tion, say a half or a third, can be assimilated, the value of the food is to be measured by that portion only, and not by the whole. The more nutritive foods are valuable not merely on account of the large proportion of useful substances they contain, but also because they are easily accessible to the animal. Thus in the turnip by far the greater part of its nutritive matters is soluble in water, little more than 2 per cent. of its weight being insoluble in that fluid, and of this small quantity a considerable proportion is dissolved by the juices of the stomach. In the cereals, although but a small proportion is directly soluble in water, the chemical changes they undergo during digestion convert them easily into a condition in which they can be absorbed. But it is quite otherwise with straws. In them the chief nutritive matters are partly soluble and partly insoluble in water, and they contain besides a large proportion of inert woody fibre. It will be easily understood that the substances soluble in water will be readily assimilated by the animal; and even those which are insoluble might, and probably would, also be taken up if it were not for the woody fibre which surrounds and protects them, and if it does not altogether prevent, must certainly greatly diminish the chances of their utility. Even in the most valuable food but a small proportion of the nutritive matters present is assimilated, and does not admit of a doubt that the portion soluble in water, or that which is most readily converted into a soluble state, will alone be absorbed.

In straws, it may be fairly anticipated that the soluble part is likely to be of use, and that the other portion, though it may, *if* rendered soluble, become useful, is so thoroughly protected from the action of the gastric juice by the woody fibre in which it is enveloped that in all probability it generally, if not invariably, escapes assimilation. In consideration of these facts it appeared to me that all the necessary requirements would be fulfilled by determining separately the quantities of each group of nutritive elements contained in the straws which are soluble and insoluble in water.

In following out this view of the matter, I at first attempted to effect the separation by macerating the straw in cold water, but it was soon found that in this way only a small quantity of soluble matters could be obtained, unless they were left in contact for a long time, and then a species of fermentation was apt to occur, which entirely altered the straw, and defeated the object in view. On the other hand, boiling water was inapplicable, owing to its producing coagulation of some of the albuminous compounds. After some trials a temperature of 140 degs. Fahrenheit was adopted, and was found sufficiently high to ensure the extraction of all soluble matters, without running the risk of rendering any of the albuminous compounds insoluble. The first fluid obtained in this way, by adding to the straw about ten times its weight of water, was brownish coloured and slightly mucilaginous, and contained the greater part of the soluble matters. Three or four subsequent additions of water were found sufficient for their complete extraction. The total amount of soluble and insoluble matters was thus determined, and the proportions of soluble and insoluble albuminous compounds were ascertained by determining the total nitrogen and the amount left in the insoluble matter. Owing to the bulky nature of straw, and the small proportion of nitrogen, this required very great care, and duplicate experiments were made, with closely corresponding results.

Wheat Straw.—Samples of wheat straw, of good ordinary quality from East Lothian and from the neighbourhood of Midhurst in Kent have been examined.

	Mr. Harvey, Whittingham.	Mr. S. Skirving, Camptown.	Kent.
Soluble in Water—			
Respiratory elements	2.68	6 68	5.26
*Albuminous compounds	0.86	0.37	1.37
Ash	3.38	1.55	4.97
Insoluble in Water—			
Oil	0 80	1.00	1.50
Respiratory elements	44 88	36.43	38.79
†Albuminous compounds	0.51	1.12	1.00
Woody fibre	32.88	34.78	35.01
Ash	2 82	6.19	1.35
Water	10.62	10.93	11.16
	99.43	99.35	100 39
*Containing nitrogen	0.139	0.06	0.220
†Containing nitrogen	0.082	0.18	0.160
Total nitrogen	0.221	0.24	0 380
" albuminous compounds	1.37	1.49	2.370
" respiratory elements	47.56	43.11	44.050

In examining these analyses, it is impossible to fail being struck by the small proportion of matters soluble in water which wheat straw contains. Excluding the ash, they amount in the first sample to no more than 3½ per cent., and in the other two to 7 and 6½ per cent. respectively. To these the large portion of soluble ash forms a very remarkable contrast, in two of the samples greatly exceeding the insoluble ash, and in the third (that from Camptown), though it falls short of the insoluble part, it must still be looked upon as proportionately large. The largest individual constituent in all these straws is the insoluble respiratory elements, and they materially exceed the woody fibre in quantity, a result for which I was not prepared. It is interesting to notice that, if we take the total albuminous and respiratory compounds, the difference between the specimens is by no means large, and the two East Lothian straws in particular are almost absolutely identical. It is only when the relative quantities of soluble and insoluble matters are taken into account that the difference becomes apparent.

Barley Straw—Samples of barley straw were obtained from the same localities as the wheat