immaturity, ripeness or fermentation. It may require a certain degree of desiccation.

Many other details must be attended to by each specialist involved in the investigation, and we probably have yet to see a single disease problem which has been completely rounded out and solved for future generations.

IX. HOW SHALL WE RECORD OUR OBSERVATIONS?

Undoubtedly the most satisfactory method of making a large series of records is to use some type of loose-leaf card or sheet filing system. By such means one can always keep in an orderly arrangement all the facts so far obtained. In the case of investigations of the causation of a given disease, one of the most satisfactory methods which has been used for recording observations is to prepare a little blank booklet, which will fit the filing system, in large quantities, each book to represent a case. This book should contain pages for each phase of the question, with blanks covering all kinds of minutes about this phase. The whole series of observations can be tabulated for each point.

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THE U. S. FOOD ADMINISTRATION'S WAR FLOUR

The U. S. Food Administrator, Mr. Herbert Clark Hoover, met and solved one of the greatest problems of the war. Prompt and seemingly drastic action was necessary in order to conserve wheat and vanquish the specter famine. The way in which this was achieved is so well known that recounting is unnecessary.

Bread is a nation's chief food, and in order to maintain an adequate supply during the war there were but two courses open for the Food Administrator to follow: To require the use either of substitutes, or of whole wheat flour, also known as long extraction flour. As head of the commission for relief in Belgium, Mr. Hoover was familiar with the results arising from the exclusive use of whole wheat flour in rationing a nation, and they were such as not to warrant a repetition of the experiment in the United States. It is most fortunate that no impractical dreamer, bent upon repeating an experiment that had failed was in charge of the U. S. Food Administration. Mr. Hoover's plans for the conservation of food and wheat in particular, rested upon basic scientific principles.

At the time Mr. Hoover assumed control there was a shortage of wheat and a fair supply of other cereals, particularly corn and barley. It was a question as to the best use of these cereals for human and animal foods. Corn and barley alone were not suitable for bread making, as they lack the gluten or binding material of wheat. Gluten is contained only in the floury part of the wheat and there is none in the wheat bran except that present in any flour that may have failed to be separated from the bran. As wheat bran and other wheat by-products contain no gluten binder they are on a par with corn and barley so far as physical bread-making value is concerned. The Food Administration took a broad view of the question and recognized that in addition to bread there must be maintained an adequate supply of milk and animal fats as pork.

Naturally the question hinged upon the relative merits of bran and corn and barley flours as human and animal foods. All available data plainly indicated that a pound of corn or barley flour furnishes the human body with more digestible protein and available energy than a pound of wheat by-product. In the animal ration, however, the wheat by-product has a higher productive value than the corn or barley.

Some recent experiments of the U. S. Department of Agriculture, conducted during the war by Arthur D. Holmes, specialist in charge of Digestion Experiments, Office of Home Economics, have an important bearing upon this subject. He reports that in eight digestion trials with men fed on fine bran bread in a simple mixed diet, an average of 44.7 per cent. of the bran protein was digested and 56.6 per cent. of the bran energy was available. In the case of unground bran 28 per cent. of the protein was digested and 55.5

per cent. of the energy was available. It is to be noted in five of these sixteen digestion trials negative results as to the digestibility of the protein were secured; that is the body actually sustained a loss of protein because of the bran consumed. "The reports made by the subjects regarding their physical condition vary from 'normal except for occasional slight pains in the stomach after eating to extreme laxative effect.'"[1]

Mr. Holmes reviews the earlier digestion trials of the U. S. Department of Agriculture, made by Woods and Merrill of Maine and Snyder of Minnesota, and reports:

	Digested Per Cent. Protein	Digested Carbohydrates
White flour	88.1	95.7
Whole wheat flour	81.9	94.0
Graham flour	76.9	90.6

Mr. Holmes's work shows that wheat bran has low digestibility as a human food. He says: "It is hoped the results of the experiments here reported when considered in connection with the available data on the digestibility of wheat will be of value in determining the most economical and physiological method of utilizing wheat for human food."

When used as animal food bran and wheat by-products have a much higher digestibility than when used as human food. Jordan reports that on an average 77.8 per cent. of the protein of bran and 79.8 per cent. of the protein of middlings are digested by animals. Thus it is quite evident that a pound of corn flour or barley flour furnishes more nutrients in a human ration than a pound of wheat by-product and on the other hand a pound of wheat by-product furnishes more nutrients in the animal ration than a pound of corn or corn flour and this is because the bran has a low digestibility as human food. In view of the facts it is quite plain the U. S. Food Administrator made no mistake in the adoption of the "substitute" flour as a conservation measure instead of the use of whole-wheat flour.

The Victory Bread of the United States made from 75 per cent. white flour (war standard) and 25 per cent. "substitutes" was far superior to the long extraction or War Bread of Europe containing no substitutes. A quotation from Alonzo E. Taylor's "War Bread" relative to the quality of the whole wheat or long extraction flours used in Europe is interesting:

> It is the experience of the nations at war in Europe that they would abandon higher extraction and return to mixed flours prepared from standard flour, provided this were possible. Breads made in England of standard (American flour diluted with an admixing flour) are much better than straight breads of 85 per cent. extraction flour. The Victory bread of the United States is so superior to the war bread of the Allies and of the enemies as to be past comparison. (Page 86.)

The "Substitute Plan" adopted by the United States Food Administration resulted in the conservation of more wheat, and the production of better bread and more nutritious than would have been possible if the whole-wheat plan, so vigorously advocated by some, had been adopted.

Dr. Armsby, director of the Institute of Animal Nutrition of the Pennsylvania State College, in his booklet "The Conservation of Food Energy," which was published about a year ago, gives some interesting data upon the utilization of cereals. He records the available energy per 100 pounds of flour as follows:

	Therms
Straight or standard patent	165.0
Whole wheat	156.1
Graham	150.5

After discussing the efficiency of animals to utilize cereals, and the food value of animal products, considering the overhead feed cost in producing such products, he concludes that:

> It is clear, then, that the endeavor should be to utilize as large a proportion of vegetable products as is possible directly as human food, leaving only the by-products to be fed to stock. In the case of cereals this is accomplished chiefly by some form of milling. (Page 58.)

It is to be noted that the figures which Dr. Armsby uses for flour milling (73 per cent.

[1] Page 17, U. S. Dept. Agr. Bulletin No. 751.

extraction) are for the pre-war flour. The U. S. Food Administration during the time of the shortage of wheat required approximately a 75 per cent. extraction. It is necessary to keep in mind this difference in the pre-war and the war standard milling basis in making comparisons. The tables show that when 100 pounds of wheat are milled into 73 pounds of flour (pre-war basis) and 27 pounds of feed, the flour being used as human food and the feed part for pork production, the pork in turn being used as human food, a total of 78 per cent. of the original therms of the wheat are utilized as human food. When, however, the calculations are made on the war standard milling (75 per cent. extraction) and the bran is converted into milk, and finally the cow into beef, while the middlings part of the wheat by-product is fed to pigs, which is the common practise in the use of wheat by-products, a return of over 80 per cent. of the therms of the original wheat is secured, which is somewhat more than is obtained when the wheat is milled and utilized as whole-wheat flour.

Even without the use of substitutes the Food Administration flour of 75 per cent. extraction, with a limit as to the amount of flour used per capita, would have been a better conservation measure than whole-wheat flour, because the therms from the milk, pork and small amount of beef are more valuable than the therms derived by man from the direct consumption of bran in whole-wheat flour bread. The quality of the therms as well as the quantity must be considered.

But the greatest conservation of wheat resulted when "substitutes" were used and a review of all the facts shows that the U. S. Food Administration could not have made the wheat supply "go farther" by milling it as whole-wheat flour. It would have gone no farther and the consumer would have had poor bread. The old adage aptly applies to this case—"Go farther and fare worse." The U. S. Food Administration's flour milling and bread-making plans accomplished results in the most efficient and satisfactory way possible.

Harry Snyder

EDWARD COWLES

Dr. Edward Cowles, who died at Plymouth, Mass., on July 25, at the age of eighty-two, was in many respects a remarkable man and had a remarkable career. He graduated from Dartmouth in 1859, where he received his M.D. two years later. He entered the Union Army, retaining his connection with it until 1872, when he became resident physician and superintendent of the Boston City Hospital, and in 1879 of the McLean Hospital for the Insane at Somerville. He directed its removal to Waverley and supervised the erection of perhaps what was then the finest hospital of its character in the world. This superintendency he resigned in 1892 because of ill health. The institution is to-day very largely a monument to his efficiency and foresight.

He was also a pioneer in the professional training of nurses for the care of the insane, but most important of all was the fact that he was the first in this country to conceive and carry out the system of scientific study of the insane within the institution itself with proper laboratory equipment and a corps of experts. It was due to his initiative that men like Dr. Adolf Meyer and Dr. Hoch were brought to this country and that other men now prominent were started on their careers. It is generally understood that his enthusiasm for the development of this scientific side of hospital work was one cause of his retirement.

He was professor of mental diseases at Dartmouth and instructor at Harvard Medical School until 1914, and for sixteen years was non-resident lecturer at Clark University, where he was one of the original trustees.

He was a member of the Alpha Delta Phi, Phi Beta Kappa, and Loyal Legion, and belonged to the St. Botolph Club of Boston, besides being a member of many scientific societies.

In his later years Dr. Cowles followed with intense interest the rise and decline of Kraepelin's views, with which his sympathy was limited. He was also interested in psychoanalysis, though not convinced of the extreme views of Freud. The list of his sci-