Milking Twice and Four Times Daily

Some important experiments along this line were conducted in Germany about a year ago, of which the *Dairy*, London, England, gives the following summary:

"Eight cows were experimented with, and the results are thus briefly summarized:

	Total yield of 8 cows.			Average Composition of Milk.	
	Milk.	Fat.	Solids not Fat.	Fat.	Solids not Fat.
Cows milked twice daily.....	524 60	17.04	45.47	3.25	8.67
Cows milked four times daily...	576.70	17.95	49.57	3.11	8.60
Percentage increase from milking four times daily..	9 93	5 34	9 01	.....	.....

"It will be seen from the above table that milking four times a day gave a larger yield of both milk and fat than milking twice a day. Contrary to the general rule, milking four times daily gave the poorer milk. To test this further, the experiment with milking four times a day was continued, the cows receiving a richer ration. On an average, the eight cows showed an increase of 5.36 per cent. in the yield of fat, but only 0.44 per cent. increase in the yield of milk and 0.65 per cent. in the yield of solids not fat over milking twice a day. It was found, further, that when the time between milkings was divided equally the milk did not have the same composition, the milk being poorer in fat after the cows had been at rest, as at night, while after they had been in active motion, feeding, etc., the fat was higher."

CORRESPONDENCE

Commercial Fertilizers

Manurial Experiments

To the Editor of FARMING:

In pursuance of this important question of increasing the productiveness of the land, it may be interesting, and certainly will be instructive, if we take a brief review of a few of the results yielded in the British experiments. However, as Thomas-phosphate-powder has been several times referred to in your columns, it may, in the outset, be as well to get a more definite view of its nature, position and purpose.

Mr. Wright remarks that this Thomas-phosphate is not a "special" manure; that, however, depends upon the interpretation put upon the word "special." Certainly Thomas-phosphate is not a *general* manure, calculated to remedy all the evils the soil is susceptible to, as is claimed for a good many charlatanic nostrums now being palmed off on the farmer as "*special manures.*" And yet for the particular purpose of supplying phosphate and lime to the soil in such form as to be specially acceptable to many phases of plant life, this Thomas-phosphate is undoubtedly a *special* manure.

It is pretty generally known that bone phosphate, and mineral or rock phosphate, is a combination of one part of phosphoric acid and three parts of lime: tribasic phosphate; and that superphosphate, dissolved bone, or acidulated phosphate, is the breaking up of this tribasic compound with sulphuric acid: oil of vitriol. This three-lime-phosphate is a very stable and insoluble compound, which breaks up but very slowly—naturally—in the soil, and becomes available for the nourishment of plants too slowly to meet the requirements of the agriculturist. Bone phosphate breaks up under the influence of the soil a great deal more freely than rock phosphate, yet raw bone is very slow. When vitriol is applied to this crude phosphate it breaks up the three lime combination, tearing away two parts of the lime, with which it unites and forms sulphate of lime: gypsum, or plaster of Paris. [Better understood by our farmers as land plaster.—ED.] The phosphoric acid is thus left in combination with only one part of lime: monobasic, or one-lime-phosphate. This monobasic form of phosphate is readily soluble in water, and is capable of at once being absorbed into the plant. When rock phosphate is thus treated it is known as superphosphate, but vitriolized bones are generally spoken of as dissolved bones.

While the original phosphate is decidedly too slow in action, there has grown up a strong opinion among practical farmers that the vitriolized phosphate is, for many purposes, too quick and stimulating in its effect, and not sufficiently continuous and lasting. Various attempts have been made to overcome these defects; but not with altogether satisfactory results. The mixing of the two forms—vitriolized and raw—together has been a good deal resorted to, with the idea of thus producing a medium form of phosphate known as reverted, or two-lime-phosphate; but the practical working of this has not always been successful.

This more recently introduced Thomas-phosphate has been found to naturally occupy an intermediary position between the soluble and insoluble conditions, which, for many purposes in practical working agriculture, has been found highly advantageous. As it is not so generally known what this basic phosphate really is, I will give a short outline of it, and, as these remarks appear to be lengthening out, the epitome of results can stand over for another week.

Common iron contains more or less phosphoric acid, and in the conversion of iron into steel this phosphorus is driven out. In the Thomas-Gilchrist process of steel manufacture, introduced a few years ago, the iron is, to put the matter graphically, boiled with an admixture of lime. The phosphoric acid combines with the lime and floats as a sort of scum to the top; this is the basic slag; a waste product in the conversion of iron into steel. Of course it was known from the first that this slag contained a large percentage of that valuable phosphoric acid so necessary to the agriculturist, but it was some considerable time before it was found how to convert it to any useful account; and immense heaps accumulated in the meantime. I may here casually remark that there is a wide difference between this basic slag and the ordinary slag of the smelting furnaces, the latter containing no phosphate at all, and being of no manurial value; yet thousands of tons are now being ground up and charlatanically sold for fertilizing purposes. To proceed, this basic phosphate was not found to be amenable to the action of sulphuric acid in the manner of the ordinary phosphate, and for a long time appeared to resist all attempts to bring it into action. The analytical chemist found this phosphate to be of an unusual and different combination from the ordinary phosphates; the phosphoric acid being in combination with *four* parts of lime; tetrabasic, or four lime phosphate. It was eventually found that if this new form of phosphate was ground immensely fine; that is, to an impalpable powder capable of passing through a sieve containing ten thousand holes to the square inch, it would break up naturally in the land under the combined influences of the soil and plant root action.

All plants require an available, sufficient and continuous supply of phosphate, and practical experience leads to the conclusion that this Thomas-phosphate meets these natural and necessary requirements; holding the store in abeyance, without waste, when not needed, and yielding up a sufficiency according to the plants' requirements without that satiety which a too soluble phosphate might induce.

The liberal supply of combined and free lime contained in the Thomas-phosphate is no doubt also a powerful factor in the bringing about those important results I shall refer to in my next.

FRANK WALLIS.

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