New York Agricultural Experiment Station.

(These series of frequent reports are intended to inform the public of progress at the Station rather than to give complete results.)

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N. Y. AGRICULTURAL EXPERIMENT STATION,
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COOKED VS. RAW FOOD FOR STOCK.

During the past summer, Mr. E. F. Ladd, our assistant chemist, devised and carried out an investigation into the effect of cooking cattle foods, which must possess the value of enforcing the truth of the many practical experimental trials which have shown that cooking food for stock lessens the nutritive value over the same food in a raw state; and has the supreme advantage that the conclusions are not subject to the chances for error which occur in the complex surroundings of a cattle feeding experiment.

The chemical evidence is shown in the following tables, whereby it is seen that there is a loss of albuminoid in the process of cooking, and also an apparent loss in the fat.

	ANALYSIS OF THE RAW FOOD.				
	Albuminoid N. x 6.25.	Crude Fiber.	Nit.—free extract.	Fat.	Ash.
1. Clover hay.....	14.531	.....	.....	3.86	.....
2. Corn meal.....	12.34	2.25	77.75	5.77	1.59
3. Corn meal.....	10.41	2.33	80.35	5.41	1.50
	ANALYSIS OF THE SAME FOODS COOKED.				
1. Clover hay.....	14.343	.....	.....	3.41	.....
2. Corn meal.....	11.25	3.31	79.31	4.38	1.75
3. Corn meal.....	9.87	2.47	.....	3.85	.....

Where the loss takes place is observed in the following table in which the albuminoid and non-albuminoid nitrogen is expressed separately, and whereby the loss is seen to occur principally in the non-albuminoid or amide portion, but in one case, the corn meal No. 2 in the albuminoid nitrogen as well. No. 2 was fresh ground meal, No. 3 was old meal, and other experiments, to be reported later, show that a change occurs spontaneously in meal upon keeping.

	1. Clover hay.		2. Corn meal.		3. Corn meal.	
	Raw.	Cooked.	Raw.	Cooked.	Raw.	Cooked.
Albuminoid Nit'gn	....	....	1.505	.831	1.222	1.217
Non- do do	....	....	.470	.969	.448	.363
Total nitrogen..	2.32	2.29	1.975	1.800	1.670	1.580

Some digestion experiments, by Mr. Ladd, add further evidence. In these trials an artificial digestion fluid, formed with scale pepsin, was employed. The accuracy of the method is evidenced by the following duplicated trials:

	Per cent. of total albuminoid digested.		
	1st trial.	2d trial.	Difference.
Pea meal	89.71	87.66	2.05
Linseed meal	89.94	89.11	.83
Ground oats	81.79	82.00	.21
Hay	49.23	49.23	.00
Fodder corn	64.00	63.00	1.00
Starch refuse	71.89	74.83	2.94

The greatest difference, 2.94 per cent. in albuminoid, as expressed in nitrogen represents a difference of less than .1 per cent. in the total amount digested in the two trials.

It is thus seen that the method used is sufficiently reliable for all the purposes of this trial.

The digestibility of the three foods analyzed above finds expression in the following table:—

	Per cent. of albuminoid digested.	
	In raw food.	In cooked food.
1. Clover hay	67.65	53.27
2. Corn meal	68.63	60.53
3. Corn meal	72.58	63.17

Or, the per cent. of albuminoid in the food, was:—

	Per cent. of albuminoid in foods by analysis.	
	Raw.	Cooked.
1. Clover hay	14.531	14.343
2. Corn meal	12.34	11.25
3. Corn meal	10.418	9.875

That is, by cooking the loss in albuminoid, per hundred pounds of the food, was in the case of the clover hay, .188 lbs.; in the fresh ground meal, 1.09 lbs.; in the case of the old meal, .543 lbs.

In the digestion trials, each hundred pounds of the food digested in albuminoid of the raw and cooked:

	Albuminoid digested. Lbs. per 100 lbs. of the food. Raw.	Cooked.	Loss by cooking, lbs.
1. Clover hay	9.831	7.641	2.19
2. Corn meal, fresh	8.47	6.81	1.66
3. Corn meal, old	7.562	6.236	1.32

It is thus seen that cooking seems disadvantageous both in the loss which occurs of actual albuminoid, and in the depreciation in the digestion value of the albuminoid that remains.

In a trial of the digestibility of clover hay, with horse and sheep, by E. Wolff and others, Bied. Centr. 1884, p. 751–2, the albuminoid digested is given at 60.02 and 54.51 per cent.; in another trial, ib. p. 753–733, the figures given are 56.84 and 57.02 per cent. In Kuhn's digestion tables, as published by Armsby, Manual of Cattle Feeding, appendix, Table II, we have given the digestibility of feeding stuffs as per German trials. These we copy in connection with the results gained here, by which it is seen that artificial digestion trials seem worthy of some confidence.

	Digestibility of Albuminoid of Feeding Stuffs. Kuhn's Tables.				
	Min.	Max.	Average.	N.Y. Station. Artificial digestion.	
Red clover hay	43.0	73.3	60	Clover hay	67.65
Meadow hay, medium	42.0	63.0	56	Hay	49.23
Maize fodder, very good	....	....	73	Fodder corn, ordinary	63.50
Linseed cake	80.2	89.9	87	Linseed meal	89.47
Oats	79.7	94.0	87	Ground oats	81.90
Peas	84.4	91.5	88	Pea meal	88.69

A portion only of our digestion data is herein used, but our additional data but serve to more strongly confirm the results at present reported for the purpose only of throwing some evidence upon the question of using cooked or raw food for stock.

E. Lewis Sturtevant, Director.