

Cheese and Butter-Making in their Relation to Soil Exhaustion.

The relation of the different farm products to the exhaustion of the soil is a question of real practical importance, and if it were more thoroughly discussed and understood, many radical changes in our systems of agriculture would take place.

The question is very significant in our dairy interests. For instance, we often hear the remark that 10 lbs. of milk will make a pound of cheese worth 12 cents, while it takes 25 lbs. of milk to make a pound of butter worth 12 or 15 cents, showing that milk converted into cheese brings about twice as much money as the same milk converted into butter. This is probably the most superficial way the question can be put. Another step in advance is the consideration that calves can be raised on the skim milk, while whey, especially that obtained from sweet curd system of cheese-making, is almost worthless. If calves can be raised on skim-milk, the fact is not complimentary to the feeding value of butter-fat, and here the practice is in close conformity with the principles. Butter is a mere luxury, and its elements are so abundant in nature that none of them have a market value for fertilizing purposes. We must, however, except the small percentages of albuminoids and mineral matter which find their way into the butter in the ordinary process of manufacture, an average of about one-half percent of the former, and a little over one-tenth percent of the latter. There is also a small percentage of fertilizing matter left in the whey. Thus we see that soil exhaustion is to be laid almost exclusively to the charge of the cheese-factory.

In the matter of butter-making, it makes some difference whether the butter is made on the farm or the cream sent to the creamery, the butter-milk being taken from the farm in the latter case. Butter-milk has almost exactly the same average composition as skim-milk, and it would therefore be to the interest of the creamery patron to mix as little milk as possible with the cream in skimming, providing a just method of testing the cream were adopted, for it is in the skim and butter milk that all the elements of fertility are contained, and all the elements of growth in man or domestic animals, the fats being merely an economizer in connection with the expensive foods, and other fats are much cheaper than butter.

Let us now take a practical illustration and show by figures what the differences really are. We will select two farmers, A and B, both having five cows; but A sends his milk to the cheese-factory, and B makes butter on the farm. Let each herd of cows give the same quantity and quality of milk, say an average of 25 lbs. per cow per day for six months, or 180 days in round numbers, so that each herd will yield a total of $5 \times 25 \times 180 = 22,500$ lbs. Let us now pick out the fertilizing constituents of this milk which have been extracted from the soil, viz., nitrogen, phosphoric acid, and potash. Milk contains an average of about 3½ percent of albuminoids which yield 16 percent of nitrogen, so that former A extracts from his pasture through the milk 135 lbs. of nitrogen. This milk will yield a little over 40 lbs. of phosphoric acid, and about the same quantity of potash in the form of the muriate.

Let us now convert these fertilizers into money. Millions of tons of these constituents are bought by farmers as fertilizers for their soil, the ordinary average retail prices being 18 cents per pound for the nitrogen, 8 cents for the phosphoric acid, and 4 cents for the potash, from which we derive the following account:

Nitrogen, 135 × 18.....	\$24.30
Phosphoric Acid, 40 × 8.....	3.20
Potash, 40 × 4.....	1.60

Total.....\$29.10

If farmer A now wishes to restore the fertility lost by the sale of his milk, he must go to the market and spend \$29.10 in fertilizers. It will not do for him to say that he can use barnyard manure for this would be fertilizing his pasture at the expense of the rest of the farm. A's pasture is therefore losing fertility at the rate of \$29.10 per year, and if half this loss is taking place in his other fields, it should occasion him alarm.

How does B's account now stand? If he makes the butter on the farm, and utilizes the skim and butter-milk, his land would suffer no loss in point of fertility so far as his dairy business is concerned, which is equivalent to saying that if A's cows realize \$29.10 more than B's, their actual profits would be identical.

Now if the milk of A's cows give 10 percent of cheese, which is about the average, and brings 10 cents per pound, he will realize \$225, but we should deduct the \$29.10 which he requires to lay out in manures or fertilizers to keep up the fertility of his soil, leaving a balance of \$195.90. On the other hand, B's milk should yield 4 percent of butter or 900 lbs. for the season, and he must sell this at 21½ cents per lb. in order to realize the same sum as A. Every farmer can make his own calculations as to the differences in the labor, dairy appliances, etc. In many instances the labor expended in making the butter would eat up the profits on the stock fed on the skim-milk.

From these figures we may deduce the general rule that the farmer who makes an exclusive business of milk production for the cheese factory can keep up the fertility of his farm by purchasing yearly one ton of fertilizers for every 8 to 10 cows, without raising stock to produce manure.

As an indication of the improvement being made among the farmers of the South, it is stated that agricultural clubs are being formed quite generally in South Carolina.

Mr. John C. Dillon, Amherst, former farm superintendent of the Wisconsin State College, was a strong advocate of the exclusive use of pure-bred bulls, but experience has taught him to change his mind. He now breeds from the best. One of the most practical and important questions in Canadian agriculture is: When will our Model Farm superintendent change his mind in this respect?

Professor W. A. Henry, of the Wisconsin Station, last summer kept six cows, three by pasturing and three by soiling, having the quality of the two herds as nearly equal as possible. The result was a product of 1779 pounds of milk from one acre of pasture, producing 82 pounds of butter, while one acre in soiling crops gave him 4782 pounds of milk, which made 196 pounds of butter. The pasture was one of the best blue grass pastures capable of carrying a cow per acre through the season under favorable weather conditions.

Stock.

Cost of Producing Fat Steers—Model Farm Book-keeping.

At one time we were under the impression that the experiments at the Model Farm were to be carried out on scientific principles; but circumstances have taken place which caused us to alter our views. The question was discussed at a meeting of the Experimental Union, and the professors took part in the discussion. We presented our views, but they were disregarded, and all of the audience who could not comprehend the subject strongly sympathized with Model Farm authorities. Prof. Brown, the practical professor, and all the scientific professors, with one voice asserted that the feeding experiments were purely practical. We pointed out that no experiments could have practical value unless they received scientific sanction. We then asked how it was that their field experiments were purely scientific, our object being to ascertain on what basis the authorities were working, but we received no satisfactory reply.

The Christmas fat stock show now being near, it is in place to inquire if the Model Farm book-keeping is conducted on practical or scientific principles; we mean the book-keeping relating to the cost of production of those steers which have been fed so very practically. We may be permitted to mention that the book keeping is under the control of the practical professor. This gentleman regards those farmers who conduct their book-keeping on the old plan as being as mule-headed as those who refuse to fall in with his "baby-beef" craze. Now that his "baby-beef" business is exploded, let us inquire if there is any redeeming feature in his system of keeping accounts.

The Model Farm fed eight steers for the Christmas fat stock show held in Guelph in 1884, and we clip the following table from the printed card which exhibited the cost of production:

COST OF PRODUCING FAT CATTLE PER HEAD.	
1st year, including calf value, milk, and all other food, with attendance.....	\$ 39.96
2nd year, food and care.....	57.77
Four months of 3rd year.....	20.88
	\$118.61
Less profit realized on charging market prices for food grown on farm.....	42.88
Total actual cost of production,....	\$ 75.73
Being 4½ cents per pound live weight.	

The table also showed that the eight steers averaged 1688 lbs., and the cost of production was therefore, sure enough, 4½ cents per pound, charging the cost of production of the food consumed, instead of the market price, and presuming that the figures are correct. With these data, any school boy can calculate that, the market prices being charged, the cost of production would be a trifle over 7 cents per pound, and as the same card states that the exportation price was then 6 cents per lb., there is a clear loss of 1 cent per lb., or \$16.88 of a total loss on each steer. But, according to his method of valuation, there is a clear gain of 1½ cents per lb., or \$25.32 per head.

Now it is certainly a very practical question for the farmer to know whether there was a gain, in this case, if \$25.32 per head, or a loss of \$16.88. The question may be viewed from