

analogy of the lean or muscle of meat, and starch, which is the vegetable counterpart of the fat of the meat. Over and above these, flour also contains a small proportion of fat, cellulose, and mineral matter, the latter of which is essential to the formation of bone. White bread is made from flour which is derived from the central part of the granule; this yields both the whitest and the finest flour. Whole-meal bread is made from a flour which is not sorted or bolted, but derived from the whole of the wheat granule. As the chemical composition of the wheat granule is not uniform from the centre to the husk, it must follow that the white flour, and hence the white bread, does not contain those substances which are present in the outer layers and husks of the wheat kernel. Chemically the chief substances in which white bread is deficient as compared with whole-meal bread are mineral matter, proteids, fatty matter and cellulose. Of these, proteids are the most expensive and the hardest to replace.

But the mere chemical composition of any material used as a food does not indicate its true nutritive value, for it is only that part which is digested, or that is brought into solution by the various digestive agencies of the body, that can in any way act as a nutrient. Cellulose is one of the most insoluble and indigestible substances known, so much so that in the human subject the nutritive value of it can practically be neglected. Not only is it very indigestible itself, but, owing to the thick coatings of the cellulose around the cells in the bran layers, it prevents other constituents from being digested. In addition to this, cellulose exerts mechanically an irritant action upon the intestines, which, with some, may be very injurious, but with others may have a decidedly beneficial effect.

In the case of the fat and mineral matters the chemical differences probably express pretty accurately the nutritive differences. The whole-meal bread will probably contain three or four times as much of these two substances as the bread made from the finest white flour.

As stated before the whole meal flour will contain rather more proteids. This is especially true with fine "patent" flours, but the baker's grade yields as high or rather higher percentage