it will be all wasted away and there will be nothing left of it, and even now it looks in some parts of the tank as though it was growing less. In the summer it was as much as five or six inches deep and hard as leather.

Mr. Bruhn: Then the longer it stays in there, the more the bacterial growth will increase?

Mr. Michaels: Yes, that is the way Professor Smith gave us to understand in his paper.

Mr. Bruhn: Would it be safe to run whey in there, cleanings from the whey tank?

Mr. Michaels: Yes, I think so. I don’t think it would be anything worse than what I have been running into mine the past summer.

A Member: Does the pipe siphon all the time, or does it work with a valve and empty it out when it gets full?

Mr. Michaels: It works only when the water is run in at the other end. You see when the tank gets up so full, it siphons it up from the bottom, and out. Mine runs into the creek.

Question: It empties out frequently, does it not?

Mr. Michaels: The tank is full all the time.

A Member: I saw an article a while ago where it said it would be better if you emptied the tank frequently; then leave it stand till it fills up again.

CHEESE FACTORY ACCOUNTING.

FRANK DEWHIRST, MADISON, WIS.

When our worthy Secretary informed me recently, in that calm, cool way of his, that my name had been placed upon your program with “Cheese Factory Accounting” as the subject, I wondered why such an infliction was placed upon both speaker and hearers.

At any rate, he might have assigned me a subject of less audience dispelling power than that of the cold figures implied by such a subject. It takes the persuasive eloquence of a Rock-
efeller or a Morgan to make figures "speak," and even then in rather uncertain tones, as many a Wall street "lamb" can testify.

However, the question of accounting in cheese factories is an important one. Carelessness and lack of system in this connection have certainly caused many failures in this industry, as in all other mercantile lines.

I do not think that it can be denied that many cheese factories have no proper system of accounts, and financial transactions are recorded, if recorded at all, in a slip-shod, hazardous fashion.

To keep a simple set of accounts which will show the condition of the business at any time is not of such a difficult nature as to appall any individual of ordinary common sense.

Rather will such accounts prevent the nerve-destroying search for a balance, when the various items have to be collected from scraps of paper, pencil marks on the walls or boards, and even from the memory of the cheese maker.

The first necessary account is a capital account, and this should be credited with all items of investment for buildings and machinery and should be debited with all items of depreciation.

At this point, I will say that especially in coöperative factories a serious mistake is made by not allowing, out of the profits, a liberal amount for depreciation. A careful inventory should be made, at least once a year,—the building and all equipment to be valued at actual worth,—apart altogether from the original cost.

Many a factory has distributed all its earnings as fast as made, taking no thought of the lessening value of the property, and the result has been the practical loss of the invested capital.

A carefully kept cash account is required, and to this account all receipts of money are charged, and it is credited with all expenditures. This itemized account will often show where unnecessary expenses have been incurred and enable a more careful scrutiny to be made of incidental charges.

Accounts must be kept with the customers of the factory, and when a shipment of cheese is made to any firm their account should be charged with the weight shipped. Where sold on
commission, the price can be left vacant, to be filled in when the returns are made.

A separate account is needed for every patron of the factory and each should be credited with the amount due him for milk delivered in whatever form the milk is bought. Any purchase made by the patron will, of course, be charged against him, to be taken note of when the check is made out for milk supplied.

I will not detain you longer with this part of the subject, as the methods in use for keeping a simple set of books—suitable to cheese factory conditions—can be easily acquired from any of the numerous elementary works on book-keeping.

The main object of this paper seems to be more along the line of how to equitably pay for the milk bought by factories.

I think that you will agree with me that the old method of pooling the milk and paying at the same rate per hundred pounds, irrespective of quality, is not an equitable method.

The work of Babcock, Van Slyke and others has shown that the fat content of milk is the determining factor in its value for cheese-making.

The yield of cheese is practically proportional to the amount of fat in the milk,—within the limits of the ordinary variations of normal milk,—and the price of cheese is measured by its fat content.

It is then manifestly unfair to pay as much per hundred pounds to the patron having milk testing 3.5 per cent. as is paid to the one whose milk tests 4.5 per cent.

If this is conceded, the percentage of butter fat in the milk is the true basis for payment in cheese factories, as well as in creameries.

Payment for milk on the basis of its fat content has been widely adopted in creameries and there are good reasons why a similar method of payment should be used in cheese factories.

To pay by this method, each day's milk should be sampled at the intake and the composite samples thus secured can be tested at intervals of ten days or two weeks. The various tests for one month added together, and the total divided by the number of tests, will give the average test for the month.

By multiplying the weight of milk delivered by the average test, and dividing by 100, the weight of fat in the whole month's milk is found.
What the price is to be per pound of butter fat will depend upon the sum realized by the sale of cheese.

From whatever sum the cheese brings, the charge for making should be deducted if the factory is conducted on that basis, or, if a co-operative factory, an amount sufficient to cover cost of making, depreciation, and incidental charges should be deducted.

The balance remaining is available for distribution, and its apportionment among the patrons can be readily calculated.

To illustrate the method of division, I will assume that a factory has disposed of 15,000 pounds of cheese at ten cents per pound—the make of a certain month.

The cost of making, commissions and freight have absorbed $225.00, or a cent and one-half a pound; $15.00 is written off to depreciation,—leaving a balance of $1,260.00.

The milk receipts for the month have been 150,000 pounds, and the average test has been 4 per cent. I use round figures because they are easier to demonstrate.

This makes the fat received for the month 6,000 pounds.

Now, the cheese has netted $1,260.00, and this is the amount received for 6,000 pounds of fat, or twenty-one cents ($ .21) per pound of butter fat.

If patron “A” has delivered 2,000 pounds of milk, having an average test of 3.6 per cent., the fat content is 72 pounds and he is entitled to receive seventy-two times twenty-one cents (72 × .21), or fifteen dollars and twelve cents ($15.12). This makes the price per hundred pounds of milk twenty-one times 3.6 or 75.6 cents.

The account may be made up from the cheese value of the butter fat.

Fifteen thousand pounds of cheese has brought $1,260.00, one pound of cheese will be worth 8.4 cents.

Now, taking patron “A” again, his butter fat, 72 pounds, will make \( \frac{72 \times 1500}{90} \) = 180 pounds of cheese. 180 pounds of cheese at 8.4 cents per pound equals $15.12.

The first method is simpler, and has the advantage that much less calculation is required.

A statement should be given to each patron, with his monthly check, and such statement ought to include such items as:—

Weight of milk received from all patrons ........

DISCUSSION.

Mr. Dewhirst: If there are any of our Canadian friends present here, there is an opening to bring in the argument made by Professor Dean of adding two to the test, to get nearer the true value of the milk.

Mr. Anderson: I am not a Canadian, yet I cannot agree with the claim that is made that the butter fat in the milk is the correct basis for paying for milk in a cheese factory. In the first place, the Babcock test must be used. The farmer who has the 4 per cent. milk may skim off enough cream to make it 3 per cent., which comes within the law, but, of course, if the lactometer is used with that, you can tell. Now, suppose a factory agrees to pay on the basis of the butter fat in the milk, one farmer has a Holstein cow; that milk makes a low test. He would take the night’s milk and skim, and give the skim milk to the cows; he will keep the cream till the next morning and put it in the milk and fetch it to the factory, and if the factory pays according to the butter fat, we don’t get the milk we ought to have, and yet that farmer would be within his rights as long as we say that the butter fat in the milk is the whole thing. In creameries the butter fat is the whole thing, but when we make cheese, the casein comes in, and we can’t make cheese without it. As far as our experiments at the Dairy School go, it proves that we do not get cheese in proportion, but, as Professor Babcock says, if we do not get cheese in proportion, why, the cheese we do get from the richer milk is richer cheese, and it will sell for more money a pound. Now, the fact is, we do not get more money from that. Many men can
not tell the difference, providing the cheese is made from whole milk, and if we do not get any more for it in the making, it isn't right to pay more for it than for a lower testing milk.

Mr. Dewhirst: Taking Van Slyke's investigation, he says, "The average pounds of casein for each pound of fat in the milk testing 3 to 3 1/2 is .66; 3 1/2 to 4 it is .66; 4 to 4 1/2 it is .65; 4 1/2 to 5 it is .64, a difference of over .02 from normal." He also says, "Recent research has shown that for milks containing a normal amount of fat the yield of cheese will be nearly proportional to the percentage of fat in the milk." It is a fact that good milk makes cheese more valuable for sale purposes than cheese made from skim milk.

Mr. McKinnon: We start out with the proposition that skim milk will make between five and six pounds of cheese—call it cheese or what you like, it will make that much skim cheese. If you add one per cent. of fat to it, it will make one pound of cheese and a fraction more, and it will keep on so doing till you get up about to 4 per cent. Now, when milk is worth $1.00 a hundred, 3 per cent. milk would be worth three-quarters of a dollar; 4 per cent. milk would be worth a dollar; therefore, the additional one pound and a fraction of a pound that is added to the weight of the cheese, for that we get twenty-five cents if you pay on the straight test, but if you pay as Mr. Anderson pays, or as Mr. Dean pays, you add two per cent., lessening the value upon that additional pound nearly one-half or one-third. Now, I claim that the difference between 3 per cent. and 4 per cent. milk can in no manner be made to equal twenty-five cents in any market, nor with any cheese buyers that are buying cheese, nor it cannot be made to produce that additional twenty-five cents. I am in favor of paying by the test, but I believe there is a fair medium somewhere between that artificial rule and the way that is often done. The fat adds to the quality of the cheese, we are all aware of that; the caseine adds to the amount, and the caseine should have a value. Now, it is fair to say that the caseine in that milk shall have at least two per cent. of the money and the additional shall go to the percentage of fat. I believe that to be strictly along the lines of honor and fair dealing, and I have given this question considerable thought.
Mr. Noyes: Don't you think the butter fat increases the yield?

Mr. McKinnon: Certainly it does. I said the casein will give us between five and six pounds of cheese. Now, we add, and for every additional pound of butter fat, we get an increase, of course, in the amount of cheese that is produced, and that is all right. It adds to the quality of the cheese, but there is no such a thing as saying that 2 per cent. milk should be paid 50 cents and 3 per cent. milk should be paid 75 cents, and 4 per cent. should be paid $1.00; there is no consistency in it, because you are paying 25 cents for an additional pound of cheese and a little over, that you get from that between the 3 and the 4 per cent.

Mr. Marty: There was a member who said here that he was in favor of the Babcock test applied to cheesemaking. I wish to call that member's attention to the fact that there are other kinds of cheese made in the state than American cheese; we have Swiss and brick cheese. Now, if your test is higher in the milk delivered at the factory, no matter what fat we obtain from the milk and get into the curd and whatever loss there would be from the same fat, it can be made into butter. This question of applying the Babcock test would certainly be out of place in the Swiss cheese industry. Now, in order to give patrons confidence in the cheese maker, what would Mr. Dewhirst recommend? Would you advocate that they start with the Babcock test?

Mr. Dewhirst: I will not take into account the question of 2 per cent. milk, because that is not normal milk and no such milk is delivered at the factory. I would take the same weight of milk of 3, 4, and 5 per cent. butter fat and I would make a cheese from it, and notice the difference in the size of those cheese, the difference in the weight, and that would demonstrate to the eye of the patron the increased cheese value of milk with the higher per cent. of fat. At the school we had several different cheeses made, running from skim milk up to 5 per cent. milk. We do not eliminate the casein in buying by the butter fat test, because the casein in the milk increases in practically direct proportion to the fat, so there is no necessity to offset the casein because the casein itself increases, and I will show that by again referring to Van Slyke. He states "that as the
percentage of fat increased the percentage of casein increased in nearly constant ratio.” If we had a short, rapid and accurate method of determining the casein, then the casein added to the fat value would then absolutely give the cheese value, but by the Babcock test alone, with normal milks, milks from 3 to 5 per cent., the Babcock test gives it so nearly accurate that it ought to account for the casein also. Now, there is another point in regard to a man skimming his milk. Mr. Baer might object to this as the assistant dairy and food commissioner, but as far as the factory is concerned, it makes no difference to us. We pay by the fat alone, and if he abstracts a portion of the fat in the cream, he takes out a larger per cent. of the fat than he does of casein, and he is really cutting his own throat by leaving more casein in that milk than the milk would normally have. Now, in regard to adding 2. When a man has 200 pounds of 5 per cent. milk, that is 10 pounds of fat, and we add 2, it makes 2 times 7 or 14; he adds 100 pounds of water to his 100 pounds of milk and brings down the test to a little over 3. We add 2 to the 3, 3 times 5, he is paid for 15 pounds instead of 14 pounds, which is a direct inducement to watering. It is offering a premium to the gentleman who is watering his milk, and is liable to come under the jurisdiction of Mr. Baer.

Mr. McKinnon: It would be fair to add this: If you have a set of patrons that are bringing you 4 per cent. milk and you made that up separately in a vat; and you had another set of patrons who are bringing you 3 per cent. milk, and you paid strictly by the Babcock test, by the butter fat, would there be 25 cents in favor of the 4 per cent. milk, over and above the 3 per cent., providing they were made up equally skillfully? I think that is not the case. I think the variation is considerable, but it is nothing like one-quarter. I think you will do pretty well if you will convince the little minority here that one additional pound of fat is going to add two and a half pounds of cheese.

Mr. Noyes: One pound of butter fat will make two and a half pounds of cheese, or more.

Mr. McKinnon: If you have 100 pounds of skim milk, it will give you six pounds of cheese. Then if you add an additional two pounds of fat, you will get eight pounds and a half of cheese, won’t you? Then, for the next additional pound,
bringing it up to 3, you get 5 pounds, then you bring it up to 4, and you get 10 pounds.

Mr. Dewhirst: In all the gentleman's figures, he assumes that 100 pounds of skim milk will make 6 pounds of cheese, but skim milk is not normal milk, and if the casein could be taken out in the same ratio as the fat there would be no cheese-making value.

Mr. McKinnon: I have made hundreds and hundreds of pounds, I know whereof I speak.

A Member: How much was your cheese worth, made out of this skim milk?

Mr. McKinnon: I am out of that argument right away.

A Member: I think that would be the right way to get the value. If you add four pounds of butter fat to the six pounds of skim cheese, it makes a lot of difference.

Mr. Dewhirst: This is not germane to the question at all; we are not talking about skim cheese.

Mr. Singleton: Mr. Dewhirst is right. Prof. Dean's is not an arbitrary rule. He found that by adding two per cent. to the fat it represented the available casein and it did come nearer the cheese-producing value of the milk than to test the fat alone. I have looked over Van Slyke's work, and I know it is a very strong argument in favor of paying by the fat alone. It is a stronger argument than Dr. Babcock makes.

Mr. Dewhirst: Upon this point Van Slyke and Dr. Babcock agree. Van Slyke in his work claims there is an increase of practically 2.7 per cent. within the range of normal milk; that there is a uniformly increasing cheese yield; that the casein increases in almost direct proportion to the amount of fat in the milk: In regard to the work of Prof. Dean, is it not a fact that the work of other investigators has not confirmed Dean's work?

Mr. Singleton: The point I want to make here is that you get a better yield for your work than we do, you make a moister cheese and we cannot compare investigations made in Canada and here.

Mr. Dewhirst: So you think that under our conditions that the Babcock test would be a fairer method of paying for the milk than the test plus 2?

Mr. Singleton: I am not prepared to say that. It might
come nearer the yield, but Prof. Dean, in his experiments, showed that his method was nearly correct for Canadian conditions where we make a dryer cheese than you do here.

The Chairman: Is Prof. Barr in the room? We would like to hear from him.

Prof. Barr: I do not wish to say very much on that subject. It always struck me with regard to Prof. Dean's experiments, that they were done along practical lines, the cheese were made from milk and the records kept and he found that the actual amount of cheese made, in fact, corresponded very closely with a 2 per cent., and I might say that those cheese were scored by some of our best experts in Canada, and there was no difference noted in the quality of the cheese, averaging the total scores, there was practically no difference in the quality of the cheese made from the 3 per cent. milk and the 4½ and 5 per cent. milk. I might say that all of our factories over there that are paying by the Babcock test are not adding the 2 per cent., some are and some are not, so that it is a matter of opinion over there, as well as here.

Mr. Anderson: I don't think it fair at all to compare full cream cheese with skim cheese, in order to find out the right way to pay for full milk, which comes, as a rule, between 3 and 5 per cent., and the bulk of it comes between 3 and 4 per cent. Now, in regard to the yield. The most reliable figures I have seen are those in the records of the Dairy School; Prof. Babcock gathered those figures from 347 factories. I have seen the figures printed. He picked out between twenty and twenty-five, running from 3 per cent. to 3½ per cent. fat. In that kind of milk, the yield was 2.95 of cheese to one pound of butter fat. Then he picked a couple of dozen of the highest factories, and there one pound of butter fat would give 2.45 pounds.

Mr. Michaels: I was in that same test at that time. My figures showed that I could make 2.77 pounds of cheese from 1 pound of fat. Today I can't do that. It was simply because at that time I did not test as high as I do today, and those low tests are not a comparison with the high ones.

Mr. Wallace: And were not those figures taken in the spring when we were making soft cheese, that was intended to go onto the market very quick.

Mr. Anderson: If you take cheese made from milk at the
same factory, if that is made soft, the same factory would make
the same amount of cheese. In 1900, the Wisconsin School
made cheese from different per cents. of milk. They sent part
of that cheese to the Paris Exposition, and I understand they
got a gold medal for the cheese. The figures were given there
of the yield from the different per cents. of milk, 3 per cent.
milk was 9.15. According to that 4 per cent. milk should go
over 12 pounds, but at the same time 4 per cent. milk made at
the same dairy school made less than 11 pounds of cheese. A
year ago last fall the Dairy School had cheese exhibited at the
State Fair at Milwaukee, cheese made from 3 per cent., and 4
per cent. milk, and 5 per cent. milk. The 3 per cent. milk made
9.2 pounds; the 4 per cent. milk made less than 11.

Mr. Michaels: I think Mr. Anderson is leaving out a valu-
able point there. He does not state that this milk in the first
place was skimmed down to 4 per cent., wasn’t it?

Mr. Anderson: No, it was made from farmers’ milk as it
was brought in. I am in favor of paying every farmer what
his milk is worth, but I think we should by all means find out
what the different per cents. will give in yield. Now, in scoring
cheese, flavor is 45 points. That should be considered in this
connection.

Mr. Dewhirst: I don’t think the Wisconsin Experiment Sta-
tion claims that those cheese at the Paris Exposition were made
from milk with the percentages of fat stated. In all those cases,
we did not attempt to determine the exact yield, it was merely
to show that there were differences. We skimmed some milk
entirely. In another case we left one per cent. of butter fat; in
another case, we left two per cent., and another three, but in
taking out the fat, we left an undue amount of casein, which
has increased the apparent yield of the lower test in the milk
and the lower test in cheese. We did not take into account the
difference which was made in the casein contents by the cen-
trifugal skimming, but we showed the point we were trying to
get, namely, that the yield of cheese is dependent upon the
amount of fat present in milk.
Mr. Mason: I have a resolution which I wish to offer this afternoon as follows:

"Resolved, by the Wisconsin Cheese Makers' Association, in convention assembled, That the Cheese & Dairy Journal, published by G. W Rankin of Milwaukee, be, and the same is, hereby designated as the official organ of this association."

On motion of Mr. Curtin, duly seconded, the consideration of the resolution was postponed until the next afternoon (Thursday, Jan. 7).

WHAT IS A FAIR COMPENSATION FOR MAKING CHEESE?

DISCUSSION LED BY HENRY VAN LEEUWEN, TOPEKA, KANSAS.

Mr. President: I guess that the cheesemakers will say that a fair compensation is all that they can get the owners or the farmers to pay them.

Of course, what the cheese maker is worth depends entirely upon the cheese maker. As superintendent of a system of factories, I have known of makers that were worth $5, $10, $15 or $20, or perhaps more, per month, than other makers, and to lay down a set rule as to what a maker is worth is a difficult matter; indeed, it is an impossibility. I do not believe we can say to a set of men you are worth so-and-so much and no more, but at the same time I believe that we can have something to base our calculations on as to what a man is worth. I don't know why I am called upon to discuss this topic, unless it is that I have a plan of paying at our factories which we think is very nice and satisfactory to ourselves, to the patrons and all, and that is a schedule, based upon the amount of milk received at the factory. Operating thirty-one factories, we have of course older men and others who are new, and so the new man always has an opportunity of calling in some one to instruct him if he gets into trouble. The new men are put into the light factories, and if they show that they are good men, do good work, and there