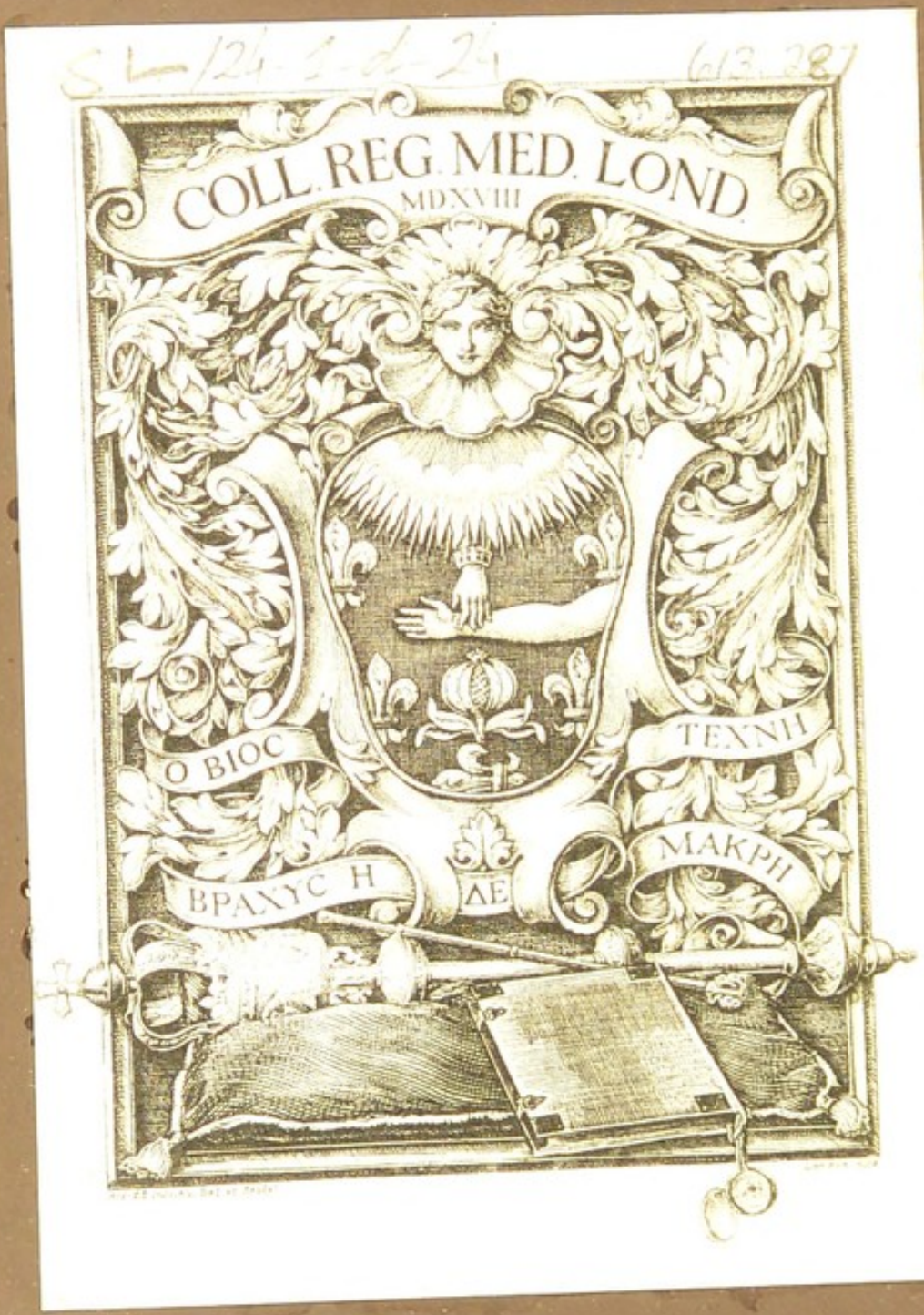
Milk in health and disease. / by A. Hutchinson Smee.

MILK

IN

HEALTH AND DISEASE



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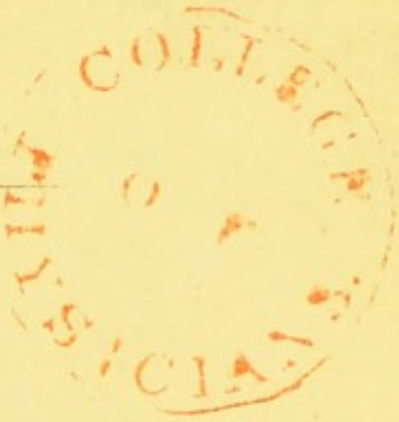
HEALTH AND DISEASE.

BY

A. HUTCHISON SMEE,

M.R.C.S., F.C.S., F.G.S.



LONDON:

PRINTED BY EDWARD NEWMAN, DEVONSHIRE STREET,
BISHOPSGATE STREET.

1875.

TO

EDWARD FRANKLAND PH.D., F.R.S., F.C.S.,

Professor of Chemistry at the College of Chemistry & School of Mines,
and Member of the Rivers Pollution Commission,

THIS INVESTIGATION

ON

MILK IN HEALTH AND DISEASE

IS

DEDICATED

IN

ADMIRATION OF HIS DISTINGUISHED CHEMICAL REPUTATION,

AND IN

REMEMBRANCE OF KINDNESS RECEIVED

BY HIS PUPIL

ALFRED HUTCHISON SMEE.

MILK

IN HEALTH AND DISEASE.

At the time of the epidemic of typhoid fever at Marylebone, in 1873, my attention was directed to the examination of milk by a friend, Mr. Power, one of the Medical Inspectors for the Privy Council, who suggested that experiments should be made with the milk from my cows.

For this purpose a series of experiments was instituted, and analyses of milk derived from my own herd, and also from other herds in the neighbourhood. The results of these experiments were extended over a whole year. The analysis of the milk was made in the manner usually employed by the public analysts. In the following tables the figures represent parts by weight in one hundred parts by weight.

The first series of analyses to which attention was directed was the milk taken from an Alderney cow for the first and four successive days after calving, to determine the difference between this milk and ordinary dairy milks.

	Jan. 26th.	*27th.*	*28th.*	*29th.*	*30th.*
Total solid—dried 212° F.	19·7	14·2	13·9	13·08	14·4
" "	80·3	85·8	86·1	86·92	85·6
	100·0	100·0	100·0	100·00	100·0
Fat	2·7	4·1	2·8	3·00	3·8
Non-fatty solids	17·0	10·1	11·1	10·08	10·6
	19·7	14·2	13·9	13·08	14·4
Casein	6·40	4·01	5·04	4·20	3·6
Albumen	4·70	0·80	0·60	0·90	0·7
Sugar, &c.	4·85	4·49	4·56	4·08	5·4
Ash	1·05	0·80	0·90	0·90	0·9
	17·00	10·10	11·10	10·08	10·6
Cream vol.	40·000?	16·000	8·000	6·000	8·000
Specific gravity	1·050	1·035	1·032	1·033	1·036

The milk from another cow, after calving, gave results corresponding with the above analysis.

The milk first drawn after calving (six hours) had a specific gravity of 1·050, which very closely approximates to the specific gravity of blood.

This milk had a strong yellow colour, tasted like beaten eggs, was much less fluid than ordinary milk, and set, on boiling, into a solid mass. It contained an excess of casein, and especially of albumen; it also contained blood-corpuscles which sank to the bottom and formed as a thin stratum. The cream, if cream it can be called, yielded by volume, was abnormally high to the amount of fat yielded, which was small in proportion. As regards cream or cream-like fluid, this case is of course exceptional; still a large percentage of cream by volume frequently yields only a small proportion of fat: this is

due, no doubt, to cream imperfectly separating from milk.

The milk on the second, third, fourth and fifth days approached gradually to the character of good Alderney milk.

Cream was noticed, as indicated by the creamometer, to separate from the milk of an individual cow more imperfectly than from milk of the whole herd when mixed together.

The second series of experiments was undertaken to determine the difference of the composition between milk first and last drawn from the udder at a milking.

The following results were obtained :—

	Water.	Solids.	Casein.	Fat.	Ash.	Cream by vol.
Milk first drawn	85·5	14·5	3·5	3·0	0·5	12·0
„ last „	80·0	20·0	4·0	8·0	1·0	Did not separate.

It will be observed that the last-drawn milk is nearly three times as rich in butter as the first, and also contains a slightly higher percentage of casein. The milk of a cow, when she is being dried off, has the same composition as normal milk.

Attention was next directed to the analysis of milk drawn from various sources: the milk was taken the same day direct from the cows. It has been observed that milk taken from herds of cows exhibits great uniformity in composition: I wished to determine to what extent the milk from individual cows, especially of different breeds, varied in composition. The following analysis gives the result of this enquiry :—

Source.	Water.	Solids.	Casein.	Fat.	Ash.	Cream volume.	Specific gravity.
1. Crawley	90·5	9·5	3·1	3·0	0·7	10 to 12 per cent.	10·31
2. Mackenzie	85·6	14·4	4·0	4·5	0·8		10·31
3. Brittany.....	86·5	13·5	3·5	3·7	0·6		10·30
4. Pedigree.....	85·0	15·0	4·1	5·8	0·9		10·33
5. Sheppey.....	86 0	14·0	4·0	4·6	0·7		10·33
6. Shorts	88·5	11·5	3·2	3·8	0·5		10·29
7. Skinlims	86·9	13·1	3·8	4·1	0·6		10·32
8. Fuller.....	85·7	14·3	4·1	4·7	1·0		10·33

Nos. 1, 5, 6, 7 and 8 is the analysis of milk from cows kept by dairymen.

Nos. 2, 3 and 4, milk from cows kept for private consumption.

Nos. 1, 4, 6 and 7 were shorthorns.

No. 3 a Brittany.

Nos. 2 and 8 half-bred Alderneys.

Nos. 1, 6, 7 and 8. These cows were stall-fed, and had at times sewage-grass given. The comparative poorness of the milk is no doubt due to the cows being unduly forced with grain.

I am quite sure that the specific gravity of No. 1 milk was correctly observed, although the total solids are abnormally less. Goppelsröder,* in his paper, gives the following four instances of milk believed to be unsophisticated, where the percentage of total solids was less than 12 with a high specific gravity, and the specific gravity had been taken prior to the milk being skimmed:—

Solids.	Cream.	Specific gravity before skimming.
10·69	10·0	1·0316
11·41	11·2	1·0320
11·43	7·5	1·0340
9·54	Not stated.	1·0279

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* *Vide* 'Verhandlungen der Natur forschenden Gessellschaft in Basil,' 1866.

Attention was next turned to the effect of food upon the quality of milk yielded by the cow. In one case such large quantities of oil-cake were given that the milk became perfectly useless for the table: large quantities of a rancid oil floated on the surface after boiling this milk. The analysis gave—

	Water.	Solids.	Casein.	Fat.	Ash.
Half-bred Alderney & Brittany	79·8	20·2	5·8	6·2	1·1

Cream would not separate.

The effect of feeding two shorthorn cows, whose milking qualities were similar,—one on ordinary meadow-grass, the other on the grass from the Beddington Sewage Farm,—was tried, with the following results :—

	Water.	Solids.	Casein.	Fat.	Ash.	Cream by vol.
October 22nd, 1873 :—						
Ordinary meadow grass	86·2	13·8	3·2	3·0	0·7	10·0
Sewage grass	86·3	13·7	2·5	2·5	0·7	6·0
October 23rd :—						
Ordinary meadow grass	86·0	14·0	3·1	3·2	0·63	6·0
Sewage grass	88·8	11·2	2·5	2·5	0·6	6·0

The milk derived from the cow fed on sewage-grass went putrid and stank after thirty-six hours. The butter from sewage-grass fed milk became rapidly rancid compared with milk from cows fed on ordinary meadow grass.

From these observations, the cream from ordinary grass required 35 m., 1½ hr., ¾ hr. to churn, and the butter was firm.

The cream from sewage-grass required 1½ hr., 1½ hr., 2½ hrs., and the butter was soft and yeasty.

These experiments were repeated with the milk from the same individual cows and with other cows, but the results obtained were practically the same. The grass on

the sewage land in spring appeared to injure the milk more than that grown in the later part of the summer. Cows fed on the sewage-grass invariably lost condition.

It was noticed that when the milk of cows fed upon sewage-grass was placed upon one of Graham's dializers the casein appeared to separate from the milk, and streamed through the membrane and fell to the bottom of the vessel containing the water as a white sediment. This separation was not due to any defect in the membrane, for with ordinary milk the same membrane was tried, when no separation took place; but again putting another portion of sewage milk in the same membrane, a separation again took place. I must add that I have only seen this phenomenon on three or four occasions. From this experiment it appears that casein, at times, exists in milk in some modified form, and it is probable that it may in this condition produce special physiological effects in the human system.

The result of feeding cows on sewage-grass led me to make an examination of the juices of both kinds of grasses. For this purpose I made an effusion from an equal weight of sewage and ordinary meadow grasses, placing equal weight of each grass in equal quantities of water for twenty-four hours after bruising the grass, and then estimating, as in water-analysis, the amount of nitrogen present.

	Meadow grass.	Sewage.
Nitrogen as ammoniacal salt	2·8	8·4
„ organic matter	0·7	1·4
„ albuminoid	5·6	12·6
	9·1	22·4

Hay made from sewage grass when kept in a vessel of water, and in a warm place, set up in a few days putrid

fermentation, whilst ordinary meadow-grass treated in a similar manner did not.

It has long been well known that certain chemical substances, such as iodide of potassium, or salts of mercury, may pass through the system of the mother and appear in the milk, affecting the infant. I thought it would be well to try if organic substances which are easily oxidized could pass through animal economy unchanged. For this purpose rosaniline was added to the water which the cows drank, but no apparent effect was produced in the quality of the milk.

An examination was made of butter made from the cream from the ordinary milk of my cows, and also with butter made from Devonshire cream. One quart of Devonshire cream required to be churned forty-five minutes, and yielded twelve ounces of butter. One quart of our cow's cream required to be churned thirty-five minutes, and yielded fifteen ounces of butter.

BUTTER.

	Fat.	Water.	Ash.	Residue org. matter
Devonshire cream	83·0	15·5	0·6	0·9
Carshalton cream	81·9	16·8	0·6	0·8

A little extra pressure would probably have removed an additional two or three per cent of water.

BUTTERMILK.

	Total solids.	Fat.	Non-fatty solids.
Devonshire cream	13·1	3·6	9·5
Carshalton cream	13·6	4·6	9·0

The fat in the analysis of buttermilk is not absolutely correct, the fluids being clotted and containing minute particles of actual butter.

The specific gravities of the buttermilks could not be taken with accuracy, owing to different samples containing a varying percentage of small portions of butter.

It is the custom in the Gloucestershire dairies to add a solution of nitrate of potash (a tea-spoonful to a pint of water) to the cream before churning. This solution is not added to the cream for the purpose of keeping it, but the farmers believe it separates the buttermilk more perfectly from the butter, and consequently improves the butter for keeping purposes.

	Without Nitrate of Potash.			*With Nitrate of Potash.*	
Date.	Pints.	lbs. made.	Time churning.	lbs. made.	Time churning.
April 10	13	5 12 oz.	40 m.	6 4 oz.	50 m.
„ 14	10	5 0 „	49 „	4 14 „	80 „
„ 19	6	2 7 „	70 „	2 10 „	45 „
„ 22	6	2 12 „	57 „	2 10 „	100 „
		15 15 oz.		16 6 oz.	

From the above experiments the addition of nitrate of potash to cream appears to slightly increase the quantity of butter yielded. The butter also I found to be firmer, and it kept sweeter longer, than that made in the ordinary manner.*

The next series of experiments was made to see to what extent a rich milk might be adulterated with water,

* The sleepy condition of cream deserves a passing comment. Cream when thus affected may be churned for hours continuously without producing butter. In this state the cream becomes ropy, and would—just when butter might be expected to form—revert back to the fluid state. I have seen cream churned for six hours continuously without butter forming; but on setting it aside for twelve hours it will, on again churning, come in a few minutes. This butter is always found in small fragments, is soft and yeasty, and the buttermilk never

especially if certain substances were added which would maintain the normal quantity of the inorganic salts.

The first five specimens of milk were taken from the same pail and adulterated to thirty-three per cent.—that is, two of milk to one of water containing extraneous matters,—and then sent to a friend, an analyst, who undertook to carry out the usual analytical operations on the samples.

	Water.	Solids.	Casein.	Fat.	Ash.	Cream.
A	88·5	11·5	2·9	2·5	0·5	12·5
B	88·4	11·6	3·1	3·5	1·	12·
C	91·	9·	2·7	2·1	0·7	7·
D	90·7	9·3	2·9	2·2	0·7	7·
E	89·25	10.75	—	4·37	0·43	20·
F	86·92	13·08	2·7	3·53	0·44	—
G	88·2	11·8	—	3·	0·8	—

A was reported to be somewhat poor and weak, probably to the extent of ten per cent. of water, beyond that present in the milk of the poorest cows. It was stated to taste strongly alkaline, and to give unusually clear skimmed milk.

B was reported of average quality, but suspiciously low in non-fatty solids, and high in ash.

C and *D* had some cream removed and then water added—three volumes of milk to one of water.

E. The lowness of the ash suggests a highly watered milk which was unusually rich in butter.

F. A peculiar herbaceous taste to this as to make milk unsaleable—two parts pure genuine milk, one water.

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perfectly separates, however thoroughly it is salted and washed, consequently it quickly becomes rancid. I have not been able to find any explanation which satisfactorily accounts for this curious physical condition.

G. These unusual characters, the abnormally high proportion of ash, and the abnormally low proportion of non-fatty solids, all indicate that water and a little mineral matter have been added to the originally "good" milk.

The real composition of the samples was as follows:—

a. Filtered sewage had been added 33 per cent.

b. A solution of silicate of soda and sugar (specific gravity 1·030) had been added to 33 per cent.

c. Sulphate of soda solution (specific gravity 1·030) to 33 per cent.

d. Boracic acid solution (specific gravity 1·010) to 33 per cent.

e. Infusion of linseed.

f. Boracic acid.

g. Solution of silicate of soda, sugar and linseed 1·030.

It is only fair to the analyst to state that he said that in the case of milks yielding such abnormal results he should, in ordinary cases, make a fuller and special investigation of the samples.

In an outbreak of typhoid fever which occurred at the Orphan School at Beddington, a few years since, the outbreak was traced to the dairy from which the School was supplied. It appeared that the dairy utensils were washed with water impregnated with sewage; and no doubt the milk was at times diluted with the same water, for on one occasion one of the children brought to the Matron of the Institution a tadpole which she had fished out of her mug; after which circumstance the dairy was changed, and the change was followed immediately by an absence of typhoid fever in the School. The importance

of a pure-water supply to every dairy is very great for the purpose of cleansing the dairy utensils, as I have been informed that at the present time many large dairymen reduce the quality of milk by the addition of a small percentage of water to the lowest standard permitted by law; and it is consequently of the greatest importance that the source from which this water, used for such adulteration, is derived, should be free from sewage contamination; unfortunately, the greater the sewage contamination, the greater amount of adulteration can be practised without detection.

I have reason to suspect that some dairymen employ persons with chemical knowledge to analyse their milk, with a view to reduce its gravity, by addition of water, to the lowest standard permitted by law.

In the Supplementary Report of the Medical Officer to the Local Government Board, for 1874, three distinct outbreaks of typhoid fever are traced to milk.

The first, reported by Dr. Ballard, occurred at Armley, 1872. Enteric fever first broke out at a dairyman's, and spread among the customers. His well was polluted by fever-evacuations.

The second case Dr. Ballard reported, 1873—'On Enteric Fever at Moseley and Balsall Heath.' The fever-evacuations were thrown into a privy; fever spread among customers of two dairymen whose wells were polluted by soakage from this privy.

The third outbreak is noticed by Mr. Radcliffe and Mr. Power, in a special and exhaustive Report on the fever at Marylebone in 1873; the outbreak was traced to

milk obtained from a particular farm, the dairy utensils being washed with water contaminated by fever-poison.

An outbreak of fever at the Lodge Farm at Barking occurred in 1873: the cause does not appear to be well-defined.

The addition of silicate of soda kept the milk fairly well, but the cream had a tendency to rapidly separate; consequently it would be of little use to the milkman.

Sulphite of soda delayed for a short time the coagulation of the milk, but it soon became offensively putrid.

Boracic acid kept the milk perfectly sweet for a week in summer; at the end of three weeks no coagulation had taken place, but an orange-red fungoid growth had developed over the surface. I am informed that two tons of boracic acid (known to certain persons in the trade as "aseptine") are sold annually for the purpose of adding to milk.

In an article on the influence of borax upon fermentation and putrefaction, G. T. B. Schnelzler* makes the following remarks upon the action of borax upon fresh milk:—

"If," the author states, "thirty cubic centimetres of fresh milk were placed in a test-tube with 1 gramme of borax, the cream quickly formed a rather thick layer in the upper portion. Notwithstanding the test-tube was closed by a cork, a mould was formed upon the cream; but the remainder of the liquid underwent no acid fermentation, and retained during several months the appearance of very clear creamed milk. Afterwards, under the influence of summer heat, the liquid became perfectly limpid, and deposited the casein as a soft white matter; but neither the deposit nor the liquid had an acid taste, and after three months they still had the odour of fresh milk. Fresh milk put into a well-closed

* 'Comptes Rendus,' vol. lxxx. p. 473.

test-tube, without borax, underwent acid fermentation in from two to three days, and became thick by coagulation of the casein."

Considering that milk is used by persons of all constitutions,—by the young and the aged, and by persons suffering from fever,—the use of a foreign material like borax, in one of the most important of all foods, ought to be restricted, unless it can be shown by authority to be innoxious. Although so large a quantity (twelve tons) is sold annually to be added to milk, it is extraordinary that no analyst has recorded its presence, and no prosecution has been instituted against offenders. This fact has a tendency to throw discredit upon the analytical evidence upon which convictions for milk adulteration have been secured.

A solution of dextrin (specific gravity 1·020), to the extent of 15 per cent., was added to the milk, and made it undrinkable, owing to the strong herby taste it imparted to the milk; nevertheless I have reason to suspect that dextrin is sometimes used to a limited extent, not exceeding 5 per cent. of a solution of the same specific gravity as the milk. I do not, however, know of any test by which the presence of dextrin, as dextrin, can be detected in so complex an organic fluid as milk.

The addition of sugar to milk, for the purpose of preservation, and its subsequent dehydration to enable it to keep, is perhaps the most valuable invention which has been made with milk. When so treated and hermetically sealed, milk seems to keep an indefinite time without further change. It is a remarkable fact that the condensed milks appear to frequently agree with infants better than the fresh milk of healthy dairy-fed cows.

The following is the analysis of the principal condensed milks in use :—

	Aylesbury.	Swiss-Anglo (Aylesbury).	Swiss.
Total solids	74·5	77·5	79·5
Water	25·5	22·5	20·5
Fat	10·	10·5	10·8
Non-fatty matter	64·5	67·	68·7
Casein	12·1	12·3	12·7
Ash	1·7	1·8	1·9

The specimens contained much sugar, and the above milk appears to be condensed to about one-fourth of the bulk.

The Aylesbury condensed milk was found to be frequently insoluble : whether this was due to its having evaporated at too high a temperature, or to the substitution of substances other than sugar, cannot be determined with accuracy.

The blue mould of paste (Penicillium glaucum) was noticed to form over tins of Aylesbury milk when exposed to the atmosphere. This mould did not develope in the Swiss milk, but numerous crystals of candied sugar crystallized out. Both tins were opened and exposed for the same period, under similar circumstances. I believe that dextrin or other farinaceous matter has been sometimes substituted for sugar in condensed milks.

Both the essence of chocolate and coffee are sometimes condensed with milk, but the mixture of chocolate is very liable to ferment and burst the tins.

Although the addition of sugar to the preserved milks is advantageous for infant's food, yet it would be desirable to institute a series of experiments upon the preservation of milk free from sugar.

The effect of adding animal charcoal to milk was tried, and keeping the same at blood-heat; also the effect of decomposing various milks by voltaic electricity; but the results were too indefinite to be of any scientific value.

The specific gravity of milk was noticed to be changed by keeping; in fact, as a rule, it diminished, the change taking place within a few hours.

The specific gravity of milk, after exposure on a dializer, always diminished; but the specific gravity fell more with some milks than with others. This fact accords with the observations made in the 'Milk Journal,' the results of which experiments I cannot do better than quote.

"In the course of an examination of milk undertaken for the 'Milk Journal,'* the observation was made that there is another source of inaccuracy hitherto quite unsuspected. Skimmed milk consists mainly of water, casein milk, sugar, and a small quantity of mineral salts. Now the exact molecular condition of the casein influences the specific gravity of milk. In other words, samples of milk of the same strength will vary in specific gravity according to the exact molecular condition of the casein. Especially are these changes in condition brought out if milk be kept for a while. This is illustrated by the following examples.

"We do not intend on this occasion to enter fully into the subject of milk analysis, but we may state that plans commonly adopted are of little worth. We have had to notice the untrustworthiness of specific gravity determinations of milk,—that is to say, the danger of judging of the strength of milk by its specific gravity. To be of any value at all the specific gravity determination must be made whilst the sample of milk is very fresh. After milk has been kept for two or three days, even in a

* *Vide* 'Pharmaceutical Journal,' Jan. 28, 1871, p. 606.

closed vessel, its specific gravity falls in a very remarkable manner. The following examples exhibit this in an extreme form. The specimens of milk had been kept in corked bottles for four days :—

	Sp. Gr. at 60 deg. F.	Percentage of Solids dry, at 212 deg. F.	Percentage of Ash.
Sample *a* -	1·0004	11·34	·94
„ *b* -	·996	10·48	·75
„ *c* -	1·0184	8·92	·66

Showing that the highest specific gravity sometimes accompanies the lowest percentage of solids. The reason of this want of correspondence between specific gravity and solid contents we have already explained. Meanwhile, in judging of the strength of milk, it is proposed to adhere to the method of evaporating to dryness in the water-bath, and weighing the residue."

I soon found that the specific gravity of milk had no relation either to the quantity of cream yielded by the creamometer or to the number of quarts yielded at a milking, thus :—

Cows 2.	Specific gravity 1·025.	Cream 34.	Qts. of milk 3.
„ 3.	„ „	„ 17.	„ 3.
„ 6.	„ „	„ 12.	„ 3.

The diurnal variation, for a month, in the quantity and quality of milk of an individual cow, is most clearly shown by reference to Table A, at the end of this paper. In Table B, I have recorded, for eight months, the quantity and quality of the milk yielded daily from each individual cow of a herd.

A curious phenomenon takes place if milk is poured into a vessel containing a large quantity of water. The milk slowly diffuses through the water, the cream rising to the surface, and the casein coagulating apparently spontaneously.

On addition of small quantities of Robbin's 10-per cent. solution of peroxide of hydrogen to milk, and keeping it at blood-heat, 96° F., for twenty-four hours, the milk not unfrequently would coagulate on boiling, as if the casein had been converted into some low form of albumen.

Bacteria have frequently been found in milk, but, owing to the great rapidity with which these bodies form in organic fluids, much significance cannot be placed upon their presence; but it is not improbable that future experiments will show that these bodies play an important part in the development of disease in the human economy.

The time required by milk to spontaneously coagulate depends not only on external circumstances, but also apparently on some condition of the milk itself. The time required for the coagulation, the condition of the curd, and the quantity and quality of the whey, appeared to depend on the food and the health of the individual cow from which the sample of milk was derived.

The milk of cows fed with sewage-grass was found to invariably coagulate sooner than milk of cows fed with ordinary meadow-grass.

The time required to coagulate the milk of the cows mentioned in Table III., when kept in closely-stoppered vessels, varied more than twenty-four hours. The curd in some of the milks reabsorbed into itself the cream, whilst others only partially absorbed the fatty matter. On this power of the casein to retain the fat depends the value of a milk for the quality of cheese produced.

Milk was exposed in vessels to the action of sewer-

gases, to ascertain whether the milk could absorb these gases, and be thus altered in composition. The methods of analysis adopted by public analysts did not indicate any change in this milk.

	Water.	Solids.	Casein.	Fat.	Ash.
Milk exposed to untrapped drain	88	12·1	3·5	0·3	0·8

This milk, when distilled at a low temperature not exceeding 120° F., yielded a distillate which had an offensive smell and unpleasant taste. Tasting the distillate set up intense headache, vigorous rapid pulse, and was followed by severe diarrhœa.

Milk exposed to the vapour arising from animal matter undergoing putrid decomposition, and subjected to distillation, was so offensive, and produced results so dangerous to health, that I refrained from making any further investigation.

Milk exposed to decomposing animal matter, or to the action of sewage-gases, putrified more rapidly than another sample of milk, atmospheric conditions being equal in both cases.

A series of analyses upon milk from cows suffering from disease was made, to determine if, under certain circumstances, diseased milk would not have an important physiological influence upon the health of persons who might unknowingly partake of it.

Pigs fed with milk from cows suffering from foot-and-mouth disease were invariably seized with the disease in a severe form. Sucking pigs were affected in a fatal form. Calves fed with this milk invariably died. Horses, however, can partake of food, over which the saliva of affected cows has dribbled, without any injury to their health.

Dr. Thorne Thorne, in the Twelfth Report of the Medical Officer of the Privy Council, states that since the prevalence of foot-and-mouth disease a large increase of diarrhœa took place amongst children in affected districts; herpetic and aptheous patches in the mouth frequently occurred to them. He however admits that in some districts which were being supplied with affected milk no morbid symptom was produced among the population. This negative testimony is also confirmed by the epidemics at Paris. Boiling the milk is said to remove effectually the danger from contagion.

At the Hertford county-jail 130 prisoners were supplied with milk from cows suffering from foot-and-mouth; none of the prisoners were affected, but the milk was always boiled with gruel.

Through the kindness of Mr. Coleman, veterinary surgeon at Sutton, I was enabled to examine a quantity of milk from an Alderney cow suffering from foot-and-mouth disease.

	Water.	Total solids.	Fat.	Casein.	Ash.	Sp. G.
Alderney cow: foot-and-mouth	88·1	11·9	2·9	3·4	·68	1034
Another severe case	87·54	12·46	3·5	—	·6	1030

From the above analysis it appears that the milk from foot-and-mouth disease does not differ in composition, according to our present method of analysis, from an ordinary milk, although as regards yield it is less than one-half the normal quantity.*

* Donne, however, has noticed that the milk of a cow suffering with *la malarie aptheuse*, which I take to be foot-and-mouth disease, closely corresponds with colestrum; but my researches on milk from this disease does not confirm this view. This difference, however, may be accounted for by the milk in Donne's case having been taken from a cow soon after calving.

I have been fortunate to obtain a specimen of milk from a cow suffering from milk-fever six hours after seizure. The analysis was as follows :—

Sp. g. 1040. Fat 1 per cent. Non-fatty 11·1 per cent. Total solids 12·1. Albuminised matter in abnormal quantity.

$$\text{Ash} \left\{ \begin{matrix} \text{Sol. in water} & . & 26 \\ \text{Insects} \quad ,, & . & 69 \end{matrix} \right\} 95 \text{ per cent.}$$

Proportion of phosphates abnormally large.

The analysis of this milk differs little from a healthy cow, corresponding hours after calving being taken into consideration, with this exception, that the quantity of phosphates in the milk of puerperal fever is abnormally high.

This is interesting from a physiological point, for during the progress of the disease the earthy phosphates leave the animal's bones, producing a species of mollitias ossium, and the long bones of the animal are liable to fracture. I have had two of my own cows thus affected after recovering from this disease; one fractured the thigh-bone, and the other had a compound fracture of the bones just above the fetlock joint. I have been unable to obtain samples of milk from cows suffering from pleuro-pneumonia or rinderpest (the typhoid and typhus fever of cattle).

Lehmann, in his 'Physiological Chemistry,' states that "In all cases of milk (woman's) I have examined who were suffering from acute disease, I found colestrum corpuscles and large granular cells rich in fat."

Herheyer has noticed that the alkaline salts increase when cows are affected with grease, whilst the casein and fat diminish.

Brewer states that in cows suffering from vaccinia the milk was strongly alkaline, and the sugar was almost completely absent. The milk of phthisis is said to be greatly altered; but I regret that I have not been able to obtain specimens of milk from this disease for examination.

My thanks are due to Professor Attfield for the kindness with which he checked the analyses, and also for the suggestions he made from time to time during the period these investigations were being conducted.

To sum up, my experiments suggest the following conclusions :—

1st.—That milk from individual cows is liable to considerable variation.

2nd.—That it is possible for good average milk to be watered to a limited extent without detection.

3rd.—That the casein, under certain circumstances, undergoes modification both physical and physiological.

4th.—That the food of milch cows affects the quality of the milk.

5th.—That milk can be the vehicle of contagion.

By direct communication of the contagion, either by the water used for purposes of adulteration, or by the vessels in which it is stored being cleansed with impure water.

By the absorption of the contagion by the exposure of milk to deleterious gases.

That in extreme instances power to communicate disease is produced in the milk itself, probably from an altered secretion of diseased animals.

6th.—That the methods now employed by public analysts are not sufficiently delicate to detect the minute physiological changes which may at times take place in so complex a fluid as milk.

Considering the universal employment of milk as an article of food by all classes of society, and the importance of having pure milk supplied to the community, especially after the outbreaks of disease which are known to have arisen from its employment, I would venture to urge the desirability, nay the imperative necessity, of a Government Commission to investigate, more thoroughly than can be done by any private individual, those minute but important physiological changes which take place, under certain circumstances, in this fluid; that more delicate tests for impurities in milk may be discovered, and that some indications may be obtained when milk is good for human food or liable to produce disease.

A thorough minute investigation of the chemical and physiological properties of milk in health and disease would involve a large number of experiments, undertaken in different localities, and under varied circumstances; and would require the expenditure of much time, scientific skill, and a considerable sum of money, certainly amounting to several hundred pounds.

APPENDIX.

The following letter, which appeared in the 'Standard,' February 28th, 1875, so closely corroborates my researches in milk from a practical point that I cannot refrain from printing it :—

Sir, — As a constant reader of the 'Standard,' I have noticed the frequent occurrence of the prosecution of milk-sellers for selling milk adulterated with 10 per cent of water. I have also noticed that some of the London magistrates seem in doubt as to whether they are right in convicting in such cases. Now, as a dairy farmer of some little experience, I may be able to give them some little assistance in the matter, by mentioning the following facts, relating to which, should any of your readers doubt the truth of my statement, I can give the full names and addresses of the farmers in question : — On a farm situated three miles from Derby, at a certain time of the year, 25 imperial gallons of milk will make a cheese 30 lbs. weight. On a farm seven miles from Derby, at a certain period of the season, it takes as much as 36 imperial gallons to make a 30 lbs. cheese, both made on precisely the same principle, and the cows fed only on grass, and the cheese from both places being of about the same quality. Now, this fact shows that it is possible for pure milk to vary as much as 30 per cent. in one of its component parts, viz., casein ; and now for the other principal part, viz., butter, and I can find cows in my own dairy that will make three times as much butter from a given quantity of milk as others, and will also vary as largely in the proportion of cream. Their milk yields according to the manner of feeding and the season of the year. I think these facts prove that it is possible for perfectly pure milk to vary considerably above 20 per cent., and that our analysts, having fixed their standard from average milk, are perfectly ignorant of what injustice they cause when they condemn as adulterated all samples varying 10 per cent. from that standard.

I do not write this from any personal pique, as, although I do supply the London market, my land fortunately produces milk of the required quality, and I believe has been several times tested.

I remain, Sir, your obedient Servant,

AGRICOLA.

Wilne, Derbyshire,
July 28.

TABLE A.

Showing the Diurnal Variation in the Quantity and the Quality of the Milk of a half-bred Alderney Cow, for 15 consecutive days, when stall-fed upon Mangold, Oil-cake, and Hay; and, four months later, also for a second period of 15 days, Cow solely fed upon Grass.

Date.	MORNING. Qts.	Sp. G.	Cream.	EVENING. Qts.	Sp. G.	Cream.
January 3rd ..	6	1·023	20	5	1·025	20
,, 4th ..	7	1·027	19	5	1·028	19
,, 5th ..	7	1·029	20	5	1·029	19
,, 6th ..	7	1·029	20	4	1·029	20
,, 7th ..	7	1·030	20	4	1·028	18
,, 8th ..	7	1·028	18	4	1·028	17
,, 9th ..	7	1·028	17	4	1·028	17
,, 10th ..	7	1·027	16	4	1·026	16
,, 11th ..	7	1·026	16	4	1·026	16
,, 12th ..	7	1·026	16	4	1·026	16
,, 13th ..	7	1·027	16	4	1·027	16
,, 14th ..	7	1·026	16	4	1·027	16
,, 15th ..	7	1·026	16	4	1·026	16
,, 16th ..	7	1·026	16	4	1·025	16
,, 17th ..	7	1·026	17	4	1·025	16
May 1st	4	1·025	15	5	1·023	15
,, 2nd	4	1·024	15	5	1·024	15
,, 3rd	4	1·024	15	5	1·022	15
,, 4th	4	1·024	15	5	1·024	15
,, 5th	4	1·024	15	5	1·023	15
,, 6th	4	1·024	15	5	1·023	15
,, 7th	4	1·022	15	5	1·023	15
,, 8th	4	1·024	15	5	1·023	15
,, 9th	4	1·024	15	5	1·023	15
,, 10th	4	1·023	15	5	1·023	15
,, 11th	4	1·024	15	5	1·025	15
,, 12th	4	1·023	15	5	1·023	15
,, 13th	4	1·021	15	5	1·022	15
,, 14th	4	1·023	15	5	1·023	15
,, 15th	4	1·024	15	5	1·024	15

TABLE B.

Showing the Percentage of Cream, and the Specific Gravity of Milk, taken Night and Morning, from a Herd of Cows of various Breeds.

October 5th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1		1·025	20	Alderney	1	1·022	4
2		1·030	30	Alderney	3	1·026	9
3		1·025	22	Brittany	3	1·025	7
4		1·030	25	Half-bred Brittany	2	1·028	20
6		1·024	12	Shorthorn	2	1·026	13
7		1·023	7	Shorthorn	3	1·023	5

5 & 8 dry.

Morning milk, the percentage of cream taken after 24 hours; the evening, after 12 hours. The percentage of cream, in all future experiments, was taken after the milk had stood 24 hours.

October 6th.

1	2	1·027	20	Alderney	1	1·026	25
2	3	1·025	34	Alderney	2	1·025	27
3	4	1·024	20	Brittany	3	1·025	17
4	3	1·025	22	Half-bred Britanny	2	1·027	20
6	3	1·025	12	Shorthorn	2	1·025	12
7	4	1·025	9	Shorthorn	3	1·024	9

Fed on oil-cake, bran, hay, and grass from Holloway's field (so gravel). No. 7 same food, except sewage-grass substituted for meadow grass.

October 7th.

1	2	1·024	26	Alderney	1	1·027	20
2	3	1·025	30	Alderney	2	1·026	30
3	4	1·023	15	Brittany	3	1·024	16
4	2	1·027	20	Half-bred Brittany	2	1·026	22
6	3	1·025	11	Shorthorn	2	1·023	15
7	4	1·025	10	Shorthorn	3	1·025	17

October 8th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·025	22	Alderney	1	1·015	20
2	3	1·025	35	Alderney	2	1·024	25
3	3	1·020	24	Brittany	2	1·027	18
4	3	1·025	20	Half-bred Brittany	2	1·025	28
6	3	1·028	8	Shorthorn	2	1·030	5
7	2	1·025	6	Shorthorn	2	1·024	10

Milk-fever prevalent amongst cows recently calved in the neighbourhood. Wilson's cow recovered from milk-fever.

October 9th.

1	4	1·021	21	Alderney	1	1·024	20
2	3	1·025	27	Alderney	1	1·024	28
3	3	1·023	22	Brittany	2	1·020	20
4	3	1·022	26	Half-bred Brittany	3	1·025	28
6	3	1·025	20	Shorthorn	2	1·022	20
7	3	1·025	15	Shorthorn	2	1·024	10

October 10th.

1	3	1·024	20	Alderney	1	1·020	22
2	4	1·026	35	Alderney	2	1·027	25
3	4	1·025	15	Brittany	2	1·025	15
4	3	1·020	23	Half-bred Brittany	2	1·024	20
6	2	1·024	20	Shorthorn	1	1·023	22
7	4	1·020	8	Shorthorn	2	1·024	10

No. (7). The quantity of sewage-grass was diminished.

October 11th.

1	2	1·024	20	Alderney	1	1·024
2	3	1·026	30	Alderney	2	1·025
3	3	1·025	18	Brittany	2	1·025
4	2	1·027	22	Half-bred Brittany	1	1·026
6	2	1·025	15	Shorthorn	1	1·024
7	3	1·025	8	Shorthorn	2	1·025

October 12th.

1	2	1·023	18	Alderney	1	1·029	18
2	3	1·018	24	Alderney	2	1·025	25
3	3	1·024	15	Brittany	2	1·030	18
4	2	1·027	20	Half-bred Brittany	2	1·027	25
6	2	1·022	18	Shorthorn	1	1·024	15
7	3	1·025	10	Shorthorn	2	1·025	10

October 13th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	2	1·025	20	Alderney	1	1·022	38
2	2	1·027	5	Alderney	2	1·020	40
3	3	1·023	12	Brittany	2	1·021	23
4	2	1·023	24	Half-bred Brittany	2	1·023	30
6	2	1·023	15	Shorthorn	2	1·020	21
7	3	1·025	10	Shorthorn	2	1·023	18

October 14th.

1	2	1·023	30	Alderney	1	1·012	30
2	3	1·022	40	Alderney	2	1·020	35
3	3	1·022	23	Brittany	2	1·021	22
4	2	1·025	30	Half-bred Brittany	2	1·022	30
6	2	1·025	19	Shorthorn	2	1·023	17
7	3	1·024	15	Shorthorn	3	1·020	19

Cows 1 to 8. Oil-cake, beans, hay; grass from Bunkin's field (soil tertiary sand). Cow No. 7. Sewage-grass stopped; cow losing flesh rapidly, and in very bad condition.

October 15th.

1	2	1·020	22	Alderney	1	1·022	24
2	3	1·020	40	Alderney	2	1·020	30
3	3	1·015	22	Brittany	2	1·023	20
4	2	1.020	30	Half-bred Brittany	1	1·020	28
6	2	1·023	18	Shorthorn	1	1·020	12
7	4	1·025	10	Shorthorn	2	1·023	18

October 16th.

1	1	1·022	22	Alderney	1	1·021	25
2	2	1·025	28	Alderney	2	1·023	30
3	3	1·026	20	Brittany	2	1·024	20
4	2	1·027	30	Half-bred Brittany	1	1·026	25
6	2	1·027	10	Shorthorn	1	1·025	20
7	3	1·025	17	Shorthorn	2	1·023	20

October 17th.

1	1	1·022	20	Alderney	1	1·022	20
2	3	1·023	30	Alderney	2	1·025	30
3	3	1·025	21	Brittany	2	1·023	19
4	2	1·027	26	Half-bred Brittany	1	1·020	25
6	2	1·028	14	Shorthorn	1	1·024	10
7	3	1·024	17	Shorthorn	2	1·023	20

October 18th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	2	1·024	20	Alderney	1	1·021	25
2	3	1·026	30	Alderney	2	1·020	30
3	3	1·025	18	Brittany	2	1·024	18
4	2	1·023	25	Half-bred Brittany	1	1·023	20
6	2	1·027	14	Shorthorn	1	1·024	10
7	3	1·025	12	Shorthorn	2	10·25	15

October 19th.

1	2	1·022	20	Alderney	1	1·021	20
2	3	1·022	30	Alderney	2	1·023	30
3	3	1·023	18	Brittany	2	1·022	17
4	2	1·023	22	Half-bred Brittany	1	1·020	21
6	2	1·025	18	Shorthorn	1	1·024	12
7	3	1·025	10	Shorthorn	2	1·023	19

October 20th.

1	3	1·023	20	Alderney	1	1·020	18
2	3	1·029	30	Alderney	2	1·023	25
3	3	1·025	20	Brittany	2	1·023	17
4	2	1·023	25	Half-bred Brittany	1	1·021	20
6	2	1·026	6	Shorthorn	1	1·025	15
7	3	1·024	20	Shorthorn	2	1·025	20

Cows 1 to 7. Fed on oil-cake, &c.; grass from Ashby-field (soil clay).

October 21st.

1	2	1·028	20	Alderney	1	1·020	18
2	3	1·028	25	Alderney	2	1·023	28
3	3	1·025	19	Brittany	2	1·023	15
4	3	1·026	22	Half-bred Brittany	1	1·020	22
6	2	1·023	10	Shorthorn	1	1·025	12
7	3	1·025	15	Shorthorn	2	1·024	13

October 22nd.

1	2	1·023	15	Alderney	1	1·020	15
2	3	1·029	28	Alderney	2	1·026	20
3	3	1·025	15	Brittany	2	1·020	16
4	2	1·023	21	Half-bred Brittany	3	1·028	20
6	2	1·026	12	Shorthorn	1	1·025	13
7	3	1·025	13	Shorthorn	3	1·022	15

All cows fed on oil-cake, &c.; grass from Holloway's field (soil gravel).

October 23rd.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	2	1·025	17	Alderney	1	1·025	20
2	3	1·029	30	Alderney	2	1·025	30
3	3	1·025	15	Brittany	2	1·025	14
4	2	1·023	20	Half-bred Brittany	2	1·025	25
6	2	1·024	14	Shorthorn	1	1·025	12
7	2	1·020	15	Shorthorn	3	1·025	15

October 24th.

1	2	1·030	19	Alderney	1	1·020	14
2	2	1·025	22	Alderney	2	1·026	18
3	3	1·025	9	Brittany	2	1·020	15
4	2	1·026	28	Half-bred Brittany	2	1·025	20
6	1	1·025	7	Shorthorn	1	1·028	19
7	3	1·026	10	Shorthorn	3	1·025	12

October 25th.

1	2	1·025	15	Alderney	1	1·020	17
2	2	1·028	28	Alderney	2	1·025	28
3	3	1·025	20	Brittany	2	1·020	15
4	4	1·026	25	Half-bred Brittany	2	1·026	22
6	1	1·028	7	Shorthorn	1	1·028	15
7	3	1·025	15	Shorthorn	3	1·025	20

October 26th.

1	2	1·025	18	Alderney	1	1·024	18
2	2	1·028	26	Alderney	2	1·023	26
3	3	1·025	20	Brittany	2	1·025	18
4	1	1·026	25	Half-bred Brittany	1	1·024	24
6	1	1·028	9	Shorthorn	1	1·024	10
7	3	1·025	15	Shorthorn	2	1·026	17

October 27th.

1	2	1·026	24	Alderney	1	1·022	26
2	2	1·024	26	Alderney	2	1·020	32
3	3	1·022	20	Brittany	2	1·020	22
4	1	1·023	24	Half-bred Brittany	1	1·020	30
6	1	1·025	9	Shorthorn	1	1·021	12
7	3	1·026	18	Shorthorn	2	1·023	18

October 28th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·023	26	Alderney	1	1·024	24
2	2	1·025	30	Alderney	2	1·020	28
3	3	1·025	20	Brittany	2	1·021	22
4	1	1·020	27	Half-bred Brittany	1	1·020	30
7	3	1·027	18	Shorthorn	2	1·025	15

Cow No. 6 dried off.

October 29th.

1	1	1·023	24	Alderney	1	1·022	25
2	2	1·020	30	Alderney	2	1·020	29
3	3	1·024	20	Brittany	2	1·024	20
4	1	1·022	28	Half-bred Brittany	1	1·020	28
7	3	1·025	18	Shorthorn	2	1·025	15

October 30th.

1	1	1·020	24	Alderney	1	1·020	24
2	2	1·020	32	Alderney	1	1·020	28
3	2	1·024	20	Brittany	2	1·024	20
4	1	1·022	28	Half-bred Brittany	1	1·020	26
7	3	1·025	18	Shorthorn	2	1·024	16

October 31st.

1	1	1·022	26	Alderney	1	1·022	25
2	2	1·020	29	Alderney	2	1·020	28
3	2	1·024	23	Brittany	2	1·024	20
4	1	1·020	26	Half-bred Brittany			
7	3	1·025	18	Shorthorn	2	1·025	18

November 1st.

1	1	1·024	22	Alderney			
2	2	1·022	24	Alderney	1	1·020	28
3	2	1·024	15	Brittany	2	1·024	20
4	1	1·023	26	Half-bred Brittany			
7	3	1·025	14	Shorthorn	2	1·026	18

November 2nd.

1	1	1·020	26	Alderney			
2	2	1·022	28	Alderney	1	1·020	28
3	2	1·024	20	Brittany	1	1·024	22
4	1	1·020	25	Half-bred Brittany			
7	2	1·025	16	Shorthorn	2	1·026	18

Cows in Holloway's field. Oil-cake, bran, hay, mangold.

November 3rd.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·020		Alderney			
2	2	1·023		Alderney	1	1·024	28
3	2	1·027		Brittany	1	1·026	20
4	1	1·024		Half-bred Brittany			
7	3	1·028		Shorthorn	2	1·027	17

November 4th.

1	1	1·020	28	Alderney			
2	2	1·022	30	Alderney	1	1·020	
3	2	1·024	22	Brittany	2	1·025	
4	1	1·020	29	Half-bred Brittany			
7	3	1·026	16	Shorthorn	2	1·027	

November 5th.

1	1	1·024	27	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
3	2	1·026	18	Brittany	2	1·026	20
4	1	1·020	27	Half-bred Brittany			
7	3	1·027	18	Shorthorn	2	1·027	15

November 6th.

1	1	1·025	28	Alderney			
2	2	1·024	30	Alderney	1	1·022	27
3	2	1·026	20	Brittany	2	1·026	20
4	1	1·025	27	Half-bred Brittany			
7	3	1·027	15	Shorthorn	2	1·027	16

Cow No. 4 dried off.

November 7th.

1	1	1·024	26	Alderney			
2	2	1·020	27	Alderney	1	1·020	28
3	2	1·026	26	Brittany	2	1·025	20
7	2	1·025	18	Shorthorn	2	1·026	16

November 8th.

1	1	1·026	25	Alderney			
2	2	1·024	28	Alderney	1	1·023	27
3	2	1·027	21	Brittany	2	1·025	21
7	3	1·027	18	Shorthorn	2	1·026	16

November 9th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·022	24	Alderney			
2	2	1·020	28	Alderney	1	1·022	28
3	2	1·025	21	Brittany	2	1.025	20
7	3	1·026	18	Shorthorn	2	1·026	17

November 10th.

1	1	1·021	26	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
3	2	1·024	21	Brittany	2	1·025	20
7	3	1·026	18	Shorthorn	2	1·026	16

November 11th.

1	1	1·022	26	Alderney			
2	2	1·023	30	Alderney	1	1·020	28
3	2	1·025	20	Brittany	2	1·024	19
7	3	1·026	18	Shorthorn	2	1·027	17

Butter made was rancid. Oil-cake, bran, hay, carrots, mangold.

November 12th.

1	1	1·020	24	Alderney			
2	2	1·020	28	Alderney	1	1·020	28
3	2	1·022	20	Brittany	2	1·024	20
7	3	1·025	18	Shorthorn	2	1·025	16

November 13th.

1	1	1·020	24	Alderney			
2	2	1·020	29	Alderney			
3	2	1·024	20	Brittany			
4	3	1·025	18	Shorehorn			

November 14th.

1	1	1·022	26	Alderney			
2	2	1·020	28	Alderney	1	1·020	28
3	2	1·024	20	Brittany	2	1·022	18
7	3	1·025	16	Shorthorn	2	1·024	16

November 15th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·020		Alderney			
2	2	1·020		Alderney	1	1·020	28
3	2	1·024		Brittany	2	1·022	20
7	2	1·025		Shorthorn	2	1·024	18

Butter made rancid. Cows in Bunkin's field by day. Oil-cake, bran, hay, mangold and carrots.

November 16th.

1	1	1·020	26	Alderney			
2	2	1·020	29	Alderney	1	1·022	28
3	2	1·022	19	Brittany	2	1·024	20
7	3	1·025	18	Shorthorn	2	1·025	16

November 17th.

1	1	1.020	27	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
3	2	1·024	20	Brittany	2	1·024	20
7	3	1·025	18	Shorthorn	2	1·025	16

November 18th.

1	1	1·020	26	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
3	2	1·024	19	Brittany	2	1·024	20
7	3	1·025	17	Shorthorn	2	1·025	16

November 19th.

1	1	1·020	26	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
3	2	1 024	20	Brittany	2	1·024	20
7	3	1·025	18	Shorthorn	2	1·025	17

November 20th.

1	1	1·022	27	Alderney			
2	2	1·020	28	Alderney	1	1·020	29
3	2	1·025	20	Brittany	1	1·024	20
7	3	1·026	18	Shorthorn	2	1·025	16

November 21st.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·020	25	Alderney			
2	2	1·022	28	Alderney	1	1·020	28
3	2	1·024	19	Brittany	1	1.025	20
7	3	1·025	18	Shorthorn	2	1·025	16

November 22nd.

1	1	1·022	25	Alderney			
2	2	1·021	29	Alderney	1	1·020	28
3	2	1·025	20	Brittany	1	1·024	20
7	2	1·026	18	Shorthorn	2	1·025	17

November 23rd.

1	1	1·024	27	Alderney			
2	2	1·025	29	Alderney	1	1·025	28
3	1	1·023	20	Brittany	1	1·023	20
7	3	1·023	18	Shorthorn	2	1·023	16

Cox's cow died with milk-fever (twelve hours). Butter rancid.

November 24th.

1	1	1·025	22	Alderney			
2	2	1·025	28	Alderney	1	1·025	28
3	1	1·023	20	Brittany	1	1·023	20
7	3	1·023	17	Shorthorn	2	1·024	16

November 25th.

1	1	1·025	26	Alderney			
2	2	1·025	29	Alderney	1	10·25	28
3	1	1·023	20	Brittany	1	1·024	20
4	3	1·024	18	Shorthorn	2	1·024	16

November 26th.

1	1	1·026	27	Alderney			
2	2	1·025	30	Alderney	1	1·025	29
3	1	1·023	19	Brittany	1	1·024	20
7	3	1·024	18	Shorthorn	2	1·025	18

November 27th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·024	27	Alderney			
2	2	1·025	29	Alderney	1	1·024	28
3	1	1·022	20	Brittany	1	1·023	20
7	3	1·024	17	Shorthorn	2	1·024	17

November 28th.

1	1	1·025	28	Alderney			
2	2	1·025	30	Alderney	1	1·024	29
3	1	1·023	20	Brittany	1	1·025	19
7	3	1·024	18	Shorthorn	2	1·024	16

November 29th.

1	1	1·025	28	Alderney			
2	2	1·025	30	Alderney	1	1·020	28
3	1	1·024	20	Brittany	1	1·024	20
7	3	1·024	18	Shorthorn	2	1·025	16

November 30th.

1	1	1·024	27	Alderney			
2	2	1·023	30	Alderney	1	1·022	29
3	1	1·025	20	Brittany	1	1·024	20
7	3	1·024	18	Shorthorn	2	1·025	16

December 1st.

1	1	1·024	27	Alderney			
2	2	1·023	30	Alderney	1	1·021	29
3	1	1·025	20	Brittany	1	1·023	19
7	3	1·024	17	Shorthorn	2	1·022	18

Oil-cake, bran, mangold, bran, hay. Cows turned during the day into Ashby-field.

December 2nd.

1	2	1·024	25	Alderney			
2	2	1·020	28	Alderney	1	1·025	20
3	1	1·022	19	Brittany	1	1·020	18
7	3	1·024	16	Shorthorn	2	1·025	18

December 3rd.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·022	15	Alderney			
2	3	1·025	23	Alderney	2	1·022	17
3	1	1·023	16	Brittany	1	1·025	12
7	3	1·025	16	Shorthorn	2	1·022	15

December 4th.

1	2	1·024	17	Alderney			
2	3	1 028	30	Alderney	2	1·025	28
3	1	1·022	20	Brittany	1	1·020	15
7	3	1·022	22	Shorthorn	3	1·024	18

December 5th.

1	2	1·022	15	Alderney			
2	3	1·025	28	Alderney	2	1·025	28
3	1	1·022	15	Brittany	1	1·022	18
7	3	1·024	17	Shorthorn	2	1·022	16

Cows in Bunkin's field.

December 6th.

1	1	1·027	24	Alderney			
2	2	1·027	28	Alderney	2	1·026	26
3	1	1·024	20	Brittany	1	1·024	20
7	3	1·023	17	Shorthorn	2	1·025	17

December 7th.

1	1	1·027	22	Alderney			
2	2	1·027	24	Alderney	1	1·025	23
3	1	1·025	18	Brittany	1	1·022	18
7	3	1·022	16	Shorthorn	2	1·024	17

December 8th.

1	1	1·026	25	Alderney			
2	2	1·027	26	Alderney	1	1·027	25
3	1	1·023	18	Brittany	1	1·024	18
7	3	1·024	16	Shorthorn	2	1·025	16

Cow No. 3 dried off.

December 9th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·024	26	Alderney			
2	2	1·024	28	Alderney	1	1·024	26
7	3	1·025	16	Shorthorn	2	1·023	16

December 10th.

1	1	1·026	24	Alderney			
2	2	1·027	25	Alderney	1	1·026	25
7	3	1·024	16	Shorthorn	2	1·024	16

December 11th.

1	1	1·024	25	Alderney			
2	2	1·023	27	Alderney	1	1·024	26
7	3	1·024	16	Shorthorn	2	1·022	16

December 12th.

1	1	1·026	25	Alderney			
2	2	1·027	26	Alderney	1	1·024	26
7	3	1·022	16	Shorthorn	2	1·023	16

December 13th.

1	1	1·024	24	Alderney			
2	2	1·025	27	Alderney	1	1·023	28
7	3	1·022	16	Shorthorn	2	1·024	15

December 14th.

1	1	1·020	26	Alderney			
2	2	1·020	29	Alderney	1	1·021	27
7	3	1·025	17	Shorthorn	2	1·025	16

December 15th.

1	1	1·021	26	Alderney			
2	2	1·020	28	Alderney	1	1·020	27
7	3	1·026	17	Shorthorn	2	1·024	16

December 16th.

1	1	1·020	26	Alderney			
2	2	1·020	29	Alderney	1	1·022	27
7	3	1·026	16	Shorthorn	2	1·026	15

December 17th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·020	26	Alderney			
2	2	1·022	28	Alderney	1	1·020	27
7	3	1·024	16	Shorthorn	2	1·025	16

December 18th.

1	1	1·024	27	Alderney			
2	2	1·020	29	Alderney	1	1·020	28
7	3	1·022	17	Shorthorn	2	1·025	16

December 19th.

1	1	1·024	26	Alderney			
2	2	1·020	30	Alderney	1	1·021	28
7	3	1·024	17	Shorthorn	3	1·023	16

December 20th.

1	1	1·024	26	Alderney			
2	2	1·020	29	Alderney	1	1·022	28
7	3	1·025	16	Shorthorn	2	1·024	16

December 21st.

1	1	1·025	26	Alderney			
2	2	1·020	29	Alderney	1	1·022	28
7	3	1·025	16	Shorthorn	2	1·024	16

December 22nd.

1	1	1·022	27	Alderney			
2	2	10·21	30	Alderney	1	1·020	28
7	3	1·026	17	Shorthorn	2	1·024	16

December 23rd.

1	1	1·020	26	Alderney			
2	2	1·020	30	Alderney	1	1·022	26
7	3	1·024	16	Shorthorn	2	1·024	16

December 24th.

1	1	1·024	27	Alderney			
2	2	1·021	28	Alderney	1	1·022	27
7	3	1·024	16	Shorthorn	2	1·026	16

December 25th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·024	26	Alderney			
2	2	1·023	28	Alderney	1	1·022	27
7	3	1·025	16	Shorthorn	2	1·024	26

Cows in Holloway's field by day.

December 26th.

1	1	1·025	27	Alderney			
2	2	1·024	28	Alderney	1	1·023	28
7	3	1·025	16	Shorthorn	2	1·026	15

December 27th.

1	1	1·024	26	Alderney			
2	2	1·022	29	Alderney	1	1·020	26
7	3	1·026	16	Shorthorn	2	1·024	15

December 28th.

1	1	1·024	25	Alderney			
2	2	1·020	26	Alderney	1	1·021	26
7	3	1·024	15	Shorthorn	2	1·025	14

December 29th.

1	1	1·022	25	Alderney			
2	2	1·024	27	Alderney	1	1·023	26
7	3	1.026	15	Shorthorn	2	1·024	14

December 30th.

1	1	1·020	26	Alderney			
2	2	1·022	28	Alderney	1	1·023	27
7	3	1·024	15	Shorthorn	2	1·026	14

December 31st.

1	1	1·024	26	Alderney			
2	2	1·022	27	Alderney	1	1·023	27
7	3	1·024	16	Shorthorn	2	1·026	15

January 1st.

1	1	1·024	28	Alderney			
2	2	1·020	29	Alderney	1	1·022	28
7	3	1·025	16	Shorthorn	2	1·024	15

Cows fed on oil-cake, bran, hay. In Holloway's field by day. Cows 3, 4, 5, 6, 8, dry.

January 2nd.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·024	27	Alderney			
2	2	1·023	28	Alderney	1	1·024	27
7	3	1·024	15	Shorthorn	2	1·026	15

January 3rd.

1	1	1·024	28	Alderney			
2	2	1·022	29	Alderney	1	1·021	27
4	6	1·023	20	Half-bred Brittany	5	1·025	20
7	3	1·024	15	Shorthorn	2	1·025	15

Cow No. 5 calved.

January 4th.

1	1	1·024	26	Alderney			
2	2	1·025	27	Alderney	1	1·024	26
4	7	1·027	19	Half-bred Brittany	5	1·028	19
7	3	1·025	15	Shorthorn	2	1·026	15

January 5th.

1	1	1·023	26	Alderney			
2	2	1·024	27	Alderney	1	1·023	26
4	7	1·029	20	Half-bred Brittany	5	1·029	19
7	3	1·025	14	Shorthorn	2	1·026	14

January 6th.

1	1	1·023	26	Alderney			
2	2	1·024	28	Alderney	1	1·023	27
4	7	1·029	20	Half-bred Brittany	4	1·029	20
7	3	1·025	15	Shorthorn	2	1·026	14

January 7th.

1	1	1·025	26	Alderney			
2	2	1·024	28	Alderney	1	1·023	28
4	7	1·030	20	Half-bred Brittany	4	1·028	18
7	3	1·026	15	Shorthorn	2	1·025	16

Cows fed on bran, oil-cake, hay, and mangold. No. 8 (brindle heiffer) calved: half-bred Ayrshire.

January 8th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·022	26	Alderney			
2	2	1·021	28	Alderney	1	1·023	28
4	7	1·028	18	Half-bred Brittany	4	1·028	17
5	4	1·029	13	Brittany heifer ..	2	1·030	12
7	3	1·024	17	Shorthorn	2	1·025	16

January 9th.

1	1	1·024	26	Alderney			
2	2	1·022	29	Alderney	1	1·023	28
4	7	1·028	17	Half-bred Brittany	4	1·028	17
5	4	1·029	13	Brittany heifer ..	2	1·027	14
7	3	1·024	18	Shorthorn	2	1·023	17

January 10th.

1	1	1·024	27	Alderney			
2	2	1·022	28	Alderney	1	1·022	28
4	7	1·027	16	Half-bred Brittany	4	1·026	16
5	4	1·027	14	Brittany heifer ..	2	1·026	14
7	3	1·026	17	Shorthorn	2	1·025	17

January 11th.

1	1	1·022	27	Alderney			
2	2	1·022	28	Alderney	1	1·023	27
4	7	1·026	16	Half-bred Brittany	4	1·026	16
5	4	1·026	14	Brittany heifer ..	2	1·026	14
7	3	1·026	18	Shorthorn	2	1·024	17

January 12th.

1	1	1·022	28	Alderney			
2	2	1·022	29	Alderney	1	1·023	28
4	7	1·026	16	Half-bred Brittany	4	1·026	16
5	4	1·026	14	Brittany heifer ..	2	1·027	14
7	3	1·024	17	Shorthorn	2	1·025	17

January 13th.

1	1	1·023	27	Alderney			
2	2	1·022	28	Alderney	1	1·022	27
4	7	1·027	16	Half-bred Brittany	4	1·027	16
5	4	1·027	14	Brittany heifer ..	2	1·027	14
7	3	1·024	17	Shorthorn	2	1·024	16

January 14th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	1	1·022	27	Alderney			
2	2	1·022	28	Alderney	1	1·023	28
4	7	1·026	16	Half-bred Brittany	4	1·027	16
5	4	1·027	14	Brittany heifer ..	2	1·026	14
7	3	1·024	17	Shorthorn	2	1·024	17

January 15th.

1	1	1·024	26	Alderney			
2	2	1·022	28	Alderney	1	1·022	28
4	7	1·026	16	Half-bred Brittany	4	1·026	16
5	4	1·026	14	Brittany heifer ..	2	1·026	14
7	3	1·025	17	Shorthorn	2	1·024	17

Cow No. 1 dried off, after being in milk eighteen months.

January 16th.

2	1	1·023	28	Alderney	1	1·024	27
4	7	1·026	16	Half-bred Brittany	4	1·025	16
5	4	1·026	14	Brittany heifer ..	2	1·026	14
7	3	1·025	17	Shorthorn	2	1·024	16

January 17th.

2	1	1·023	28	Alderney	1	1·023	27
4	7	1·026	17	Half-bred Brittany	4	1·026	16
5	4	1·025	15	Brittany heifer ..	2	1·026	14
7	3	1·025	18	Shorthorn	3	1·024	17

January 18th.

2	1	1·022	29	Alderney			
4	7	1·025	17	Half-bred Brittany	4	1·026	17
5	4	1·026	15	Brittany heifer ..	2	1·025	14
7	3	1·024	17	Shorthorn	2	1·024	17

January 19th.

2	1	1·023	28	Alderney			
4	7	1·027	17	Half-bred Brittany	4	1·026	16
5	4	1·026	15	Brittany heifer ..	2	1·025	14
7	3	1·023	17	Shorthorn	2	1·024	17

January 20th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
2	1	1·022	28	Alderney			
4	7	1·025	18	Half-bred Brittany	4	1·026	17
5	4	1·026	16	Brittany heifer ..	2	1·027	14
7	3	1·024	17	Shorthorn	2	1·024	17

January 21st.

2	1	1·022	29	Alderney			
4	7	1·027	17	Half-bred Brittany	4	1·026	16
5	4	1·026	15	Brittany heifer ..	2	1·025	14
7	3	1·023	17	Shorthorn	2	1·022	17
8				Half-bred Ayrshire	5	1·025	13

No. 1 cow dried off.

January 22nd.

2	1	1·020	26	Alderney			
4	7	1·025	15	Half-bred Brittany	4	1·026	14
5	4	1·025	14	Brittany heifer ..	2	1·025	13
7	2	1·023	16	Shorthorn	1	1·022	16
8	8	1·025	13	Half-bred Ayrshire	5	1·025	13

January 23rd.

2	1	1·022	26	Alderney			
4	7	1·024	15	Half-bred Brittany	4	1·025	14
5	4	1·025	14	Brittany heifer ..	2	1·026	13
7	2	1·022	15	Shorthorn	1	1·021	15
8	8	1·026	13	Half-bred Ayrshire	5	1·025	13

January 24th.

2	1	1·020	26	Alderney			
4	7	1·025	15	Half-bred Brittany	4	1·024	15
5	4	1·024	14	Brittany heifer ..	2	1·025	13
7	2	1·020	16	Shorthorn	1	1·020	16
8	8	1·025	13	Half-bred Ayrshire	5	1·024	13

January 25th.

2	1	1·020	27	Alderney			
4	7	1·025	14	Half-bred Brittany	4	1·025	14
5	4	1·025	13	Brittany heifer ..	2	1.026	13
7	2	1·020	16	Shorthorn	1	1·022	15
8	8	1·024	14	Half-bred Ayrshire	5	1·024	14

January 26th.

No.	MORNING. Qts.	Sp. G.	Cream.	Breed.	EVENING. Qts.	Sp. G.	Cream.
2	1	1·020	27	Alderney			
4	7	1·025	14	Half-bred Brittany	4	1·025	14
5	4	1·024	13	Brittany heifer ..	2	1·025	13
7	2	1·020	16	Shorthorn	1	1·020	16
8	8	1·025	13	Half-bred Ayrshire	5	1·026	14

Cows in Bunkin's field. Fed on cake, bran, hay, mangold.

January 27th.

2	1	1·020	27	Alderney			
4	7	1·024	14	Half-bred Brittany	4	1·025	14
5	4	1·024	13	Brittany heifer ..	2	1·024	13
7	2	1·020	16	Shorthorn	1	1·020	15
8	8	1·025	14	Half-bred Ayrshire	5	1·026	14

January 28th.

2	1	1·020	27	Alderney			
4	7	1·026	14	Half-bred Britanny	4	1·025	14
5	4	1·025	13	Brittany heifer ..	2	1·024	13
7	2	1·020	16	Shorthorn	1	1·020	16
8	8	1·025	14	Half-bred Ayrshire	5	1·026	14

January 29th.

2	1	1·020	27	Alderney			
4	7	1·026	14	Half-bred Brittany	4	1·025	14
5	4	1·024	13	Brittany heifer ..	2	1·024	13
7	2	1·020	15	Shorthorn			
8	8	1·025	14	Half-bred Ayrshire	5	1·024	14

January 30th.

2	1	1·020	26	Alderney			
4	7	1·025	14	Half-bred Brittany	4	1·026	14
5	4	1·024	13	Brittany heifer ..	2	1·025	14
7	2	1·020	16	Shorthorn			
8	8	1·025	14	Half-bred Ayrshire	5	1·025	14

January 31st.

2	1	1·020	26	Alderney			
4	7	1·025	14	Half-bred Brittany	4	1·025	14
5	4	1·024	13	Brittany heifer ..	2	1·024	13
7	2	1·020	16	Shorthorn			
8	8	1·025	14	Half-bred Ayrshire	5	10·25	14

February 1st.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
2	1	1·022	28	Alderney			
3	7	1·026	16	Brittany	4	1·025	16
4	7	1·025	15	Half-bred Brittany	4	1·024	15
6	4	1·024	15	Brittany heifer ..	2	1·026	14
7	1	1·023	14	Shorthorn			
8	8	1·025	16	Half-bred Ayrshire	5	1·024	16

Cows fed on oil-cake, bran, mangold, hay. In Ashby's field by day.

February 2nd.

2	1	1·022	27	Alderney			
3	7	1·026	16	Brittany	4	1·024	16
4	7	1·025	15	Half-bred Brittany	4	1·025	16
5	4	1·024	15	Brittany heifer ..	2	1·024	15
7	1	1·022	16	Shorthorn			
8	8	1·025	16	Half-bred Ayrshire	5	1·026	16

February 3rd.

2	1	1·023	26	Alderney			
3	7	1·026	16	Brittany	4	1·025	16
4	7	1·025	16	Half-bred Brittany	4	1·024	16
5	4	1·026	15	Brittany heifer ..	2	1·023	15
7	1	1·023	16	Shorthorn			
8	8	1·024	16	Half-bred Ayrshire	5	1·024	16

February 4th.

2	1	1·020	26	Alderney			
3	7	1·024	16	Brittany	4	1·024	16
4	7	1·023	17	Half-bred Brittany	4	1·025	16
5	4	1·025	15	Brittany heifer ..	2	1·026	15
7	1	1·020	16	Shorthorn			
8	8	1·024	16	Half-bred Ayrshire	5	1·023	16

February 5th.

2	1	1·020	26	Alderney			
3	7	1·024	16	Brittany	4	1·025	16
4	7	1·025	16	Half-bred Brittany	4	1·024	16
5	4	1·023	15	Brittany heifer ..	2	1·023	15
7	1	1·020	16	Shorthorn			
8	8	1·024	16	Half-bred Ayrshire	5	1·024	16

February 6th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
2	1	1·020	26	Alderney			
3	7	1·024	16	Brittany	4	1·025	16
4	7	1·025	16	Half-bred Brittany	4	1·024	16
5	4	1·024	15	Brittany heifer ..	2	1·024	15
7	1	1·020	16	Shorthorn			
8	8	1·024	16	Half-bred Ayrshire	5	1·024	16

Cow No. 7 dried off.

February 7th.

2	1	1·020	26	Alderney			
3	7	1.025	16	Brittany	4	1·024	16
4	7	1·024	16	Half-bred Brittany	4	1·025	16
5	4	1·023	15	Brittany heifer ..	2	1·023	14
8	8	1·025	16	Half-bred Ayrshire	5	1·024	16

February 8th.

2	1	1·020	26	Alderney			
3	7	1·024	16	Brittany	4	1·025	16
4	7	1·024	16	Half-bred Brittany	4	1·024	16
5	4	1·023	14	Brittany heifer ..	2	1·022	14
8	8	1·025	16	Half-bred Ayrshire	5	1·026	16

February 9th.

2	1	1·020	26	Alderney			
3	7	1·024	16	Brittany	4	1·024	16
4	7	1·025	16	Half-bred Brittany	4	1·025	16
5	4	1·023	15	Brittany heifer ..	2	1·022	15
8	8	1·025	16	Half-bred Ayrshire	5	1·024	16

February 10th.

2	1	1·020	25	Alderney			
3	7	1·024	16	Brittany	4	1·024	16
4	7	1·023	16	Half-bred Brittany	4	1·025	15
5	4	1·023	14	Brittany heifer ..	2	1·023	14
8	8	1·024	16	Half-bred Ayrshire	5	1·023	17

February 11th.

2	1	10·20	26	Alderney			
3	7	1·024	16	Brittany	4	1·023	17
4	7	1·023	17	Half-bred Brittany	4	1·024	16
5	4	1·023	15	Brittany heifer ..	2	1·023	15
8	8	1·025	16	Half-bred Ayrshire	5	1·023	17

February 12th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
2	1	1·022	25	Alderney			
3	7	1·024	16	Brittany	4	1·023	17
4	7	1·025	16	Half-bred Brittany	4	1·022	17
5	4	1·024	15	Brittany heifer ..	2	1·023	15
8	8	1·025	17	Half-bred Ayrshire	5	1·023	17

Cows fed on oil-cake, bran, mangold, hay. In Holloway's field by day.

February 13th.

2	1	1·020	26	Alderney			
3	7	1·025	16	Brittany	4	1·023	17
4	7	1·024	16	Half-bred Brittany	4	1·024	16
5	4	1·025	14	Brittany heifer ..	2	1·023	15
8	8	1·025	16	Half-bred Ayrshire	5	1·024	17

February 14th.

2	1	1·020	26	Alderney			
3	7	1·023	17	Brittany	4	1·024	17
4	7	1·024	16	Half-bred Brittany	4	1·023	17
5	4	1·022	15	Brittany heifer ..	2	1·022	15
8	8	1·024	17	Half-bred Ayrshire	5	1·024	17

February 15th.

2	1	1·022	26	Alderney	Not taken.
3	7	1·024	15	Brittany	
4	7	1·025	16	Half-bred Brittany	
5	4	1·022	15	Brittany heifer ..	
8	8	1·024	17	Half-bred Ayrshire	

February 16th.

2	1	1·021	26	Alderney			
3	7	1·024	16	Brittany	4	1·023	17
4	7	1·023	16	Half-bred Brittany	4	1·024	17
5	4	1·022	15	Brittany heifer ..	2	1·023	15
8	8	1·024	17	Half-bred Ayrshire	5	1·024	17

Cow No. 2 dried off.

February 17th.

3	6	1·024	16	Brittany	3	1·023	16
4	6	1·024	16	Half-bred Brittany	3	1·024	16
5	3	1·023	15	Brittany heifer ..	2	1·023	14
8	7	1·025	16	Half-bred Ayrshire	4	1·024	16

February 18th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
3	6	1·024	15	Brittany	3	1·024	16
4	6	1·023	16	Half-bred Brittany	3	1·022	16
5	3	1·024	16	Brittany heifer ..	2	1·023	14
8	7	1·023	16	Half-bred Ayrshire	4	1·025	16

February 19th.

3	6	1·022	16	Brittany	3	1·023	16
4	6	1·023	16	Half-bred Brittany	3	1·025	16
5	3	1·024	15	Brittany heifer ..	2	1·023	15
8	7	1·024	16	Half-bred Ayrshire	4	1·023	16

February 20th.

3	6	1·023	16	Brittany	3	1·024	16
4	6	1·024	16	Half-bred Brittany	3	1·023	16
5	3	1·022	15	Brittany heifer ..	2	1·022	15
8	7	1·025	16	Half-bred Ayrshire	4	1·024	16

February 21st.

3	6	1·024	16	Brittany	3	1·024	16
4	6	1·024	16	Half-bred Brittany	3	1·023	16
5	3	1·022	15	Brittany heifer ..	2	1·020	15
8	7	1·025	16	Half-bred Ayrshire	4	1·022	16

February 22nd.

3	6	1·024	16	Brittany	3	1·024	16
4	6	1·023	16	Half-bred Brittany	3	1·022	16
5	3	1·024	15	Brittany heifer ..	2	1·022	15
8	7	1·023	16	Half-bred Ayrshire	4	1·023	16

February 23rd.

3	6	1·022	16	Brittany	3	1·023	16
4	6	1·024	16	Half-bred Brittany	3	1·024	16
5	3	1·023	15	Brittany heifer ..	2	1·024	15
8	7	1·024	16	Half-bred Ayrshire	4	1·024	16

February 24th.

3	6	1·023	16	Brittany	3	1·023	16
4	6	1·024	16	Half-bred Brittany	3	1·024	17
5	3	1·023	14	Brittany heifer ..	2	1·022	14
8	7	1·024	16	Half-bred Ayrshire	4	1·022	16

February 25th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
3	6	1·022	16	Brittany	3	1·023	16.
4	6	1·024	16	Half-bred Brittany	3	1·024	16
5	3	1·023	14	Brittany heifer ..	2	1·022	15
8	7	1·024	16	Half-bred Ayrshire	4	1·025	16

February 26th.

3	6	1·024	16	Brittany	3	1·025	16
4	6	1·025	16	Half-bred Brittany	3	1·024	16
5	3	1·024	15	Brittany heifer ..	2	1·022	15
8	7	1·025	16	Half-bred Ayrshire	4	1·024	16

February 27th.

3	6	1·022	16	Brittany	3	1·024	15
4	6	1·023	15	Half-bred Brittany	3	1·023	16
5	3	1·024	14	Brittany heifer ..	2	1·024	14
8	7	1·024	16	Half-bred Ayrshire	4	1·024	15

February 28th.

3	6	1·023	14	Brittany	3	1·023	14
4	6	1·024	15	Half-bred Brittany	3	1·024	15
5	4	1·023	14	Brittany heifer ..	2	1·022	14
8	7	1·024	15	Half-bred Ayrshire	4	1·024	15

(Daily Record for March lost.)

March 31st.

3	5	1·022	15	Brittany	3	1·022	15
4	4	1·023	15	Half-bred Brittany	3	1·022	15
5	3	1·022	15	Brittany heifer ..	2	1·023	15
6		1·028	10	Shorthorn		1·028	10
7		1·024	12	Shorthorn		1·023	12
8	4	1·025	12	Half-bred Ayrshire	3	1·025	12

April 1st.

3	5	1·022	15	Brittany	3	1·022	15
4	4	1·023	15	Half-bred Brittany	3	1·023	15
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6		1·028	16	Shorthorn		1·028	10
7		1·023	12	Shorthorn		1·023	12
8	4	1·025	10	Half-bred Ayrshire	3	1·025	10

Cows in Bunkin's field.

April 2nd.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
3	5	1·023	15	Brittany	3	1·024	15
4	4	1·022	15	Half-bred Brittany	2	1·023	15
5	3	1·023	15	Brittany heifer ..	2	1·022	15
6		1·028	10	Shorthorn		1·028	10
7	4	1·024	12	Shorthorn	3	1·025	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	12

April 3rd.

3	5	1·023	15	Brittany	3	1·023	15
4	4	1·023	15	Half-bred Brittany	2	1·024	15
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6		1·028	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10

April 4th.

3	5	1·025	15	Brittany	3	1·025	15
4	4	1·023	15	Half-bred Brittany	2	1·024	15
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	2	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10

April 5th.

3	5	1·023	15	Brittany	4	1·023	15
4	4	1·022	15	Half-bred Brittany	3	1·022	15
5	3	1·023	15	Brittany heifer ..	2	1·020	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	4	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10

April 6th.

3	5	1·024	15	Brittany	4	1·025	15
4	4	1·022	15	Half-bred Brittany	3	1·024	15
5	3	1·022	15	Brittany heifer ..	2	1·023	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	3	1·025	12
8	5	1·025	10	Half-bred Ayrshire	4	1·025	10

April 7th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
3	5	1·022	15	Brittany	4	1·022	15
4	4	1·023	15	Half-bred Brittany	3	1·020	15
5	3	1·022	15	Brittany heifer ..	2	1·020	15
6		1 027	10	Shorthorn		1·026	10
7	4	1·025	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·026	10

April 8th.

3	5	1·022	15	Brittany	3	1·024	15
4	4	1·023	15	Half-bred Brittany	2	1·024	15
5	3	1·022	15	Brittany heifer ..	2	1·025	15
6		1·026	10	Shorthorn		1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·025	10	Half-bred Ayrshire	4	1·024	10

April 9th.

3	5	1·024	15	Brittany	3	1·023	15
4	4	1,024	15	Half-bred Brittany	3	1·022	15
5	3	1·023	15	Brittany heifer ..	2	1·020	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·025	10

April 10th.

3	4	1·022	15	Brittany	3	1·024	15
4	3	1·023	15	Half-bred Brittany	3	1·024	15
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6		1·027	10	Shorthorn		1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·025	10

April 11th.

3	4	1·024	15	Brittany	3	1·024	15
4	3	1·024	15	Half-bred Brittany	3	1·024	15
5	3	1·024	15	Brittany heifer ..	2	1·022	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 12th.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream
3	5	1·024	15	Brittany	4	1·022	15
4	4	1·024	15	Half-bred Brittany	3	1·022	15
5	3	1·022	15	Brittany heifer ..	2	1·023	15
6		1·026	10	Shorthorn		1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·023	10	Half-bred Ayrshire	4	1·022	10

April 13th.

3	5	1·024	15	Brittany	4	1·024	15
4	4	1·022	15	Half-bred Brittany	3	1·023	15
5	3	1·023	15	Brittany heifer ..	2	1·022	15
6		1·026	10	Shorthorn	1	1·027	10
7	4	1·023	12	Shorthorn	4	1·024	12
8	5.	1·023	10	Half-bred Ayrshire	4	1·025	10

April 14th.

3	5	1·023	15	Brittany	4	1·024	15
4	4	1·022	15	Half-bred Brittany	3	1·023	15
5	3	10·22	15	Brittany heifer ..	2	1·022	15
6		1·027	10	Shorthorn		1·027	10
7	4	1·023	12	Shorthorn	3	1·022	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 15th.

2	2	1·020	20	Alderney	2	1·020	20
3	5	1·023	15	Brittany	4	1·024	15
4	4	1·023	15	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6		1·026	10	Shorthorn		1·027	10
7	4	1·024	12	Shorthorn	3	1·023	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 16th.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·024	15
4	4	1·022	16	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	2	1·023	15
6	6	1·027	10	Shorthorn	5	1·027	10
7	4	1·024	12	Shorthorn	3	1·023	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 17th.

No.	MORNING. Qts.	Sp. G.	Cream.	Breed.	EVENING. Qts.	Sp. G.	Cream.
2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·023	15
4	4	1·024	16	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6	7	1·028	10	Shorthorn	5	1·028	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 18th.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·023	16	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	2	1·022	15
6	7	1·028	10	Shorthorn	5	1·028	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

Cows in Holloway's field.

April 19th.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·023	16	Brittany	4	1·025	15
4	4	1·022	17	Half-bred Brittany	3	1·022	16
5	3	1·022	16	Brittany heifer ..	2	1·020	16
6	7	1·028	10	Shorthorn	5	1·028	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 20th.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·023	16	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	2	1·020	15
6	7	1·028	10	Shorthorn	5	1·027	10
7	4	1·024	12	Shorthorn	3	1·023	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 21st.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·023	16	Half-bred Brittany	3	1·022	16
5	3	1.020	15	Brittany heifer ..	2	1·020	15
6	7	1·028	10	Shorthorn	5	1·027	10
7	4	1·025	12	Shorthorn	3	1·023	12
8	5	1·024	10	Half-bred Ayrshire	4	1·023	10

April 22nd.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
2	3	1·022	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·025	16	Half-bred Brittany	3	1·022	16
5	3	1·022	15	Brittany heifer ..	4	1·020	15
6	7	1·027	10	Shorthorn	5	1·027	10
7	4	1·023	12	Shorthorn	3	1·023	12
8	5	1·025	10	Half-bred Ayrshire	4	1·020	10

April 23rd.

2	3	1·022	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·025	16	Half-bred Brittany	5	1·022	16
5	3	1·022	15	Brittany heifer ..	4	1·020	15
6	7	1·027	10	Shorthorn	5	1·027	10
7	4	1·025	12	Shorthorn	3	1·025	12
8	5	1·025	10	Half-bred Ayrshire	4	1.022	10

April 24th.

2	3	1·022	26	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·025	15
4	4	1·025	16	Half-bred Brittany	5	1·022	16
5	3	1·022	15	Brittany heifer ..	4	1·020	18
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	3	1·025	10	Half-bred Ayrshire	4	1·023	11

April 25th.

2	3	1·022	20	Alderney	2	1·022	21
3	5	1·024	15	Brittany	4	1·024	14
4	4	1·025	16	Half-bred Brittany	5	1·023	15
5	3	10·22	15	Brittany heifer ..	4	1·020	17
6	7	1·026	10	Shorthorn	5	1·027	10
7	4	1·024	12	Shorthorn	3	1·023	12
8	5	1·025	11	Half-bred Ayrshire	4	1·023	10

April 26th.

2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	16	Brittany	4	1·024	15
4	4	1·025	16	Half-bred Brittany	5	1·022	16
5	3	1·022	15	Brittany heifer ..	4	1·020	18
6	7	1·027	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
April 27th.							
2	3	1·020	20	Alderney	2	1·020	20
3	5	1·023	15	Brittany	4	1·023	15
4	4	1·024	16	Half-bred Brittany	5	1·022	16
5	3	1·023	18	Brittany heifer ..	4	1·023	18
6	7	1·027	10	Shorthorn	5	1·027	10
7	4	1·023	13	Shorthorn	3	1·022	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10
April 28th.							
2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	16	Brittany	4	1·024	15
4	4	1·025	16	Half-bred Britanny	5	1·024	16
5	3	1·022	15	Brittany heifer ..	4	1·023	15
6	7	1·027	10	Shorthorn	5	1·026	10
7	4	1·025	12	Shorthorn	3	1·024	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10
April 29th.							
2	3	1·020	20	Alderney	2	1·020	20
3	5	1·024	15	Brittany	4	1·024	15
4	4	1·023	16	Half-bred Brittany	5	1·023	16
5	3	1·022	15	Brittany heifer ..	4	1·022	15
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12
8	5	1·025	10	Half-bred Ayrshire	4	1·024	10
April 30th.							
2	3	1·020	20	Alderney	2	1·020	20
3	5	1·025	16	Brittany	4	1·025	16
4	4	1·024	16	Half-bred Brittany	5	1·024	16
5	3	1·022	15	Brittany heifer ..	4	1·022	15
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·023	12	Shorthorn	3	1·023	12
8	5	1·024	10	Half-bred Ayrshire	4	1·024	10
May 1st.							
1	6	1·025	15	Alderney	4	1·024	15
2	3	1·022	20	Alderney	2	1·022	20
3	5	1·024	15	Brittany	4	1·024	15
4	4	1·025	15	Half-bred Brittany	5	1·023	15
5	3	1·022	15	Brittany heifer ..	4	1·020	16
6	7	1·026	10	Shorthorn	5	1·027	10
7	4	1·024	12	Shorthorn	3	1·024	12

Cow No. 8 sold.

May 2nd.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	6	1·025	16	Alderney	4	1·025	16
2	3	1·022	20	Alderney	2	1·020	20
3	5	1·026	15	Brittany	4	1·022	15
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

Cows in Bunkin's field.

May 3rd.

1	6	1·025	17	Alderney	4	1·025	18
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·023	15	Brittany	4	1·023	15
4	4	1·024	15	Half-bred Brittany	5	1·022	15
5	3	1·022	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 4th.

1	6	1·025	16	Alderney	4	1·025	16
2	3	1·024	19	Alderney	2	1·024	19
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·022	14	Brittany heifer ..	4	1·022	14
6	7	1·027	10	Shorthorn	5	1·027	10
7	4	1·023	12	Shorthorn	3	1·024	12

May 5th.

1	6	1·024	18	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·022	16	Brittany	4	1·024	16
4	4	1·024	15	Half-bred Brittany	5	1·023	15
5	3	1·026	15	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·023	12	Shorthorn	3	1·023	12

May 6th.

1	6	1·025	17	Alderney	4	1·025	17
2	4	1·024	18	Alderney	2	1·023	18
3	5	1·023	16	Brittany	4	1·024	16
4	4	1·024	15	Half-bred Brittany	5	1·023	17
5	3	1·023	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·023	12	Shorthorn	3	1·024	12

May 7th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	6	1·025	17	Alderney	4	1·024	17
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·023	16	Brittany	4	1·024	16
4	4	1·022	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 8th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	15
4	4	1·024	15	Half-bred Brittany	5	1·023	15
5	3	1·022	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·027	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 9th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Brittany	5	1·023	15
5	3	1·022	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 10th.

1	6	1·025	18	Alderney	4	1·025	18
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·024	16	Brittany	4	1·024	15
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·023	12	Shorthorn	3	1·024	12

May 11th.

1	6	1·024	17	Alderney	4	1·024	17
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·024	16	Brittany	4	1·024	16
4	4	1·024	15	Half-bred Brittany	5	1·025	14
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 12th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	6	1·024	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·024	15	Brittany	4	1·023	16
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 13th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	15
4	4	1·021	15	Half-bred Brittany	5	1·022	15
5	3	1·024	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 14th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·023	18
3	5	1·024	16	Brittany	4	1·024	16
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 15th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1.023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 16th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·024	16	Brittany	4	1·024	16
4	4	1·024	15	Half-bred Brittany	5	1·023	15
5	3	1·023	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

Cows in Holloway's field.

May 17th.

No.	MORNING. Qts.	Sp. G.	Cream.	Breed.	EVENING. Qts.	Sp. G.	Cream.
1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 18th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·022	15	Brittany	4	1·022	16
4	4	1·024	14	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 19th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·023	15	Brittany	4	1·023	15
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 20th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	15	Brittany	4	1·023	15
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 21st.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·024	16	Brittany	4	1·023	15
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 22nd.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Britanny	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 23rd.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·023	18
3	5	1·024	16	Brittany	4	1·024	16
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·023	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 24th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·024	16	Brittany	4	1·024	16
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 25th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·023	15	Half-bred Brittany	5	1·024	15
5	3	1·024	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 26th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	10·24	12

May 27th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·023	15	Half-bred Brittany	5	1·024	15
5	3	1·024	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 28th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	16
4	4	1·023	15	Half-bred Brittany	5	1·022	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 29th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·023	18	Alderney	2	1·023	18
3	5	1·024	15	Brittany	4	1·024	16
4	4	1·023	15	Half-bred Brittany	5	1·023	15
5	3	1·024	14	Brittany heifer ..	4	1·024	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 30th.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	2	1·024	18
3	5	1·023	16	Brittany	4	1·023	15
4	4	1.024	15	Half-bred Brittany	5	1·022	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

May 31st.

1	6	1·025	17	Alderney	4	1·025	17
2	3	1·024	18	Alderney	3	1·023	18
3	5	1·025	16	Brittany	4	1·024	16
4	4	1·024	15	Half-bred Brittany	5	1·024	15
5	3	1·023	14	Brittany heifer ..	4	1·023	14
6	7	1·026	10	Shorthorn	5	1·026	10
7	4	1·024	12	Shorthorn	3	1·024	12

June 1st.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·024	16	Alderney	3	1·023	15
3	5	1·023	15	Brittany	3	1·024	15
4	4	1·022	16	Half-bred Brittany	3	1·025	14
5	3	1·020	15	Brittany heifer ..	2	1·022	12
6	7	1·025	14	Shorthorn	5	1·026	15
7	5	1·024	16	Shorthorn	3	1·025	16

Cows in Hackbridge field.

June 2nd.

1	4	1·022	16	Alderney	3	1·023	16
3	5	1·020	15	Brittany	3	1·023	15
4	4	1·023	16	Half-bred Brittany	3	1·022	15
5	3	1·020	14	Brittany heifer ..	2	1·021	14
6	7	1·026	14	Shorthorn	5	1·024	15
7	5	1·025	16	Shorthorn	3	1·026	14

June 3rd.

1	4	10·24	16	Alderney	3	1·024	15
3	5	1·021	15	Brittany	3	1·022	16
4	4	1·024	16	Half-bred Brittany	3	1·023	15
5	3	1·022	13	Brittany heifer ..	2	1·020	14
6	7	1·026	14	Shorthorn	5	1·026	14
7	5	1·025	15	Shorthorn	5	1·025	16

Vince's cow attacked with foot-and-mouth.

June 4th.

1	4	1·023	17	Alderney	3	1·022	16
3	5	1·020	15	Brittany	3	1·021	16
4	4	1·023	16	Half-bred Brittany	3	1·023	15
5	3	1·022	13	Brittany heifer ..	2	1·020	13
6	7	1·026	14	Shorthorn	5	1·026	14
7	5	1·025	15	Shorthorn	3	1·024	15

June 5th.

1	4	1·024	16	Alderney	3	1·022	16
3	5	1·022	15	Brittany	3	1·021	15
4	4	1·024	16	Half-bred Brittany	2	1·022	16
5	3	1·020	14	Brittany heifer ..	2	1·020	14
6	7	1·026	13	Shorthorn	5	1·026	14
7	5	1·024	15	Shorthorn	3	1·024	15

June 6th.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·024	16	Alderney	3	1·024	16
3	5	1·020	15	Brittany	3	1·022	15
4	4	1·020	16	Half-bred Brittany	3	1·024	15
5	3	1·022	14	Brittany heifer ..	2	1·020	13
6	7	1·026	13	Shorthorn	5	1·025	14
7	5	1·024	15	Shorthorn	3	1·023	15

June 7th.

1	4	1·023	16	Alderney	3	1·022	17
3	5	1·020	16	Brittany	3	1·021	15
4	4	1·023	15	Half-bred Brittany	3	1·024	16
5	3	1·020	14	Brittany heifer ..	2	1·020	15
6	7	1·026	14	Shorthorn	5	1·026	14
7	5	1·024	15	Shorthorn	3	1·024	15

June 8th.

1	4	1·024	16	Alderney	3	1·024	16
3	5	1·023	15	Brittany	3	1·022	15
4	4	1·022	16	Half-bred Brittany	3	1·023	15
5	3	1·020	14	Brittany heifer ..	2	1·020	14
6	7	1·025	14	Shorthorn	5	1·026	13
7	5	1·024	14	Shorthorn	3	1·023	15

Frost's cow attacked with foot-and-mouth.

June 9th.

1	3	1·023	16	Alderney	2	1·024	15
3	2	1·022	20	Brittany	1	1·022	28
4	3	1·025	12	Half-bred Brittany	2	1·024	14
5	2	1·020	20	Brittany heifer ..	1	1·020	12
6	5	1·026	10	Shorthorn	3	1·028	8
7	3	1·025	18	Shorthorn	2	1·027	26

Cows at home. Fed on grass, bran and hay. All suffering from foot-and-mouth.

June 10th.

1	2	1·023	16	Alderney	1	1·023	17
3	1	1·020	24	Brittany	1	1·022	22
4	2	1·023	14	Half-bred Brittany	1	1·024	15
5	2	1·020	15	Brittany heifer ..	1	1·024	14
6	5	1·027	12	Shorthorn	3	1·026	11
7	2	1·026	20	Shorthorn	1	1·025	18

June 11th.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	3	1·024	18	Alderney	2	1·024	13
3	2	1·021	23	Brittany	1	1·023	18
4	3	1·024	17	Half-bred Brittany	2	1·025	15
5	3	1·020	18	Brittany heifer ..	1	1·025	14
6	6	1·026	12	Shorthorn	4	1·026	10
7	3	1·025	18	Shorthorn	2	1·025	13

June 12th.

1	3	1·025	15	Alderney	2	1·024	15
3	2	1·023	18	Brittany	1	1·022	18
4	2	1·025	14	Half-bred Brittany	1	1·024	14
5	2	1·025	13	Brittany heifer ..	1	1·023	13
6	6	1·027	12	Shorthorn	4	1·027	12
7	3	1·025	10	Shorthorn	2	1·025	10

Skellerton's and Fuller's cows attacked with foot-and-mouth.

June 13th.

1	4	1·025	15	Alderney	2	1·025	15
3	3	1·023	17	Brittany	2	1·023	17
4	3	1·024	15	Half-bred Brittany	2	1·024	15
5	2	1·024	13	Brittany heifer ..	1	1·023	13
6	7	1·025	12	Shorthorn	5	1·027	12
7	4	1·024	11	Shorthorn	3	1·025	11

June 14th.

1	4	1·023	15	Alderney	3	1·024	15
3	5	1·024	16	Brittany	3	1·022	16
4	4	1·023	15	Half-bred Brittany	2	1·024	14
5	4	1·022	14	Brittany heifer ..	2	1·023	13
6	8	1·027	12	Shorthorn	5	1·027	12
7	5	1·024	12	Shorthorn	3	1·024	13

June 15th.

1	4	1·023	16	Alderney	3	1·024	15
3	4	1·022	17	Brittany	3	1·022	17
4	4	1·024	15	Half-bred Brittany	2	1·024	15
5	4	1·024	14	Brittany heifer ..	2	1·023	14
6	7	1·028	12	Shorthorn	5	1·027	12
7	5	1·025	12	Shorthorn	3	1·026	12

June 16th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·025	15	Alderney	3	1·024	15
3	5	1·023	17	Brittany	3	1·024	17
4	4	1·024	16	Half-bred Brittany	2	1·022	16
5	4	1·022	14	Brittany heifer ..	2	1·023	14
6	7	1·027	12	Shorthorn	5	1·026	12
7	5	1·025	12	Shorthorn	3	1·025	12

Cows in Holloway's field. Getting well.

June 17th.

1	4	1·025	15	Alderney	3	1·024	15
3	5	1·023	17	Brittany	3	1·024	17
4	4	1·025	16	Half-bred Brittany	2	1·025	16
5	4	1·023	14	Brittany heifer ..	2	1·023	14
6	7	1·027	12	Shorthorn	5	1·027	12
7	5	1·025	12	Shorthorn	3	1·025	12

June 18th.

1	4	1·024	16	Alderney	3	1·024	16
3	5	1·023	17	Brittany	3	1·023	16
4	4	1·024	16	Half-bred Brittany	2	1·024	16
5	4	1·022	14	Brittany heifer ..	2	1·021	14
6	7	1·027	12	Shorthorn	5	1·026	12
7	5	1·025	12	Shorthorn	3	1·024	12

June 19th.

1	4	1·024	16	Alderney	3	1·025	15
3	5	1·023	17	Brittany	3	1·023	15
4	4	1·024	15	Half-bred Brittany	2	1·024	16
5	4	1·022	14	Brittany heifer ..	2	1·021	14
6	7	1·027	12	Shorthorn	5	1·026	13
7	5	1·025	12	Shorthorn	3	1·024	12

Cows well.

June 20th.

1	4	1·025	15	Alderney	3	1·024	15
3	5	1·024	15	Brittany	3	1·023	15
4	4	1·023	16	Half-bred Brittany	2	1·024	16
5	4	1·023	15	Brittany heifer ..	2	1·023	15
6	7	1·026	13	Shorthorn	5	1·026	13
7	5	1·024	12	Shorthorn	3	1·023	13

June 21st.

MORNING.					EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·024	15	Alderney	3	1·023	15
3	5	1·024	15	Brittany	3	1·023	15
4	4	1·023	16	Half-bred Brittany	2	1·024	16
5	4	1·024	15	Brittany heifer ..	2	1·023	15
6	6	1·026	12	Shorthorn	5	1·026	13
7	5	1·022	13	Shorthorn	3	1·023	13

June 22nd.

1	4	1·023	15	Alderney	2	1·024	15
3	5	1·024	16	Brittany	3	1·024	15
4	4	1·023	15	Half-bred Brittany	2	1·022	15
5	4	1·024	15	Brittany heifer ..	2	1·023	15
6	7	1·026	12	Shorthorn	5	1·026	12
7	5	1·025	13	Shorthorn	3	1·024	13

June 23rd.

1	4	1·023	15	Alderney	2	1·024	15
3	5	1·024	15	Brittany	3	1·023	16
4	4	1·023	16	Half-bred Brittany	2	1·022	15
5	4	1·023	15	Brittany heifer ..	2	1·024	15
6	7	1·026	12	Shorthorn	5	1·026	12
7	5	1·024	13	Shorthorn	3	1·024	13

June 24th.

1	4	1·024	15	Alderney	2	1·024	15
3	5	1·024	16	Brittany	3	1·023	15
4	4	1·023	15	Half-bred Brittany	2	1·024	15
5	4	1·024	16	Brittany heifer ..	2	1·022	14
6	7	1·026	14	Shorthorn	5	1·025	12
7	5	1·024	13	Shorthorn	3	1·023	14

June 25th.

1	4	1·024	16	Alderney	2	1·024	16
3	5	1·023	16	Brittany	3	1·023	16
4	4	1·024	15	Half-bred Brittany	2	1·024	15
5	4	1·023	16	Brittany heifer ..	2	1·022	16
6	7	1·026	13	Shorthorn	5	1·026	13
7	5	1·025	14	Shorthorn	3	1·025	14

June 26th.

	MORNING.				EVENING.		
No.	Qts.	Sp. G.	Cream.	Breed.	Qts.	Sp. G.	Cream.
1	4	1·025	15	Alderney	2	1·023	15
3	5	1·024	15	Brittany	3	1·024	16
4	4	1·023	16	Half-bred Brittany	2	1·024	15
5	4	1·024	15	Brittany heifer ..	2	1·022	16
6	7	1·027	12	Shorthorn	5	1·026	13
7	5	1·025	13	Shorthorn	3	1·025	13

June 27th.

1	4	1·024	15	Alderney	2	1·023	15
3	5	1·023	16	Brittany	3	1·024	15
4	4	1·024	15	Half-bred Brittan	2	1·023	16
5	4	1·022	15	Brittany heifer ..	2	1·023	15
6	7	1·025	13	Shorthorn	5	1·026	13
7	5	1·026	12	Shorthorn	3	1·025	13

June 28th.

1	4	1·024	15	Alderney	2	1·023	16
3	5	1·023	16	Brittany	3	1·422	16
4	4	1·023	16	Half-bred Brittany	2	1·024	15
5	4	1·023	15	Brittany heifer ..	2	1·022	15
6	7	1·025	13	Shorthorn	5	1·026	12
7	5	1·023	14	Shorthorn	3	1·025	13

June 29th.

1	4	1·024	15	Alderney	2	1·022	16
3	5	1·024	16	Brittany	3	1·024	16
4	4	1·023	15	Half-bred Brittany	2	1.023	15
5	4	1·022	15	Brittany heifer ..	2	1·023	16
6	7	1·026	13	Shorthorn	5	1·027	12
7	5	1·024	14	Shorthorn	3	1·025	13

June 30th.

1	4	1·024	15	Alderney	2	1·023	15
3	5	1·023	16	Brittany	3	1·024	16
4	4	1·024	16	Half-bred Brittany	2	1·023	15
5	4	1·022	15	Brittany heifer ..	2	1·024	15
6	7	1·025	13	Shorthorn	5	1·026	13
7	5	1·025	13	Shorthorn	3	1·024	14

Experiments stopped.

The specific gravity of the milk in the foregoing Tables was taken immediately after each individual milking, consequently at blood-heat: a specific gravity of 1·030, at the normal temperature (60°), is equivalent to 1·022 blood-heat.

A study of the above Tables leads to the following conclusions:—

The quantity and specific gravity and the percentage of cream, on milk from an individual cow, is tolerably constant when the cow is in full profit.

The quantity, however, slowly decreases, whilst the specific gravity and percentage of cream increase, from time of calving. The diurnal variation of milk from an individual cow is small; as a rule, the milk produced in the morning is greater in quantity and richer in quality than that yielded in the evening.

Occasionally, remarkable fluctuations take place both in the specific gravity and percentage of cream; whether this fluctuation is caused by some temporary disturbance in the health of the animal, or to the cows having drunk large quantities of water previous to milking, future investigation must decide.

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ERRATA.

Page 13, line 9, *for* (twelve tons) *read* (two tons).

,, 43, January 21st, *omit* No. 1 cow dried off.