of such exposure, day after day, and season after season, without the slightest doubt, lessens the durability of any machine.

Having looked into some of the agencies which have a detrimental effect upon agricultural implements in general, let us next proceed to promulgate some plans for the counteraction of such agencies.

From the study of the effects of air, temperature and moisture on implements, it will be readily seen that, to obtain the best results, implements require as much care during the summer as in the winter. We often hear the query, "How should agricultural implements be taken care of during the winter?" but very little is said of their care during the summer season.

It is needless to say that during the summer months we have sudden changes of temperature nearly every twenty-four hours. A cold night is very often followed by a warm day. If an implement, composed of iron and wood, is left exposed to the weather during the summer months, the sudden contraction and expansion will certainly have the effect of straining the implements. The wood work will become warped and cracked; the joints will become loose, and the iron parts will become attacked by rust, which has been shown to have a detrimental effect. Implements, therefore, require urgent attention during the summer months.

On every well-regulated farm, an implement house is almost as necessary as any other farm building. Too often do we find implements stored here and there through the farm buildings, some in the stables, others in the corner of a hay mow, if the latter is empty, and some of them left under a temporary building, with a few boards for a roof and the sides all knocked out, the latter place being almost as bad as no covering at all.

The implement house does not require to be a costly building, but should be perfectly built, so as to allow no snow or rain to enter and wet the implements from time to time, the size of which should be determined by the number of implements to be stored therein.

The means that may be taken to retard the progress of deterioration and to shield implements from the wasting influences of the atmosphere, are few and simple in character, but not unimportant in effect. One very simple, practical direction is of great consequence.

All implements employed at intermittent work should be taken to the shed, placed under cover, repaired, well cleaned, oiled and kept ready for taking out again, at the shortest notice, in good working order.

By thus putting away implements and tools much time, worry and money will be saved, and the slovenliness of a yard strewn with machines will not rise up and pronounce the owner as being a slovenly untidy and wasteful farmer.

To give a rough estimate of the loss of machinery that is left out of doors, let us take for an example two binders, costing the same, say, one hundred and twenty-five dollars each; doing precisely the same amount of work, but cared for under the two different treatments. L. T. Hunter, a very eminent authority estimates the loss, as nearly as he can calculate, to be two-thirds, when exposed as above mentioned.

Therefore, suffice it to say that the binder with the sheltered treatment would last twelve years, while the one with the exposed treatment would only last four years.

G. W. MORGAN.

The above is from the pen of Mr G. W. Morgan, being an essay for which he was awarded a gold medal last fall. The prize was the gift of Mr. L. H. Dampier, Manager of the Strathroy branch of the Bank of Commerce, and the competition was open to the county of Middlesex. No less than ten essays were handed in, so that it is no empty honor to have secured first place in the contest. Ed.

The Metabolism of Nutrients in the Animal Body and the Source of Muscular Energy.

In its widest sense the production of work means the conversion of latent into actual energy. In the animal it is the latent energy contained in the various components of the food or the body, which is thus converted into actual during the breaking up of these components into simpler substances. All work is performed at the expense of food or tissue and the more work is performed the less remains for the production of flesh, fat, etc.

The question as to the manner in which the food is utilized in the body in the production of energy has long been a subject of much study and controversy, and the general interest in the subject has widened as the investigations have advanced, and practical results have been obtained. Investigations along this line are extremely complicated, and there is a great liability to form incorrect conclusions and advance erroneous theories.

Liebig advanced the theory that protein is the source of muscular power. Voit also maintained the idea that the metabolism of protein was the important factor in the production of energy, and in proof of this advanced the theory that whether the organism is at rest or performing labor, the same amount of protien was metabolized. If mechanical labor is produced it is used for this; at other times it simply produces heat. He and Pettenkofer compared the metabolism of protein in a body to a mill stream; it produces mechanical labor when it flows over the water wheel, at other times the energy is not utilized.

This theory is not accepted today. The maximum energy which the metabolism of protein in the body can yield has been determined by Rubner by means of exact calorimetric investigations. His data is used in determining the results of a large number of experiments conducted by Keller and E. Wolff on a draft horse. For a long period the animal performed the same amount of work daily, and the actual mechanical equivalent of this work, and the nitrogen excreted in the urine were determined. Assuming that only the protein can serve for the production of external muscular labor, in many of the experiments scarcely half the work done can be accounted for. This discrepancy is still more apparent when we remember that the beating of the heart and breathing represent a considerable amount of mechanical labor, which increases with increased external work.

While Pfluger has proved by his experiments on a very lean dog, fed exclusively with fat-free meat, that it is possible for an animal to live and do considerable labor on a purely protein diet, yet under ordinary circumstances there can be no doubt but that the nitrogen-