Report of the Moisture Committee

By W. H. IRWIN, *Chairman*

FOLLOWING the untimely death of P. S. Tilson, the former chairman of the Moisture Committee, the new chairman decided to confine the co-operative work this year to a small committee and to make a study of the Bidwell-Sterling and Kingman distillation methods, and also collect data on the same samples from a number of laboratories which were equipped with a jacketed glycerin oven, similar to the one recommended by Dr. W. D. Richardson when he was chairman of the Moisture Committee in 1920.

Six samples of cottonseed meal were secured from various parts of the country, carefully prepared, and sent out at intervals to the several collaborators.

The only change made in the Bidwell-Sterling Method as sent out the previous year, was in the size of the sample (40 grams), and an instruction to the analyst to carry the distillation forward for three hours, since it had been our experience that it was necessary to carry the distillation on for this length of time to get over the last traces of water.

The Kingman Method used was the same in principle and apparatus as the Kingman Method, published in the Journal of Industrial and Engineering Chemistry, Volume 18, No. 12, December, 1926, by the Committee on Analysis of Commercial Fats and Oils of the American Chemical Society and the American Oil Chemists' Society, in the "Standard Methods for the Sampling and Analysis of Commercial Fats and Oils," the only modification being the size of the sample to be used (40 grams).

Early in the study of the methods, most of the members of the Committee reached the conclusion that the Bidwell-Sterling Distillation Method was not a satisfactory method, and that the Kingman Distillation Method, which required only about forty-five minutes as against three to four hours by the Bidwell-Sterling Distillation Method, offered more hope of a successful distillation method.

The compilation of results given below shows the results obtained by the several members of the Committee, working independently on the two distillation methods.

A. O. S. C. CO-OPERATIVE CHECK MEAL RESULTS, 1926-27

	Kingman Distillation Method					
	1	2	3	4	5	6
C. P. Long, Globe Soap Company	8.19	...	8.55	8.83	8.78	8.98
M. L. Sheeley, Armour Soap Works	8.55	9.14	7.99	8.50	8.26	7.99
C. H. Cox, Barrow-Agee Laboratories	7.75	9.90	8.95	9.72	9.18	8.92
W. D. Hutchins, Southern Cotton Oil Co	8.04	10.00	8.10	8.98	8.50	8.38
J. J. Vollertsen, Armour & Company	8.00	9.69	8.27	8.56	8.56	9.81
E. H. Tenent, International Sugar Feed Co.	8.23	9.05	...	8.74	8.39	8.50
N. C. Hamner, Southwestern Laboratories	...	...	...	8.81	8.12	8.03
W. H. Irwin, Swift & Company	8.22	9.94	8.32	8.72	8.44	8.82
Maximum	8.55	10.00	8.95	9.72	9.18	9.81
Minimum	8.00	9.05	7.99	8.50	8.12	7.99
Average	8.12	9.26	8.36	8.86	8.53	8.68

	Bidwell-Sterling Method					
	1	2	3	4	5	6
C. P. Long, Globe Soap Company	...	8.50	7.76	...	...	...
M. L. Sheely, Armour Soap Works	7.53	9.06	7.81	7.69	7.68	7.65
C. H. Cox, Barrow-Agee Laboratories	7.13	9.12	7.33	...	...	...
W. D. Hutchins, Southern Cotton Oil Co	7.81	9.70	8.17	...	...	8.27
J. J. Vollertsen, Armour & Company	7.90	...	...	8.13	8.44	8.12
E. H. Tenent, International Sugar Feed Co.	7.88	8.66	...	8.28	8.19	...
N. C. Hamner, Southwestern Laboratories	...	...	...	...	...	...
W. H. Irwin, Swift & Company	8.09	9.76	7.94	8.13	8.13	8.14
Maximum	8.09	9.76	8.17	8.28	8.44	8.27
Minimum	7.13	8.50	7.33	7.69	7.68	7.65
Average	7.72	9.13	7.80	8.06	8.11	8.04

A study of the data on the Kingman Distillation Method shows some rather erratic results. From some special work done, it appears probable that some high results were obtained due to a continuation of the distillation period for too long a time, resulting in a destructive distillation with the production of moisture. The temperature attained at the end in the Kingman Distillation Method is between 142-144°C. If the distillation is stopped promptly at this point, uniform results are obtained. If, however, the operator carries the distillation on after reaching this temperature, high and variable figures result. A modification of the Kingman Distillation Method to govern the rate of distillation, the amount of distillate to be collected, and the time of distillation, may result in a satisfactory method.

Glycerin Oven

The six samples were forwarded to fifteen Swift & Company laboratories for a moisture determination in the standard glycerin oven. The results are tabulated below:

These results, in the opinion of the Committee, are extremely satisfactory. Figures of this kind would result in no controversies between laboratories.

The Committee asked two chemical supply houses to bid on the construction of an oven of this

A. O. C. S. Co-Operative Samples of Cottonseed Meal, Numbers 1 to 6 for Moisture Determinations, Swift & Company Laboratories, Using Swift & Co. Standard Jacketed Glycerin Oven, Temp. 101° C.

Laboratory	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
1	6.91	9.00	7.36	7.98	7.94	7.39
2	7.17	8.85	7.40	7.95	7.85	7.55
3	6.90	9.12	7.58	7.81	7.67	...
4	7.20	9.05	7.56	8.03	7.80	7.58
5	6.83	9.25	7.62	8.15	7.97	7.63
6	7.00	9.03	7.49	8.11	7.93	7.54
7	6.84	9.07	7.50	7.97	7.92	7.57
8	...	9.08	7.56	7.86	7.64	7.73
9	6.80	9.05	7.50	7.99	7.78	7.59
10	6.95	9.15	7.50	8.00	7.80	7.70
11	6.97	9.17	7.54	8.06	7.88	7.58
12	7.01	9.24	7.53	8.07	7.87	7.59
13	7.21	9.30	7.69	8.18	8.02	7.65
14	6.84	9.24	7.70	8.03	7.94	7.36
15	6.94	9.10	7.54	8.05	7.84	7.77
Maximum	7.21	9.30	7.70	8.18	8.02	7.77
Minimum	6.80	8.85	7.36	7.81	7.64	7.36
Average	6.99	9.11	7.54	8.01	7.79	7.59

kind. The figures ran, depending on the number, from $195 to $250 each, which, in view of the Committee, is excessive. These ovens can be constructed and sold at a reasonable profit for $125 each. While Swift & Company are not builders of laboratory equipment, they are willing to make these ovens in their shops for this figure, if a sufficient number of laboratories indicate their desire for such an oven.

A review of the work of the moisture committees in years past seems to indicate that while a distillation moisture method is desirable that, where large numbers of samples are to be handled, an oven is much to be preferred to any distillation method.

The Committee recommends:

1. The adoption of a jacketed glycerin oven, similar in principle and design to the one recommended by Dr. W. D. Richardson in his report (1920), and used by Swift & Company laboratories in the cooperative work during the past year.

2. That the study of the Bidwell-Sterling Distillation Method be dropped, since the time required for the determination is too long and the results unreliable on cottonseed meal.

3. That the Kingman Distillation Method be studied during the coming year with the modifications suggested in the report.

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