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THE FARMER'S ADVOCATE.

Oats or Wheat for Horse FeedIng?

ANSWERED BY MR. FRANK T. SHUTT, CHEMIST, DOMINION EXPERIMENTAL FARMS, OTTAWA.

Question 1.-Is wheat at 40 cents per bushel to [•] be preferred to oats at 30 cents per bushel for horse feeding?

Though there is considerable difference in composition between varieties of oats and varieties of wheat, it will, however, suffice for all practical purposes to take the average results obtained from a large number of analyses. These are as follows:

	- 77	neat.	Oats
Water		10.16	11.5
Albuminoids		12.15	11.93
Fat		2.16	4.2
Carbo hydrates (Starch).		71.72	59.2
Fibre		1.88	10.1
Ash		1.93	2.9

100.00 100.00

In the case of the oats the analysis gives the composition of the kernel plus the hull, since the latter is always consumed by the animal with the former; for the wheat the figures represent the composition of the kernel only

The features to be noticed in connection with the analytical data are: In albuminoids wheat is somewhat the richer of the two; in fat, oats contain about twice as much as wheat ; in fibre, oats, owing to the presence of the hull, possess about six times the amount present in the wheat kernel; in soluble carbo-hydrates (starch, &c.), wheat is about twelve per cent. richer; in mineral matter,

oats are richer by about one per cent. There appears to be very little on record with regard to the digestibility of wheat by horses, nor, indeed, can I find published any practical experience on feeding this grain to horses. This un-doubtedly is due to the fact that generally wheat is too expensive a grain for feeding purposes, and therefore seldom comes into competition with oats as horse feed.

For a basis of comparison, therefore, it must be answered that these grains are equally digestible by the horse, though for certain physical reasons, as we shall see later, this is probably not quite correct

Placing the value of the albuminoids and fat at two and a-half times that of the starch, we obtain the following :

Wheat

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Oats (with hull). Then, if oats weigh 31 lbs. per bushel and wheat 60 lbs. per bashel, we have, calculating from the above nutritive numbers, the value of wheat as 57 cents per bushel, assuming that of oats to be 30 cents per bushel.

It is not, however, probable that these figures represent the true and exact value of wheat and oats per bushel for horse feeding. It is universally acknowledged that for working horses, oats, as the grain portion of the food, stand first among the cereals. This may be due to two causes: First, their easy and uniform digestion, principally owing to the loose and mealy character of the ground grain. The presence of the hull favors this me-chanical condition. Moreover the gluten of wheat is of a sticky character compared with that of oats, so that in the stomach of the horse the tendency would be to form a cohesive mass which would not allow the digestive fluids to easily permeate it. Secondly, outs contain, in small quantities, certain stimulating principles not found in wheat. These have a marked influence on the working powers of a horse With wheat at the price here quoted, however, I think a trial with partial wheat feeding is ad-visable. A mixture of equal parts, by weight, of wheat and oats ground together and mixed with chopped, coarse fodder, such as hay, might be tried. It is always recommended in horse feeding that concentrated food should be first ground and mixed with a certain amount of chopped, coarse fodder. This ensures a horse more easy and complete digestion of the concentrated food.

The Dairy Industry of Ontario.

BY H. H. DEAN.

Before speaking of the improvements in methods of manufacturing cheese, I wish to call attention to an error in my last, wherein, speaking of how to find the per cent. of water that has been added to milk for adulteration, I am made to say, "find the per cent. of solids, not fat, by adding one per cent. of fat in the sample to the true lactometer reading, and then divide this sum by 4." It should read, find the per cent. of solids, not fat, by adding the (instead of one) per cent. of fat in the sample,

IMPROVEMENTS IN METHODS OF CHEESE MAKING. The first we shall notice is that of a rennet test for the ripeness of milk. A great many makers still depend upon their sense of smell as to the proper time at which the rennet should be added, and there is no doubt that after years of experience they can come very closely to the proper degree of ripeness in the vat of milk, yet the same makers would be disposed to laugh at a woman who puts her finger in the cream to know when it is the proper temperature for churning. They both belong to the same order of things. There is no doubt but good cheese can be made by using the nose for a rennet test, and that good butter can be made by using the finger for a thermometer, but certainty and uniformity are more certain and uniform where proper methods and instruments are employed.

The first rennet test was used, so I am told, by Mr. Harris, a former inspector and instructor of the Western Dairy Association. It consisted in taking a cup of milk at the proper temperature, to which was added a spoonful of rennet. When coagulation took place in a certain number of seconds the milk was considered in fit condition for receiving the rennet. As cups and spoons vary a great deal in size and capacity, and as it is also a difficult matter to put exactly the same quantity into a cup or spoon, makers began to look around for a more accurate test. What is now known as the dram test has been in use for some time among the makers of the Province. Who the originator was I do not know. To make this test, eight ounces of milk are measured in a graduated glass, the temperature is carefully noted and the milk started in a rotary motion by means of a spoon, or spatula. When a good motion has been obtained add one dram of rennet extract of known strength, stir for about 10 seconds, and count the number of seconds from the time the rennet was added until the milk coagulates. A piece of stick or burnt match in the milk is a good guide as to the exact second when coagulation takes place. When it stops circulating the rennet has done its work. The number of seconds to which the milk should be ripened depends upon the season and the kind of cheese to be made. For spring cheese, from 17 to 20 seconds will be about right. In summer the milk is usually ripe enough as soon as heated, but a test is advisable, as it enables the maker to know how the curd is going to work—whether fast or slow. In the fall the milk should be ripened a few seconds less than for summer, and in winter it needs to be ripened still more. The reports of cheese made by our dairy students last winter indi-cate that about 15 seconds gave good results.

A rennet test has several advantages, among which may be mentioned the fact that it enables a maker to know how long the curd is likely to stay in the whey. From 2½ to 3 hours is needed to thoroughly "cook a curd," but in many cases if a curd were allowed to stop in the whey so long as this it would allow too much acid to develop. It much be dimensioned in the state of the maker knows. Allowed to stop in the whey so long as this it would allow too much acid to develop. It much be dimensioned in the state of the maker knows. must be dipped in less time. The maker knows that he must heat up quickly in case of ripe milk (10 or 15 minutes), so as to get it cooked before there is too much acid, whereas if the milk were working properly he could take from 30 to 40 minutes to heat to 98°. No cheesemaker can afford to be without a rennet test. The measuring glasses do not cost much, and as for the time required, it will pay to make the test. Another point in this connection. I have seen makers throw the curd from the tests out doors or into the whey gutter. This is not necessary. In case two or three tests are made from each vat and this curd wasted, it will amount to considerable in a year. Collect the curd from the tests, and after the vat has been cut pour this curd over a curd knife and into the vat. The use of rennet extracts of known strength and of prepared coloring is an improvement which is coming into general favor with makers. The expense is the only drawback. For young makers would recommend the use of these in preference to home-made extracts and coloring. Another improvement is that of "milling" or grinding" early. There are makers, and those who manufacture good cheese, who allow the curd to completely "mellow down" and show 2 to 3 inches of acid before milling. The curd is then salted and put to press soon after. Milling about half way between dipping and salting, or when the curd shows 3 to 11 inches of acid by the hot iron test, is now practised by our best makers. It has several advantages: 1. It saves butterfat. In case the curd becomes very ripe and mellow, and it is then put through a "peg" mill, the loss of fat is great. The grease seen on the press boards of many factories is often caused by this practice. Such waste of the most valuable part of the milk is needless.

2. Milling early allows the curd to be well stirred and aired, thus improving the flavor. This is an especial advantage in case of bad flavored or tainted curds. While the curd is in a matted condition aeration is impossible.

(Nearly all our makers are agreed that matting the curds is preferable to thestirred curd, or granu-lar process. What is known as the "sheep-skin process" appears to have no advantages, according to experiments carried on in the Dairy School last inter.)

Different methods in the manufacture of spring, summer, fall and winter cheese may also be mentioned. While there has always been some dis-tinction in making cheese at different seasons, yet has not been so clear until within recent years. What these distinctions are, I would refer readers to Bulletin 88, published by the Department of Agriculture, Toronto, and prepared by committees appointed by the Dairy School students of 1893. It is a concise and comprehensive treatise on the subject of cheesemaking, and worthy the perusal of both patrons and makers of the Province.

As it is not my intention to write on the details of cheesemaking at the present time, I shall just mention two other improvements, and close with some extracts from a diary written some years ago when I was new at the work.

The two other points are : Paying by test or per cent. of butterfat instead of by the hundred pounds, which subject has been gone over so thoroughly from a theoretic standpoint that there is little to be said. What we need now are the practical results, which will doubtless be given at the annual dairy conventions in January. These reports I and many others are anxious to hear. The second point is the feeding of whey at factories instead of returning it in the milk cans. This is a decided improvement, but there is still room for more factories to adopt this plan.

EXTRACTS FROM DIARY.

July 28.—" Milk very ripe. One can thick at bottom. Took in top of can (the maker did), bottom sent home. Large amount of dirt in milk— would hardly go through the strainer. Set at 90°. Added one cup of coloring to 1200 pounds of milk Added one cup of coloring to 1200 pounds of milk and stirred rapidly from top first. Rennet—one cup to 1,500 pounds of milk, and then stirred. Ready to cut in about 10 minutes. Used perpen-dicular knife first. Kept stirring after cutting until it was heated to 100°. Dipped soon after. Had to keep stirring the curd for a long time after being put in sink. Ground when acid developed. Salted at rate of $2\frac{3}{2}$ lbs. to 1,000 lbs. milk. Worked off very rapidly—all through by 4 o'clock. off very rapidly—all through by 4 o'clock

ing curd. Dipped in 35 mins. Curd slightly gassy. Raised pan out. Dirt between and under the frame of the pan and water-tank, which leaked very much. More dirty milk. Tested several with pioscope. All very good. Sp. Gr. of one vat 100 by actometer.

July 31.-"Curd worked pretty fast. One can of bad milk. Set it at once and hurried it through. Sprinkled curing-room floors."

Aug. 1.—" Very hot; curd gassy; laid about four hours in sink. Allowed to string out 31 inches in

cheese; another was puffed in centre at one endput in a wire and pressed the gas out." Aug. 5.—"Cooler to-day. Curd laid in vat 3 hours and in sink 4. In curiug-room noticed cheese humped at end. Rennet and coloring added by guess.

Question 2.- Is boiled or chopped wheat the better?

I am of the opinion that the ground food would be much easier and more completely digested than the boiled, especially when mixed, as before stated, with coarse fodder. Under normal conditions it does not appear that boiling, though it may increase the palatibility, increases the efficiency of the concentrated feed stuffs when fed to horses.

Question 3.—Would half wheat and half oats, with a little bran added, make a suitable winter feed for weaned foals, or what would you consider better?

From the reasons already stated, and also the fact that the digestion of newly-weaned foals should not be overtaxed, ground oats should be preferable to ground wheat

The digestibility of bran appears to be about equal to that of the grains. There can therefore be no objection-to its use, more especially as it is veryrich in nitrogenous matter (albuminoids) and by its presence would tend to lighten up other in gredients of the mixture. Hay, of course, should be used to supplement these concentrated foods.

With respect to the latter part of the question, it might be said that milk is strongly recommended as part of a ration for foals. It presents nutritious food in a soluble and easily digestible form. If skim milk is used it may be enriched with a little linseed meal

Aug. 28.—"Noticed a cheese very mouldy. Mice at cheese in curing-room.'

Sept. 3.--"Went to a neighboring factory to-day to see how they got on there. First vat set at 93"-lumpy curd; quick worker (ready to cut in 5 mins.), and had harsh feel when salted. Allowed another vat to heat up to 100° before milk was all in. Some more came in later, which brought it down to 90°. They stir very slowly after adding rennet, and not long enough. Add rennet so as to come in 35 mins., and heat it to 100° in same length of time. Curds cut up very fine, and roughly handled; never saw such a man to stir curd-like a cow round a new straw stack. Ground in about $2\frac{1}{2}$ hours. Allowed to lie in sink about half hour after salting. Bandages very loose. Turned and bandaged some in about half an hour after putting in press. Some soft cheese in curing-room, where the ceiling is low, poorly ventilated, and windows without blinds. Floor of factory had; no gutter; big holes in some places; not half clean. Sink cloth filthy; dirty, sour smell; not enough care in washing; untidiness prominent. No piling or cutting of curd, which is put through the mill at a very rapid rate. Followers not washed at all, neither was curd mill, and it was poorly swept off. Sour smell in whole factory.

Sept. 4.-." Went to another factory, Floor kept very clean, and also rest of building. Milk set at 88°; heated with dry steam, and when scalding it is run up in about 30 mins. Horizontal knife not used at all, but after cutting both ways with the perpendicular, the curd was turned over and cut length-