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The Teaching of Experiments in Feeding Milking Cows.

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There are few matters of greater interest to the man who keeps cattle. which I think it important for him to know, than the most economical way of feeding cattle. Instead of presenting a long and elaborate explanation of the underlying principles of cattle feeding, I will try and concentrate your attention on a few of the main points of feeding dairy stock in stables. Most men who feed cattle take no pains to have any practical knowledge on the subject at their fingers' ends. I hardly ever meet a farmer who has given as much thoughtful attention to the feeding of his stock as he has to the shape of the mould board of his plow. I do not know any part of farm practice which has been followed with so much hap-hazard blindness as the feeding of cattle.

Food is any substance which nourishes the tissues of the body and at the same time furnishes energy to perform the functions of living. A horse wears off parts of his muscles by working. He expends energy by pulling loads, and must have something to supply the waste which comes from efforts and movements. A cow does not require so much energy for labor, but she requires nourishment for the main. tenance of her body, and substances for the formation of the product which she yields. So in feeding cows you have to feed materials not merely to supply the place of waste tissue, but to form a product having the same constituent elements in itself as the feed which is consumed. The body of a cow creates nothing. Nobody creates anything. We may change the appearance of things-we may alter the arrangements of things—we never create. We may expend only what we have before acquired. Now then, in feeding cattle economically a man has to use the kinds of food which are adequate to furnish energy-force-like the fuel in the furnace for the boiler of an engine. Some foods have in them a sufficiency of energy to keep the animal living, but the energy is difficult to get at—to get out by the animal. Another way of putting it : If you analyse a stick of cordwood quite green, you will find there as much substance and more than in the same stick of cord wood quite dry, and I think the green stick of cordwood would give you more energy through a steam engine than the dry one, but it would take more favorable conditions to get it to burn, or in other words to get the energy out fo definite use. You get a special service from the silo, in that sense. If you can make the food palatable, you quicken all the energies of digestion. I went to a hotel last year in British Columbia. where the waiters were all Chinamen, and the table cloth seemed to have been sprinkled with coffee and soaked in gravy. All the appointments were in the same condition. The meat, I think, was wholesome, the potatoes seemed to be about as dry as usual, and the bread was all right, yet I could stand only one meal and a half. My digestive organs refused to act after that. I think chemistry could have found more there than one could see. Do not forget in preparing food for cattle to make it of a flavor such as they will like. Talking of corn stalks, if you allow them to wilt for half a day after cutting you will have a delicious aroma You get that in corn by wilting and in hay by the curing process. I have not time to speak of the real value of ensilage beyond this : We have made a very careful calculation of the cost of the corn ensilage in our silo, and we find it to be about \$1.40 a ton, after making allowance for the waste. Every animal seems to have a constitutional limit for consuming food with economy and profit. Some animals have a capacity for using a great deal more than others, and of giving a better return for it. In some cases where I have fed beyond 7 lbs. of grain per day per cow, the | weight.

quantity and quality of the milk have been deereased and depreciated, respectively. When that result follows liberal feeding, we have gone

beyond the capacity of that animal for economical digestion; when we go beyond that, it means both a waste of feed and injury to the animal. I find a great many men feeding animals more rich food than they can use to advantage. Now, rich food has a very small proportion of water in itself, and an animal must have a great deal of water in its system to use rich food to advantage. Under suitable con-ditions an animal will not drink enough water to enable it to use more than 6 or 7 lbs. of grain per day to advantage, if it is fed plenty of dry fodder besides. Water performs a double service in the feeding of animals-it is a solvent to dissolve the food, and it is a vehicle to carry the dissolved food around the system. Now, every milking cow requires a large quantity of water, and you can give it to her best in the form of succulent food. If you have a cow with a large capacityand are giving her a large supply of grain food, make sure that you give her succulent food with it.

In our feeding experiments with milking cows, definite conclusions cannot be given yet, for the simple reason that the experiments will have to be continued longer and repeated in some parts, to establish any principle or reliable and instructive conclusions.

In the case of three cows, we commenced on a ration as follows: Corn ensilage, 30 lb.; hay, 15 lb ; bran, 2 lb.; chopped peas, 2 lb.; oil cake, 2 lb.; cotton seed meal, 2 lb.; total, 53 lb. Of that mixture, the cows consumed an average of 68 pounds each per day. The cost was 23 19 cents per day.

At the end of one month the quantities of ensilage and bay were increased, until the ration stood: Corn ensilage, 40 lb.; hay, 20 lb.; bran, 2 lb.; chopped peas, 2 lb.; oil cake, 2 lb.; cotton seed meal, 2 lb.; total, 68 lb. Of that mixture, the animals consumed an average of 53 pounds per day. The daily cost was 16 22 cents per head. In this class, as between the first and second periods of feeding. the cost per day was reduced nearly 7. cents per head, and there was no appreciable falling off in the yield of milk. There was the natural lessening of quantity, which in the course of a month was equal to 1 pound 6 ounces of milk per cow per day

pound 6 ounces of milk per cow per day. With another set of three cows of smaller size, the cost per day was reduced by increasing the proportion of bulky food in the ration. For the first month the ration stood : Corn ensilage, 60 lb.; bran, 2 lb.; chopped peas, 2 lb.; oil cake, 2 lb.; cotton seed meal, 2 lb.; total, 68 lb. Of this mixture, the cows consumed per day 74.5 pounds each. The value of feed per day was 15.57 cents.

During the feeding period of the second nonth, an additional quantity of corn ensilage

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No vocation requires a more thorough knowledge of details than the feeding and management of farm stock, and at no time does this demand as close attention as the beginning of winter,

When the herd or flock comes into winter quarters from the pastures in good condition, there is not much difficulty in keeping them moving forward atterwards. Hence, the saying, well summered, half wintered," has more truth in it than appears on the surface. It is, however, too often that the reverse condition is found to prevail, and it is just here that the skill of the feeder is brought out. Much of the success of wintering animals, whether they are to be kept in store condition or fattened, depends upon the first month's management in the stall. It will always be found easier to improve them the first month, while the temperature is still more moderately mild than after the more severe weather of winter has set in. More care is also required in changing from the succulent pasture to the drier feed supplied to them in the stable ; and as the first month is an exceedingly busy one on the farm the cattle are too often neglected and are apt to fall away, and not only lose weight, but, what is still worse, suffer from loss of health or condition. In this manner nature furnishes a lesson in her wild animals, which are sleek and fat at the beginning of winter, and are thus enabled to withstand the cold which otherwise would prove disastrous where comparatively no shelter is afforded.

Although, if not in high flesh after the summer's run on pasture, stock should at least be in that condition that they should rapidly gain if feed in sufficient quantity and in a proper form is prepared for them, it is in the preparation of the ration that more knowledge and better practice is most seriously required.

The animal organism is like a complicated piece of machinery. Operating it is easy and straightforward while everything is running right, but should a remote part get out of order it then requires the skill of the trained machinist to set it to rights. So with the animals under the feeder's care. With the organs healthy assimilation is perfect, the appetite is regular, and a small quantity of concentrated food in the shape of ground grain, oil cake, cotton seed meal, or whatever is cheapest, nutrition value considered, is all that will be required to form that part of the ration.

Cattle, sheep, and all ruminants have capacions stomachs calculated to manipulate bulky and fibrous food. Nature never intended that they should be fed upon concentrated food alone. Grain is ordinarily much heavier in proportion to its bulk than hay or straw. Thus the rumin-ating animal requires the grain to be mixed the more bulky hay or straw, in order that it should go to the first stomach and have the benefit of the macerating process of the rumen, and be raised, remasticated and mixed with the saliva. Experiments have proved that meal and grain and other concentrated food do not in any material extent go to the first stomach when fed to cattle alone, and in order to make the most of feed this point must be guarded against. And herein lies the skill of the feeder to first see that his cattle are in the proper condition with all the organs capable of doing their work, and then to so form the ration that they will be able to assimilate all the nutritious elements in the food with the least possible strain on the digestive organs. If roots have been grown, there is no time in which these may be fed to greater advantage than during the first month, but they should be fed moderately at first. They help to assimilate the more fibrous and less digestible hay and straw, and in this, more than in the nutriment they contain, lies their value for feeding. When neither roots nor ensilage have been provided, some other method of supplying a succulent ration must be adopted, for if cattle are fed on nothing but dry feed, such as corn fodder, hay or straw, with the addition of ground grain, they may be improved in condition and fattened, but the process is too slow and expensive for profit. The following management will be attended with more labor, but it will be found to repay

was added to the ration, after which it stood as follows: Corn ensilage, 90 lb.; bran, 2 lb.; chopped peas, 2 lb.; oil cake, 2 lb.; cotton seed meal, 2 lb.; total, 98 lb. Of this mixture the cows consumed an average of 70.8 pounds each per day. The value of the same was 11.75 cents per day per cow.

per day per cow. In every one of the cases, when the ration of six different sets of cows was reduced in cost by the addition of bulky feed with the meal, we found that the animals consumed a less weight per day of the cheaper ration; and in no case was there any appreciable difference in the yield of milk that could be reckoned as due to that cause. The indication of the test is that the ordinary cows, of from 900 to 1,200 pounds, cannot consume to advantage more than from 7 to 8 pounds of meal mixture per day, together with corn ensilage or hay or roots.

In every case the teaching of the experiment is in this direction,—that by reducing the quantity of the expensive and concentrated feed down to 7 or 8 pounds of meal per day, we obtained as much milk per head, the animals were in as good health, and the cost of feeding was very much lessened. When a large quantity of expensive feed is given, (exceeding the quantities I have mentioned of from 6 to 8 pounds per day for the ordinary cow), it will result in no more milk and no increase of live weight