

formed 81 pounds of starch. This substance, therefore must be burned in the stomach, physiologists being of opinion that it serves the same purpose in the human body, as coal does in the production of heat in a room. This was an important practical point in reference to the economy of animal food. The plant, in order to sustain the animal, must not only have what will give it fat, muscle, and bone, but what will also give it heat. The carbon given out by the lungs varies under different circumstances. A little man will respire five ounces of carbon in a day; but a tall man, with a capacious chest, who takes exercise, will respire as much as fifteen ounces, and an animal, such as a cow or a horse, from five to six pounds. In order to respire five ounces of carbon per day, we must have about eleven ounces of starch, and the more exercise we take the more starch must we have. Thus was nothing wasted in nature, such a thing as wasting was not known in nature. There was no waste of starch or carbon from the lungs. If the animal was cold more would be required to keep it warm, consequently, in the economy of food, a great deal depended on the warmth and condition in which the animal was kept. If their land was in a cold condition, the animals which fed on it would be cold also—just in the same way as a person, when he entered a cold room, would become cold in proportion to the temperature of that room. Animals that are kept cold will also eat more food. In like manner, if they fed their cattle on an exposed situation, they must eat more food; but if they kept them in a shed, or in folds dry and sheltered, they would eat less. It was not merely the result of the theory he had explained, on which this principle was founded; but it has been arrived at by actual experiment. The following table showed an experiment made on sheep:—

	Live, Nov. 18.	Weight Mar. 9.	Increase.	Roots Eaten.	Incr. for each 100 lbs. of Roots.
	lbs.	lbs.	lbs.	lbs.	lbs.
Unsheltered, .	108	131.7	23.7	1912	1.2
In open Sheds,	104	129.8	25.4	1394	2.0
Do., but confined,	108	130.2	22.2	1238	1.8
Close Shed, dark,	102	132.4	27.8	886	3.1
Do., but confined,	111	131.3	20.3	886	2.4

The original weight of the sheep was given in the first column, and the second contained the increase they made from the month of November

until the month of March. The animal placed in an unsheltered situation had increased 23lbs.; the one in the open shed 28lbs.; the one in the same description of shed, but confined in a crib, 22lbs.; the one in a close shed in the dark, 27lbs.; and the one kept in the same sort of shed, but confined, 20lbs. The increase was greatest where the animal was kept in an open shed; but then the quantity of turnips consumed was double that of the animals kept in the close shed. From this table it was obvious, that in the dark sheds a great saving of food had been effected, which arose from the animals being less disturbed, and therefore less restless. Motion was found to be accompanied by a waste of substance. Let them consider how the different purposes could be best accomplished. If it were for the purpose of manufacturing dung, as in Lincolnshire, that they kept cattle, intending afterwards, as they did there, to sell them at nearly what they cost, it was not, in this case, of consequence to save food. They would not, of necessity, give the cattle rich food for effecting this purpose, but that kind of food of which they would consume the most. They would also keep them in a cool place, and give them a great deal of exercise. But, suppose the farmer looked to something else—to lay on fat—he would give his cattle those substances which contained a large proportion of fatty matter. Oil-cake was one of these. It was exactly on account of the quantity of oil which it contained that it was valuable for laying on fat. Bran was another thing. Many persons were surprised that bran should be so valuable for fattening pigs; but if they looked at its composition in the following table, they would find that it contained about five per cent of oil:—

Water,	-	-	-	13.1
Gluten,	-	-	-	19.3
Oil,	-	-	-	4.7
Husk and a little Starch	-	-	-	55.6
Saline matter	-	-	-	7.3

100

Oil, consequently, was greater in amount in the husk of the wheat than in the wheat itself. Oil also especially abounded in Indian corn; hence in the United States, and other countries where it was grown, it was extensively used for the fattening of pigs. Professor Johnston then alluded to the differences which existed in oil-cake, some of which was much better adapted for fattening than others. But suppose they kept their animals, not for the purpose of laying on beef and mutton