nions. What the weights and tests teach, each reader can judge for himself. If rich feed increases the richness of the milk, the accurate record will show it. The recorder of the weights and tests of milk and feed is as willing to note down one set of figures as another. His aim is to show what the cow did, r gardless of what he thinks she ought to do. With this end in view and in this frame of mind, the writer has weighed and tested the milk of each of six cows, every day through the whole milking period. The live weight of each cow was recorded every week, and a history of the cow's feed and care is also given in the record. A summary of the results of this vast amount of work is given in Dairy Bulletin No 23, of the Ag'l Exp. Station, of the University of Illinois. This bulletin is now in the hands of the printer, and will be ready for distribution early in March. A new feature of this bulletin is a graphical diagram of the record of one of the cows. It shows the weekly variations in live weight of the cow and the daily variations in the weight and composition of her milk through out the milking period. This gives the reader an opportunity to see more at a glance than could be readily ob tained from the mass of figures which the diagram represents.

E. H. FARRINGTON.

Champaign, Illinois.

(*Hoard's Dairyman.*

THE ECONOMICAL PRODUCTION OF BUTTER.

BY JAS. W. ROBERTSON, DAIRY COMMISSIONER.

There is nothing sordid in economy. The economical production of anything is the result of the application of the best skill to its manufacture. Men sometimes sneer at economy, because they think it has an element of meanness in it. I know men so mean that they will clasp both hands over two cents, and grip them so hard and continuously that their fingers will be too numb to scatter the seed in springtime to get a good crop for harvest. There must first be a giving out, a liberal sowing, before there can be an abundant harvest for reaping with joy. It is economical to sow bountifully when the seed and the soil are good.

Now, in the production of butter it is always economical to recognize that economy takes cognizance of a man's environment. We can grow oranges in Canada; we have an orange tree bearing oranges in Ottawa, but it is in a conservatory. We cannot grow oranges economically in this climate. Many men try to go on doing something, regardless of the natural conditions that they find around them Now, we have in Canada the conditions for an economical production of butter. We have, first of all, a fertile soil—a soil rich in all the elements of plant food. We have a soil which gives the largest crop of forage plants in the world, with conditions to support all animal life in robust health. We have a capable people needing occupation—needing employment. Why should a man, living in Canada, want to go elsewhere to get *more room* to spread himself on a great big farm? The money to-day is being made on small farms by men who farm well, and not by men who spread themselves over great areas and farm poorly. We have markets calling out for fine butter all the time; and making butter will enable farmers to keep their land in good condition, and give them and their families profitable employment. It is economy for the governments, for the people, to do all they can to extend the economical production of butter.

It pays to concentrate the products of the soil, and sell the refined products that carry the highest value with the least exhaustion of fertility. It is a fact that in one ton of hay you will sell 85 times more from the soil than you will in one ton of fine butter, and you will get for the hay probably $10 and for the butter $450.

Then, in the economical production of butter, it will always, pay a farmer to remember that butter is merely a kind of food whereby a man obtains energy for work. If I move my arm I rub off some of the material of my muscles—the friction has worn some off. I need *something in my food to* repair the waste of tissues in my body; besides, I need a supply of energy that will make it possible for me to originate and continue motions and perform the functions of living. There is nothing in fuel that will repair the waste of the cylinder of an engine; but without the fuel you could not get the motion. What does that mean? You get all energy in all food and fuel from the old sun. He streams his rays down on the earth and on and into the plants, which the soil carries. He rolls his strength up into plants, as I might wind my strength into the spring of my watch. A plant may then become food and fuel It is economical practice on the part of the farmer to select for his fields the plants which can serve him best in that capacity. The sun can store more of his energy during a single season's growth into the corn plant than into any other plant that grows easily in Canada. A cornstalk furnishes to the cows more energy than any other plant. Then, you get this energy transmuted into butter, and you have "materialised sunshine" —energy to supply force for your work. There is economy in that method of getting the sun to serve you by means of cornstalks, cows and butter. For this reason I think that every man who helps to make a farmer have increased faith in the value of cornstalks does a service to his country. The wealth of the Western States has come practically from two sources—from the sun and from the minerals; from the sun through the cornstalks, which in various forms of derivative diet, have furnished the energy to dig up the minerals. You need not try to "bamboozle" yourselves into thinking that wealth comes into existence without somebody's effort.

Then, in the production of excellent butter, the farmer needs to have good cows. I have a great deal of respect for a good cow. I have a good deal more respect for some of the cows in my stable than I have for some men. If you will treat a cow properly, she will give back an equivalent for what she gets. She is therefore honest, and will pay for her way through life. I will hunt with a microscope in the careers of some men, to see what they have given to the world of valuable service, and cannot find it. A cow sometimes does get more than she gives. I would not spare that cow. Put her on the block; get your money out of her in that way. You think of cows as boarders, kept for the profit of the man who keeps the boarding house. Did you ever think of a man keeping a boarding house, running on the general satisfaction plan, saying that if he does not get enough from one boarder to pay for his keep, he will get it from the other? No! he expects to make a profit on each one of them. The farmer should act in that way towards the cows. There is advantage from watching the cows and selecting the best of them. It is not so very hard to do, and most cows are capable of paying for their board in full, if they are given a fair chance. But if they are brought up the wrong way, they are sure to go astray—just like boys

Some people have a preference for a large cow. To my mind, if I wanted a cow to consume more food than she will give a return for, I would like an immense animal. If I wanted her to pay for her board, I would just as soon have a small one. I believe I would rather have a small cow than a large one, if she will give the same quantity and value in her milk. Then there is a notion that the bigger the cow, the better the quality of her milk. It is not so. I have faith in the quality of goods done up in small packages. I want to tell you what selection has done. The Hon. Thos Ballantyne—a man who has done more to advance the dairying interests of Western Ontario than any single individual I know—spoke lately in my hearing, and he stated that one cow in his herd last year gave 12,000 pounds of milk; another gave, 11,900 pounds in the season. They furnished milk for cheesemaking during the summer and for butter through the winter. It is possible for a farmer, by judicious selection and feeding, to enlarge the capacity of the cows in his herd. Mr. George Allan, who lives near Ottawa, is an excellent farmer. He had four cows in 1888, which gave only 78 pounds of butter each. He began to grow cornstalks, and feed these with a little bran, and in 1889 they gave 131 pounds each; and in 1890 his cows gave him 204½ pounds of butter each See the enlargement of capacity, and therefore the economical production. It is possible to enlarge the capacity of the cow, and thus reduce the cost of production. That belongs to economy, and the wise man is economical always, because to be otherwise is to waste; and waste is worse than folly.

(*To be continued.*)

Farmer's Advocate.

RATIONS FOR MILCH-COWS.

Louis SIMPSON, Esquire
Manager of the
"Montreal Cotton Co."
Valleyfield, P. Q.

Dear Sir,

You ask me to give you a milk ration, with straw as the main coarse fodder. You have no doubt made it out yourself from my instructions in the Ensilage pamphlet. However, here is what I would advise under the circumstance:

	Solids.	Sugar.	Digestible Protein.	Digest. Fat
Lbs.				
12 Straw	12 2	4.1	0.2	0.1
2 Cotton Seed Meal	1 79	0 55	0 61	0 19
5 Clover Hay	3 2	1 52	0.30	0 06
2 Bran	1.6	0 91	0 22	0 06
2 Crushed food	1.71	1.13	0.27	0 06
23	20.5	8.22	1.60	0 47
1st. Series				
As above with	20.5	8.22	1.60	0 47
20 lbs. Ensilage	3.74	2.2	0.18	0 08
	24.24	10.42	1.78	0.55
2d Series.				
As above with	20	8.22	1.60	0 47
20 lbs. Swedes	2 6	1 9	24	0 02
	23.1	10.12	1.84	0.49

With such rations and moistened cut fodder, you should obtain in winter an average of 20 lbs. of milk with good average milch-cows.

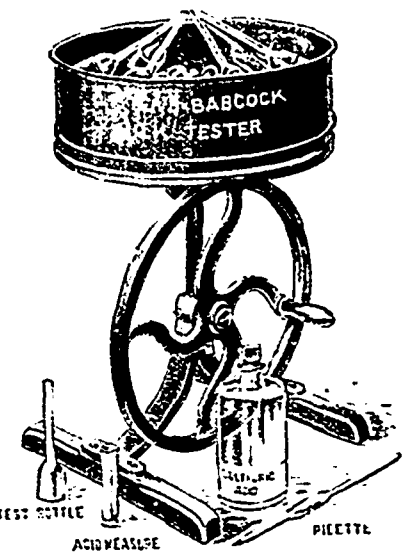
DR.

P. S.—Please let me know what you are doing in the matter and what results you obtain.

LISTER'S BABCOCK MILK TEST.

We have frequently drawn attention to the test invented by Professor S. M. Babcock, chief chemist of the University of Wisconsin, the object of which is to provide a cheap, expeditious, simple, practical, and accurate method for determining the quality of milk Messrs. Lister and Co., Dursley England, have now brought out an adaptation, of which we give a sketch. They say in explanation of it:

The Babcock method, combining chemical transformations to dispose of the sugar and the casein, and mechanical power to concentrate the dispos-



ed fat globules, is simply perfection. The test deserved a more simple and less cumbersome machine, and we take great pleasure in presenting the results of persistent efforts in that direction. Our latest is a machine without belt or cog-wheel, compact, neat in appearance, noiseless in operation, easy running, and in every way a fit companion for the perfect Babcock method. Of what use? Given a quantity of milk—the product of a single cow, or the total of a herd, large or small, as the case may be, and the important commercial question is, how much fat does it contain? The butter maker the cheese-maker, the city consumer, no less than the farmer himself, are financially interested in the question. How shall it be answered? First, thoroughly mix he mass by pouring from one vessel into another, or by stirring, and then with the pipette secure the sample and put it into a testing bottle. Add an equal volume of commercial sulphuric acid, that has been kept stoppered, of 1.843 specific gravity. By a gentle rotary motion thoroughly mix the acid and milk. Then place the bottles in the machine and turn for ten minutes, at a speed of eighty-six to ninety turns of the handle per minute, then stop, and fill the tank with water at a temperature of 190 degrees F., and at the same time fill bottles to the 7 per cent. mark with water of the same temperature; this may be taken with the pipette from the hot water tank. Be careful not to have the water above 190 degrees, as it may burst the bottles. When this is done, put the bottles back into machine, and turn it again for two minutes. The bottles can then