

by constituents of food in so far as their are concerned, but each according to circumstances can lend itself to the work which is more peculiar province of the other. The portion of carbon in fatty matter amounts to more than 80 per cent., and is much more than in gum, sugar, or starch. Oil and for this reason, are not only better producers than starchy and sugary compounds, but likewise more powerful agents for the support of respiration and the maintenance of animal heat—the heat generated in the body being proportionate to the amount of carbon consumed in a given time during respiration. Gum, sugar,ilage, starch, and a few similar compounds may be represented as consisting of carbon and hydrogen only, and on account of the simplicity of their composition they are well adapted to support respiration. The quantity of carbon consumed by the respiration of animals varies at different times and in different species, according to the rapidity of their breathing and their mode of living. Under all circumstances, however, considerable, especially in the case of ruminating animals. Thus cows consume four-ninths of the carbon contained in their ordinary daily food by respiration, and throw it off in their excretions in the form of carbonic-acid gas. Hence the absolute necessity of supplying large quantities of animals with abundance of carbonaceous food.

The chemical analyses of various kinds of straw, by Professor Voelcker, form a very valuable portion of his report. It is only the general results of these that I shall attempt to bring before you on this occasion; and this I shall do by giving the different amounts of soluble and insoluble matters which the straw examined by Professor Voelcker were proved to contain. This was done by a mode of examination originally adopted by Dr. Sinclair, in his examinations of the different grasses cultivated in the grass garden at Woburn, the results of which are given in the valuable "*Hortus Gramineus Woburnensis*." The mode of determining the nutritive value of different grasses, observes Mr. Voelcker, by ascertaining the proportion of matters soluble in water, furnishes comparative results which tend to form a tolerably good opinion of the nutritive value of straw. Indeed I find that the nutritive samples invariably produce the same amount of watery extract. Straw in which he finds varies very materially in its nutritive value; and this to a considerable extent is influenced by the degree of maturity it had attained before it was cut, the unripe being the most nutritious, the over-ripe straw the least so. I found in two samples of wheat straw, the one of ripe, the other over-ripe—

RIPE, OVER-RIPE.

.....	8.14	..	9.17
.....	8.77	..	4.81
.....	83.09	..	86.02

100.00 100.00

In wheat stubble gathered in December—

Water	17.66
Substances soluble in water	5.83
Substances insoluble in water	79.51
	100.00

Similar results were obtained from other straws; for instance, in barley straw dead ripe was found—

Water	15.20
Soluble organic matter	2.92
“ inorganic	2.88
Insoluble organic	77.62
“ inorganic	1.38
In barley straw not too ripe—	
Water	17.50
Substances soluble in water ..	12.40
“ insoluble	70.10

Then, again, in the case of oat straw examined in three different states of maturity, viz., when green, when fairly ripe, and when over-ripe, the following results were obtained—

GREEN. RIPE. OVER-RIPE.

Water	77.14	..	46.64	..	35.20
Soluble organic mat. 6.29 ..	9.06	..	4.42		
“ inorganic .. 1.59 ..	2.30	..	1.75		
Insoluble organic ... 14.72 ..	40.28	..	55.48		
“ inorganic ... 0.26 ..	1.72	..	3.15		
	100.00		100.00		100.00

The most valuable of the ordinary straws is that of the pea. This was found to be composed of—

Water	16.02
Soluble organic matters	11.28
“ inorganic “	2.72
Insoluble organic “	67.77
“ inorganic “	2.21
	100.00

With regard to the nutritive value of bean straw, great indeed is the difference of opinion amongst practical men. If we may judge from the discordant results obtained by Way and by Voelcker, it is probable that bean straw varies very considerably in composition, as influenced by soils, seasons, and varieties. The bean straw of 1860 and 1861 was analysed by Professor Voelcker. He found 100 parts of each—

BEAN STRAW OF 1860.

Water	19.40
Soluble organic matter	5.69
“ organic “	2.31
Insoluble organic “	71.20
“ inorganic “	1.40

BEAN STRAW OF 1861.

Water	17.75
Substances soluble in water ..	6.86
“ insoluble in water ..	75.39