a month—introduced into the tank every 8 or 10 weeks, would prevent any loss of ammonia.

As it is of much consequence to ferment manure with regularity, and as fermentation is almost altogether stopped when excrementitious matters and straw are completely immersed in water it is advisable to give the dung-pit a somewhat inclined position, so that any superfluous liquid may find its way back into the tank.

Next month I will describe the style of liquid-manure cart I prefer, and give a notion of its use in carting out the ammoniacal liquid of the gas-works, &c., as I hope to pursue it in the Spring.

ARTHUR R. JENNER FUST.

OUR ENGRAVINGS.

The engraving of "A Sheepfold" will tell its own story. The hurdles are made of white pine 4 × 4 and 1½ × 1½ inches. The rape which the sheep are feeding off (3½ acres) kept 35 sheeps for seven weeks, with the addition of a pint of oats per head per diem. The figure in the corner of the fold is intended to represent the present writer, but the features are rather blurred, owing to the necessary distance between the camera and the object. A. R. J. F.

Champion Milking Short-horn Cow Red Cherry.

We reproduce, on a somewhat smaller scale, from the London Live Stock Journal, the accompanying illustration, of the subject of which our contemporary remarks:

This wonderful cow has, two years in succession, won the champion prize for the best yield of milk at the annual show of the British Dairy Farmer's Association. She was bred by her owner, Mr Joseph Phillips, Park Meadow Farm, Peterborough, is eight years old, rich red in color, of large size, with long frame, narrow in front and very wide behind. She is not eligible for the Herd-book, but, nevertheless she partakes largely of the Short-Horn form and character. She has produced six calves, her last one having been calved on the 3d of May last. This year her day's produce of milk, in two milkings, weighed 51.75 lbs., or a little over five gallons, and the milk was found to contain 12.31 per cent. in total solids and 3.26 per cent. of butter fat. Last year she gave almost the same result.

ENSILAGE.

BY GEORGE FRY, F. L. S.

In a few short articles I propose, first, to offer a few remarks on some recent contributions to the literature of this subject; secondly, to record a few new facts and observations; and thirdly, to show that the theory which seems best to accord with all the observed phenomena attending the production of sweet ensilage is that the fermentation is not caused by independent organisms, but by the living cells of the plants put into the silo.

I.

The recently published volume (Vol. XVI.) of the transactions of the Highland and Agricultural Society of Scotland contains an article written by Dr. A. P. Aitken (the Chemist of the Society). The conclusions at which this writer arrives are directly contrary to those to which my studies and experiments have led me; and, as his opinion cannot fail to have considerable influence on a large section of the agricultural community, I take the liberty of directing attention to the fallacy on which his conclusions are based.

I may say at starting that if I could admit his facts and assumptions I should share his conclusions. It appears to me that if Dr. Aitken had carefully followed the admirable studies which M. Louis Pasteur has published in his two books, "Etudes sur le Vin" and "Etudes sur la Bière,"(1) he would see reason to modify, to a very large extent, his opinion on ferments in general, as expressed by him on pages 406 and 407 of the volume to which I refer. Passing these over, I proceed to give in Dr Aitken's own words the keystone of the arch on which the bulk of his superstructure rests:—"If deprived of air, or rather the oxygen contained in the air, or if surrounded by any gas which does not contain free oxygen, grass or other green fodder can be kept moist and fresh for a very long time. This is what is done in a silo. When green fodder is thrown into a silo, and pressed down so as to diminish as much as possible the air space within it, the amount of oxygen is very small in comparison with the mass of solid material; and if the walls of the silo are air-tight, and the surface of the heap covered over with some impervious covering, and the whole subjected to continuous pressure, the limited supply of oxygen contained in the substance and the interstices of the fodder is very soon used up by the ferments. *and when that point is attained the fermentation ceases.*"

If the statement in italics be true, then the views on ferments which have been held by the majority of scientific men for the last ten years (at least) are all wrong, and Pasteur has lived and taught in vain.

Pasteur has not only shown that ferments can exist without air or free oxygen, but he has proved, by evidence which satisfies my mind, that in the presence of free oxygen some alcoholic ferments (such as *Mycoderma vini*) produce little or no alcohol, the production of alcohol being due to the abstraction of combined oxygen from the sugar by the ferment. He has gone much further than this, for he has shown that organisms that are not alcoholic ferments, such as *Penicillium glaucum*, *Aspergillus glaucus*, and *Mucor mucedo*, also produce alcohol when grown out of contact with free oxygen.

Pasteur says:—"After the germ has received the first impulse from oxygen gas, successive generations are born indefinitely, absolutely free from the influence of atmospheric air." (Etudes sur la Bière, 1876, page 275.). He has also shown that, according to the amount of oxygen admitted to the ferment, the proportions between the weight of the yeast and of the sugar decomposed vary from 1 of yeast to 176 of sugar (where the supply of air was very small) to 1 of yeast to 23 of sugar (where the supply of air was abundant) (Idem, pages 241 and 243.)

After the most exhaustive experiments on this point, Pasteur thus expresses himself:—"The deductions from the whole of the facts which precede cannot be doubtful for any one. As to myself, I cannot prevent myself from seeing in them the foundation of the true theory of fermentation. In the experiments which I have just described, fermentation by yeast—that is to say the type of ferments properly so called—is presented to us as the direct consequence of a work of nutrition, of assimilation, of life—in one word, carried on without free oxygen gas. . . . . .

The fermentation by the yeast seems then essentially allied to the property which this little cellular plant possesses of breathing in some way (with) the combined oxygen of the sugar." (Id., page 251.)

Again he says, even more emphatically:—"The truth of the theory of fermentation, to which I have been conducting in the preceding paragraphs, is contained, for the main part,

(1) The latter I read with great interest. If our Canadian brewers would study it, and be guided by its precepts, we should not be obliged to drink such horrid potions in the summer. A. R. J. F.