacca, where two European Officers died from contaminated milk. Dr. Gregg, Sanitary Commissioner for Bengal, 7th July 1891. (d) On Bacilli of Cholera Typhoid and Tuberculosis in milk, butter, and cheese: Dr. Heim, German Imperial Health Department. (*Lancet*, September 14th, 1889). (e) An interesting article on flies and cholera diffusion through milk, Surgeon-Major Macrae, with report by Drs. Haffkine and Simpson—*Indian Medical Gazette*, November 1894.

‡ See references to investigations by Booker and Jeffries in America, and Escherich, Bagnisky and Stadthagen in Germany. "Infection of Meat and Milk," by Dr. Vaughan, Michigan, United States; International Congress Hygiene, &c, 1891, Vol. III, p. 126. (b) "Summer Diarrhoea and sterilisation of milk," Bagnisky Epitome; *Medicine, B. Med. Journal*, 17th November 1894.

Vomiting and Purging (ptomaine poisoning)*.
 Gastritis†.
 Dyspepsia (acidity, &c.)‡.
 Stomatitis and Aphthæ§.
 Diphtheria||.
 Scarlatina¶.
 Foot and mouth disease (eczema epizotica)**.
 Peculiar febrile symptoms††.
 Peculiar "milk sickness" (vomiting, collapse, &c.,
 from cows suffering from the "trembles.")‡‡.

* Due to Deneke's *Spirillum tyrogenum* and others; Vaughan's tyrotoxicon or cheese poison. Report of Michigan State Board of Health; also *Analyst*, November and December 1886. (b) Parke's Hygiene. (c) Lyon's Medical Jurisprudence, India. (d) Taylor's Medical Jurisprudence, 1872. (e) Mr. Smee's experiments: Editorial, *Indian Medical Gazette*, August 1890, page 239.

† Mosler, Virchow's Archive, 1868, quoted by Parkes.

‡ Hesling, Virchow's Archive; Army Medical Report, Hygiene: quoted by Parkes. Common belief in India; especially buffalo milk.

§ Fagan, *Brit. Med. Journal*, 1869; Mosler and others also (Parkes). (b). Epidemic Aphthous Fever: Dr. Robinson, Dover, International Congress Hygiene, 1891, Vol. III., p. 170.

|| In 1881 Mr. E. Hart tabulated seven Epidemics of Diphtheria due to milk. (b) XVI m. Report, Medical Officer, Local Government Board, 1885-1886: Mr. Powers. (c) Further Report on Etiology of Diphtheria; Report, Medical Officer, Local Government Board, 1889-90, p. 167. (d) See "Infectious Udder Diseases of the cow in relation to Epidemic Diseases in the human subject," by Dr. Klein, International Congress Hygiene, 1891, Vol. III, p. 145 *et seq.* (e) See Klein's paper, Proceedings, Royal Society, Vol. 48.

¶ Dr. Russel, Glasgow; see Editorial "Dairy Farms and Health," *Indian Medical Gazette*, August 1890. (b) In 1881, E. Hart tabulated 15 epidemics of Scarlet Fever traced to milk: International Medical Congress, 1881, Vol. IV. (c) "Infectious Udder Diseases of the Cow, &c." International Medical Congress, 1891, Vol. III, p. 130; confirmed by Dr. Bostock Hill, Health Officer, Birmingham; Discussion, same, p. 153. Infection is denied by Drs. Crookshank, McFadyean, Ostertag, Brown and others; same. (d) Bexley, Epidemic 1892, Dr. Sutherland, "Dairyman," April 1892.

** See references to Drs. McBride, Gooding, Hislop, Latham, and Briscoe, Parkes' Hygiene. (b) Professor Brown remarks: "Milk is contaminated with specific diseases, such as pleuro-pneumonia, tuberculosis, and foot and mouth disease" International Congress Hygiene, 1891, Vol. III, p. 168. (c) Russel, *Indian Medical Gazette*, August 1890.

†† Sanitary Record, Vol. II, quoted by Parkes: the Aberdeen Outbreak, 1881.

‡‡ Hirsch has collected many instances. See other references, Parkes: due to cattle eating *Rhus toxicodendron* (poison oak).

To these may very probably be added several others, including dysentery, malarial fevers,* smallpox, rinderpest,* pleuro-pneumonia,† actinomycosis, and anthrax* due to direct contamination or adulteration with befouled water, etc. Milk may also be contaminated by inflammatory products in nearly every disease to which the cow is subject. Professor Brown cites an instance where, in a case of septic mammitis, a milker actually milked into a pail a quarter of the contents of the udder, from which came nothing but pus, under the impression that it was peculiarly rich milk.‡

Certain medicines given to milch animals, as tartar emetic, arsenic, &c.; or poisonous plants eaten by them (*euphorbium*, *colchicum*, *rhododendron*) impart to milk characteristic poisonous properties. The injurious effects, especially now in India, from feeding on brewery grains, distillery refuse, and sewage grass, require to be recollected. Cattle fed on the former two get alcoholised, and after a factitious increase of poor milk, dry up or die early; while sewage farms are suggestive of enteric, &c. Unnatural food of any kind (of which more anon), so universal in India, would alter odour and flavour of milk, but not necessarily, and hence the greater danger, although such milk would not keep well. Milk again is frequently—in India commonly—contaminated by milking with dirty hands and from unclean udders, by dipping fingers into the milking vessel to moisten the teats—(recollect the personal habits of natives with their hands! and connect cholera and enteric)—and by “droppings.” Dr. Edmunds puts enteric down to the last (*B. Med. Journal*, 22nd September 1894.) Storage or carriage in metallic vessels, or foul pails, particularly uncleansable ear-

*Pepper's System of Medicine, Philadelphia, 1885, Vol. I, p. 590

†Husband's Forensic Medicine includes under one head rinder-pest, anthrax, pleuro-pneumonia, and foot and mouth disease. (b) In Middlesborough Pneumonia Epidemic (490 deaths), reported by Ballard, infected food was proved by Klein to be the medium; then why not milk? Professor Brown says it is, International Congress Hygiene, 1891, Vol. III, pp. 112 and 168.

‡International Congress Hygiene, 1891, Vol. III, p. 167.

thenware (ghurras, handies, &c.) is a *very* fruitful source ; as is exposure in dirty, dusty, open street shops, kitchens, &c.

III. THE CONDITION OF COW-BYRES AND NATIVE DAIRIES, uninfluenced by law or regulation of any kind, is not only deplorable but disgraceful. Such deliberate neglect is but a natural outcome of the *laissez faire* or *kuch purwa ne* system in vogue throughout India. In 1886 Dr. Kenneth McLeod, I. M. S., of Calcutta, in a lecture on this subject before the Calcutta Health Society, called attention to the revolting condition of the squalid *goala barees* of the city and suburbs ; and the Society appealed to the Government of Bengal for legislative help. But I doubt if anything came of it. Quite recently the Calcutta Press—in common with that of other parts of India—have been again discussing the question. As doctors are believed to exaggerate, some independent civil and lay testimony may prove more satisfactory.

A writer in the *Indian Daily News* says : “ In our midst we have perhaps the foulest dairies or byres in the world, regulated by no rules of cleanliness, care, or humanity. They are nurseries prepared and ready for the germ which is to spread an epidemic of disease and death amongst us. I would ask any one with an enquiring turn of mind, and one who is not particular about smells or filth, to come with me and visit some of the largest byres in the northern division of the town. In amongst the bye-lanes you have many establishments, some containing up to 150 cows. Huddled together in tiled sheds, these unfortunate creatures are not allowed more than standing room, and are only saved from suffocation by the many holes in the roof, which, if they save them from immediate death, let in the weather. Over and over again I counted forty tethered in two rows in a room forty feet long, and with enough depth of space to allow the forefeet to touch the *gumla* that does duty for a manger, whilst the hindlegs rested on the edge of a drain about eight inches broad by eight

inches deep. In some of the smaller sheds I counted six animals in ten feet, but then they had the advantage of no drain." [Dr. Armstrong, Medical Officer of Health, Newcastle-on-Tyne, advocates 800 cubic feet as the *minimum* for each cow in a cow house. (Int. Cong. Hyg., 1891, Vol. III, p. 169)] "It was or is impossible that the animals could lie down together; they have to take it in turns. The drain is for the purpose of receiving the droppings, and is placed so close to the heels that no labour is required for cleaning. The refuse is carried or washed through into a shallow pit immediately outside the shed, and often mixes with human excrement drained into the same place from sources only too palpable to sight and smell. This mixture percolates through the sodden light soil, and as the wells which supply the drinking water for the cows are only a few feet away, you can imagine what must be the nature of the contamination and the miracle which is exercised every day in warding off communicable disease from milk consumers. The milch cows' lot in the hands of the Calcutta wholesale milk supplier is not a happy one. Tethered in sheds from the moment they are bought, they never leave again for pasturage, water, or any other purpose; they are closely confined, fed on husks of gram and grain, chaff, and occasionally a little oil cake; rendered barren by a most inhuman process of cruelty which is inflicted twice a day or oftener to make them render up their milk freely; and then after patient endurance of these agonies for six months, which is mercifully not often extended to the year, they are led forth to the butcher's knife, and so from 30,000 to 50,000 cows are led annually to the shambles instead of contributing to the increase and purity of the milk supply." (*Indian Daily News*, September 1894.)

Now, what is this barren-resulting inhuman process alluded to? It is known as "*phooka*" (blowing,) and consists of blowing air into the vagina with the mouth by means of a bamboo tube six inches long. This causes immediate bearing-down pains which makes the

cow yield up all her milk without the aid of her calf. A previous application of salt to the tongue, followed by a free drink, causes the secretion of a comparatively abundant, thin watery milk of low specific gravity. This is quite a common practice in Calcutta. A Superintendent of Dairies in the Punjab tells me : "A bamboo tube is not invariably used ; the mouth is also applied direct to the vagina held in position and compressed by the hands. Sometimes only air is blown in, at others a little salt is put into the mouth, to which is then added some milk, and this mixture is injected. (The agony endured can be imagined.) Again the tail of the animal operated on is forced into the vagina and left there for some little time, often for half an hour, if the animal prove obstinate. Also, the *goala* often inserts his own hand into this organ, as far as it will go, and, keeping it there, pats the animal on the back with the disengaged hand. After a few minutes the other is withdrawn, and the *goala* at once sits down and draws all the milk he can. It can well be imagined how the intense agony caused by these inhuman practices causes the poor animal to let down her milk. The practice is *common all over the country*. It is said these practices continued in renders the animal eventually barren. I should think so. The Calcutta Society for Prevention of Cruelty to Animals has made strenuous efforts and representations to Government to allow them to stop this outrage to all feelings of humanity by arresting all detected cases. Government, however, refuses to extend the powers of the Society for this purpose." (*Indian Daily News*.)

The special independent reporter of the *Civil and Military Gazette* was deputed last year to visit the cow sheds and dairies in the city of Lahore. Here is what he says : "I had often heard doctors and veterinary surgeons speak of the unutterable filth of all the arrangements connected with the milk supply in Lahore city and bazar. I had heard, too, that the Punjab Secretariat considered that the views of doctors and veterinary surgeons were too highly colored * * * ,

but I must confess, after what I have seen, that if the professional reports were too highly colored they must have been the most extraordinary official documents ever penned. To do justice to the subject, it appears to me that one would have to write one's remarks *in ink that smells.* * * * It was just daylight when I arrived at the first place of interest in connection with my object. This was a collection of mud huts inhabited by Gujars surrounding a small open space tenanted at that moment by apparently forty milch kine and buffaloes. The odour of the place was fetid. The ground was slippery with filth. It was traversed by little miniature drains which slowly oozed a thick liquid of the color of chocolate. There were some very old earthenware vessels full of very dirty water, in which, *with the aid of cow dung*, the *lotahs* for the milk were being 'cleansed.' I watched the milking operations, and saw a man with his hand scoop away a lot of filth from the place where he desired to squat, and then with the same hand he commenced to milk the buffalo next to him. I have often noticed a queer, dark sediment in bazaar milk. I now know where one component of that sediment is derived, for after the man had been milking for a little while his hand was washed quite clean. I then proceeded to the next place where milch kine are collected outside the city walls. There had been heavy rain overnight, and all the filth that washing could remove was gone. * * * But oh, the condition of those cows, crowded together in rows! Their feet were sunk in the 'splodgy' ground, which was not mud but strata of old filth, permeated with moisture throughout, and in places presenting every shade of decomposition, green, purple, and black." He saw at least one cow buffalo with elephantiasis (?) in all four legs and one emaciated cow suffering from rinderpest, both yielding up their moiety of milk. "One buffalo cow had been lying down. The under surface of the body, and especially her udder, were dripping with filth. It never occurred to the milker that any cleansing operation was needed before he proceeded

to add her milk to the store." And he goes on to describe the usual over-crowded, loathsome dens, alleys, and dairy huts, with befouled drinking water wells, etc. "Out of this noisome hole issues the milk for young European children and invalids." ("Tell me where is typhoid bred?" By our special reporter, *Civil and Military Gazette*, 3rd June 1893.)

These are the independent testimonies of eye-witnesses, and I could multiply quotations from the *Englishman* (editorial and letters, August 2nd, 16th, 28th, 1894); *Pioneer*; *Medical Reporter* (September 1894); *Madras Times* (October 1894), and other Indian Papers.

III. FODDER: HOW COWS ARE FED IN INDIA.—Many good people decline to believe that milch cattle are fed on *highly objectionable and unnatural fodder*. But it is a fact nevertheless, and should be impressed on the Government. Ordinary garbage is the least objectionable of such "food." It is notorious that cattle all over India are fed on excreta-soaked litter cast out from horse stables. This particularly in cantonments where cavalry and artillery are stationed. In Calcutta, I believe it is bought from syces, and I have myself, in a mofussil station, more than once witnessed cattle feeding on this in preference to grass, probably from usage. Brigade-Surgeon Hamilton says: "I have known the riding schools to be covered with horse litter from the stables in the day, and next morning it had disappeared, eaten by the very cows and buffaloes that supplied the hospital and barracks with milk.*" But this is not all. When pushed for fodder, or even without any scarcity, under the impression that such conduces to increase the richness of milk, the *goala* does not scruple to deliberately feed his animals on actual *horse dung*, if from a gram-fed animal the better. I have myself more than once caught *goalas* (in Beluchistan) in the act of collecting excrement from mules, and discovered traces of the

* Hamilton's Enteric Fever in India, p. 21.

same in the feeding *gumlas*.* But early morning or night is the feeding time. In the "*goala mundis*" up country, buffaloes particularly are so fed on the sly.

But worse still, if possible, for there is even a "lower hell" in *goala* feeding, it should be widely known that owing to neglect and deliberate training Indian village milch cattle are often natural "foul-feeders," like sheep, dogs and pigs, wild and domesticated.† Some ten years ago, a local Lahore print (the *Punjab Advertiser*, I think) called attention to the general practice of Gujars deliberately grazing their kine and buffaloes on particular fields in the vicinity of the suburbs and large villages (noted for cholera too) of that city. In a cantonment in Assam, I had the misfortune to discover that cows and other animals forced their way into the military latrines, so that we had to have a sort of fortification with guarded entrances erected to protect them. Such indeed are the animals that provide us meat and dairy produce in this country.

It is thus very apparent that very close and constant inspection is absolutely necessary; and that no greater mistake could ever be made than to believe that if the consumer sees his *goala's* cow milked before his door that he ensures either a pure or a safe supply. The *goala*, moreover, can cheat under the very eyes of the onlooker. The clever twirl, upside down, of a partially-filled *lotah* of water, to prove it is empty, is a common dodge; and Dr. Hamilton detected a man literally "milking" water into his *lotah* from a small leathern bag (*mussuk*) concealed in his clothes, and this under the eyes of the orderly set to watch him.

It ought also to be specially borne in mind that "*cheap*" and "*nasty*" are convertible terms in dairy

* The local Native Magistrate fined them Rs 5 on two separate occasions ! !

† This no doubt is due to want of salt. Goats and others eat bones for this purpose.

produce. I wish to emphasise this fact that it is *absolutely impossible* to get good, pure, wholesome dairy produce at the *present prevailing rates*. Generally speaking, they are *starvation rates* on which no *goala* can live without fraud. They ought most certainly to be raised from one-third to one-half higher.

IV. ADULTERATIONS.—Time only permits of the enumeration of the principal or commoner adulterants :—

- (1). *Milk*,—Foul tank or other water (as much as 20—25 per cent is common in Calcutta) ; skimmed milk ; churned fresh milk ; these separately or mixed with fresh milk ;* milk of various animals mixed ; chalk (coloring) ; flour or arrowroot (color and consistence).
- (2). *Cream*,—*Dahi* ; *Khoa* (condensed milk) ; Linseed (? boiled in milk yields a creamy jelly) ; cotton seed oil (?).
- (3). *Butter*,—Water (often foul) or butter-milk well intermixed (30—50 per cent common) ; curds ; plantain ; (fat) ; suet (lard) ; extra salt ; potato and other starches (?) ; oleo-margarine, butterine, etc. †
- (4). *Ghee*,—Walnut oil ; cotton-seed oil (?) ; mowaseed oil (*Bassia latifolia*) ; fat (Dumba sheeptail-fat common in Punjab) ; lard ; potato, flour, and other starches ; raisins (to preserve it, Punjab and Frontier) ; gram powdered (*basun* or *suthoo*).

I have now, I think, made out a very strong case for legislative interference in the interests of both Natives and Europeans. The Municipal Act should be amended and strengthened, and rigid inspections

* The lactometer test still applied in hospitals is useless, as the modern *goala* knows how to "correct" the specific gravity of his skimmed milk with water and sugar.

† A sort of "butter" has even been manufactured in London from grease found in Thames mud !

and regulations enforced on all the points I have indicated. And as the country at large is not yet ripe for such measures, I beg to earnestly urge that the amended Adulteration and Dairy Produce sections of the Municipal Act, or a new separate *Pure Food Act*, be extended to all cantonments, large railway stations, and all municipal towns, and perhaps Sub-Divisional head-quarters of districts. All Inspectors to be properly qualified, and be Europeans in large towns and cantonments. Another thing I would beg to urge on Government would be the direct encouragement, in every possible way, of *European private enterprise in Dairy farming*, in preference to any Commissariat monopoly of such, as otherwise the civil population can never hope to enjoy the untold advantages of modern dairying.

Meanwhile, let everybody who values his life *boil his goala's milk*. This is known as "Pasteurisation." Water boils at 212° F.; milk at 213·5°F.* All infectious germs are thus destroyed, the digestibility of casein apparently not affected, and the keeping power of the milk improved and prolonged.

DISCUSSION.

The President of the section said that Dr. O'Gorman's paper had well described the insanitary conditions in which the milk-supply is conducted in this country, and has shown the necessity for some reform in this direction. Till every municipal town is provided with Health Officers and Analysts, little can be done beyond amending municipal byelaws, *e.g.*, that all milk vendors should be licensed, and, as Dr. O'Gorman suggests, be made to keep a list of their customers for inspection. As the milk-supply of a town is usually drawn from villages within ten or fifteen miles of the place, no mere inspection of dairies, etc., within municipal limits will suffice. In regard to the milk supplied to British troops, it was absurd that, while the men were supplied with good milk from cantonment dairy farms, the Quartermaster of a regiment should be allowed to pass milk for the married quarters supplied by native bazaar vendors.

With respect to the remarks made about the use of cow-dung as a plaster for the walls of native houses, we should remember that

* Dr. J. Edmunds, *British Medical Journal*, 22nd September 1894.

many cattle diseases are conveyed to animals by the excreta. He was also convinced that cholera could thus be communicated to man.

With regard to Dr. Dutta's contention that there should be a standard for milk of buffaloes as well as for Indian cow's milk : this, of course, was necessary, but any one who has watched the prosecutions in England for supplying bad milk, cannot fail to have noticed that Magistrates do not recognise standards, and it was easy to provide experts who will show that differences may be expected in the quality of milk due to difference in forage, temperature, season, &c. A rigid standard like that for water cannot be upheld for milk. A large series of analyses of Indian milk from all parts of the country is much wanted.

