PROTEIN IS MOST IMPORTANT SUBSTANCE IN ANY FOODSTUFF

Composed of Nitrogen, Carbon, Hydrogen, Oxygen, Sulphur, and Phosphorus—It Makes Up Muscles, Tendons, Ligaments, Connecting Tissues, and Almost Everything but Fat.

(By H. B. M'CLURE.)

The nutritive substances in hay or feed may be divided into two classes—flesh forming and fuel or energy producing substances. When the proper amount of these two classes of substances is fed the ration is said to be balanced. If an unbalanced ration is fed, as one containing more fuel or energy producing substances than are needed and less flesh-forming material, the ration is partially wasted, and such unwise feeding will not bring as good results as the feeding of the same amount of a balanced ration. Each class of substances has different offices to perform in the body. If not enough flesh forming substance is

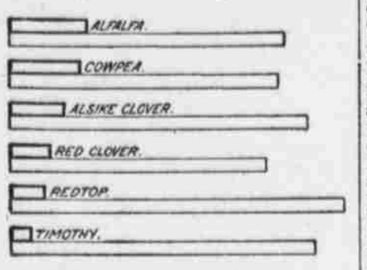


Diagram showing the relative amounts of digestible protein and carbohydrates in different kinds of hay. The section inclosed in light lines represent the carbohydrates; those inclosed in heavy lines, the protein.

fed, the body suffers, because it is absolutely necessary to keep the body in good condition. Thousands of horses are fed all they can eat, yet are poorly nourished because the food contains little except fuel substances.

The flesh forming substances are used to replace the waste that goes on in all living tissues. Energy producing substances are used to furnish the energy required for the nervous and muscular activities of the body, and when fed in excess they may to a certain extent be stored up in the form of fat for use later, when needed for either energy or heat.

One of the most important substances in any foodstuff is protein. All nutritive substances which contain nitrogen are classed under the general term of protein. Protein is composed of nitrogen, carbon, hydrogen, oxygen, sulphurs, and phosphorus.

Protein is the substance which builds up the body. The muscles, tendons, ligaments, connective tissues, skin, hair, hoofs, part of the bone, and in fact every part of the body but fat are made up of protein, together with mineral matter and water.

The next important class of substances is the carbohydrates, which contain carbon, hydrogen, and oxygen, but no nitrogen, sulphurs, or phosphorus; they include starch, sugars, etc. These are used for practically the same purpose for which coal or wood is used in the steam engine, namely, to furnish energy and heat.

The third important constituent of hay is its oils. Small quantities of oil are present in all kinds of hay. These oils serve the same purpose as the carbohydrates. A pound of these, however, will furnish two and one-fourth times as much energy or heat as the same quantity of carbohydrates. It can readily be seen, when the chemical analysis of hay is considered, why the price of the different grades or kinds of hay should depend, first, upon the amount of digestible nutrients contained, and, second, upon the purpose for which the hay is fed. If the concentrated feed—i. e., the grain in the ration—lacks protein, then the hay that is high in this substance is more valuable than one which contains little but carbohydrates, and vice versa. There is quite a range in the amount of the different classes of nutrients in the various kinds of hay.

On an average, in 100 pounds of alfalfa hay the digestible protein amounts to 10.58 pounds; in cowpea hay, 10.79 pounds; in alsike clover hay, 8.15 pounds; in red clover hay, 7.38 pounds; in redtop hay, 4.80 pounds; and in timothy hay, 2.89 pounds.

In 100 pounds of redtop hay the digestible carbohydrates amount to 47 pounds; in timothy hay, 43.72 pounds; in alsike clover hay, 41.70 pounds; in alfalfa hay, 37.33 pounds; in cowpea hay, 38.40 pounds; in red clover hay, 36.15 pounds.

When fed for protein, timothy hay ranks last, but when fed for carbohydrates it stands next to redtop, which heads the list. If the total nutrients are considered there are a number of different kinds of hay which are equal, if not superior, to timothy hay for feeding purposes.

EVERY FARMER CAN USE PAINT

Adds to Appearance of Place and to the Durability of Any Kind of Farm Building.

Any man can do an average job of painting, and can thereby not only improve the appearance of his place, but can add greatly to the durability of the buildings.

The average farmer, if there is such a thing, seems to think that paint is used solely for ornament, and he is of all men most keenly practical, he eschews what he regards as an unprofitable luxury. It is, perhaps, the rule rather than the exception in some sections to see houses and agricultural implements sadly in need of repaint.

Of course paint does improve the appearance of property, but it is far more useful as a protector rather than an ornament. The expenditure of a small amount of money and time in painting a valuable piece of farm machinery or a building will add greatly to the length of its life. Another

A Hand-power Paint Mill.

useful object accomplished by painting is the improved sanitary conditions of buildings and outhouses. The cost of such work is small, the necessary equipment not expensive, and with proper care will last a long time.

In order to supply information which will enable the farmer to purchase the paint economically and apply it intelligently and to the best advantage, Secretary Wilson caused experts in the bureau of chemistry to investigate the subject and prepare Farmers Bulletin No. 474 calling attention to the economic importance of painting farm buildings and equipment and giving details as to the cost, purchase, and care of brushes, cost of the ingredients needed, how to mix and apply them.

Paint conveys to the casual reader the idea of a mixture of pigment with linseed oil, but the general conception of the word includes both whitewash and calcimine, but not varnish, and the bulletin gives several very valuable recipes for making both of those excellent coatings for both out and inside of buildings.

The secretary in addition to urging the proper use of paints for both useful and ornamental purposes, for he does not think anything too good or attractive for the farm homes, emphasized several precautions: "Do not use any paint containing compounds of lead about stables or outbuildings where the fumes from decaying organic matter occur, since these gases are likely to darken the lead paints. Do not use with lead compounds any pigment which may liberate compounds of sulphur. For example, ultramarine blue which contains sulphur in a form in which it may be set free is a beautiful blue and may be used with zinc white, but should not be used with white lead or any other lead pigments. Prussian blue, on the contrary, does not contain sulphur and may be used with lead pigments.

"Remember that turpentine and benzine are very inflammable and especial precautions should be taken not to bring paint containing these substances near any light or open fire.

"Many pigments are poisonous, and the workman should be particularly careful to remove all paint stains from the skin, and not under any circumstances allow any of it to get into his mouth. A man should not eat in the same clothes in which he has been painting, and before eating should not only change his clothes but wash all paint stains from his skin. It is not advisable to use turpentine or benzine in removing paint stains from the hands, but by oiling thoroughly with linseed oil, or, in fact, with any fatty oil, and then thoroughly washing with soap, the paint may be removed, provided it has not been allowed to dry too thoroughly on the hands."

Good Liberal Education.

One of the best investments that any farmer can make, with a view to helping his boys and girls in the future, is in giving those boys and girls a good liberal education, that will enable them to compete with others and hold their own in the future. One thousand dollars and a good education equip a young man much better for his struggles in life than will two thousand dollars and no education.

Care of Farrowing Sow.

During the farrowing hour, the sow should be kept quiet and should seldom be approached by any person. She will not need the attention of man and as she is extremely nervous and irritable at this time, all causes of excitement should be removed as far as possible.

Shoats for Killing.

Pick out the very smoothest and most likely shoats for the winter killing, keep them in clean quarters and feed so as to make well balanced meat—not too much fat.

THE CHILDREN

BRAIN EXERCISED AT HOME

Something Entertaining as Well as Instructive for Boys and Girls on Cold Winter Evening.

Often of a cold winter evening boys and girls like to spend the time in doing something entertaining and instructive as well. A good pastime that will prove instructive is that of solving problems. Distribute pieces of paper among those present and tell them to solve the following problems, the answers to which are given below:

1. What two numbers multiplied together will produce seven?
2. How may four fives be placed so as to make six and a half?
3. If five times four are thirty-three what will the fourth of twenty be?
4. What is the difference between twice twenty-five and twice five and twenty?
5. Divide the number fifty into two such parts that if the greater part

Working Problems.

be divided by seven and the lesser by three the quotient in each case will be the same.

Some may answer correctly and some will be caught, easy as the problems appear.

Here are the answers:

1. The two numbers are 7 and 1.
2. The figure 5, the fraction 5-5 and the decimal fraction .5.
3. Eight cents and one-fourth.
4. Twice 25 are fifty. Twice 5 and 20 are 30.
5. The two parts are 35 and 15.

SILVER COIN MADE TO JUMP

Clever Little Trick May Be Performed With Port Wine Glass, but Conical Form Is Easier.

Choose a wineglass of the conical form, shown in the illustration, whose greatest diameter is a little larger than a silver dollar. At the bottom of the glass place a silver quarter, and above it the dollar, which will fall only a little way into the glass; it will rest horizontally, like a lid upon it. Now tell your friends that without touching either glass or coin you have it in your power to make the quarter of a dollar jump from its position. All you have to do is to breathe strongly on the silver dollar. It will rotate and so assume a vertical position. At the same instant

The Jumping Coin.

the compressed breath at the bottom of the glass will cause the quarter to skip from its position quite a distance on the table, after which the dollar will slowly go back to its former position. Sometimes this trick may be performed with a little port wine glass, but with the conical form it is still easier.—Magical experiments.

BEES PARTICIPATE IN WAR

Terrifying and Demoralizing Method of Repelling Besiegers Employed by Themiseyraeans.

In these days of scientific warfare there are more ways of killing a man than of going to church, but you would have to look far and wide before you would find a more terrifying and demoralizing method of repelling besiegers than that employed by the people of Themiseyra, an ancient city of Asia Minor. A Roman historian tells that when the city was besieged there were great buildings put up to be pushed toward the walls so that the attackers might advance uninjured. But the Themiseyraens were a capable people, and they chopped holes in the tips of the buildings and cast down on the heads of the advancing army whole swarms of bees and all the wild and ferocious animals that their municipal menagerie had contained.

Likewise, in England, a few hundred years later, the Danes and Norwegians were attacking the ancient Roman city of Chester, then held by the Saxons. After all the ordinary methods of warfare had failed to drive away the Norsemen the bee hives of Chester were brought to the city walls and overturned on the heads of the enemy, who retired in haste.

AN ACCIDENT.

She was 7 whole years old,
So I have been lately told.
But, pray, ma'am, do not listen. 'Twill
but give you such a shock!

She was writing notes to Nell,
If the whole truth I must tell,
And she spilled the whole ink bottle
on her pretty new pink frock.

DOG WINS A FOOTBALL GAME

Members of Columbia Squad Are Inspired by Sight of Canine Attacking Red Hot Poker.

A remarkable turning of a game between the halves occurred at Ithaca in 1905. Cornell led Columbia by six to nothing when the teams returned to the dressing rooms. Columbia had not recovered from a wearing game with Princeton the week before. Many of the men were overtrained. There was a distinct feeling of the hopelessness of it all when the players lay down upon the floor and benches. Only Bill, a white bull terrier mascot, showed signs of liveliness. It was cold in the dressing room and a trainer shook the ashes in the stove. He used a poker, the end of which became red hot. When finally he laid down the metal rod the red whitened, but the heat remained. Bill, deciding that the poker was to be played with like a stick, caught the heated end in his mouth. Instantly his lips seared and turned black. Bill only shook the poker harder. Two men grabbed him and tried to force him to open his mouth. But Bill fought back and finally they had to choke him before he would loosen his grip. It was then that Coach Morley nudged Captain Fisher and pointed to the dog. Catching the idea, Fisher sprang to his feet and built up a speech around Bill. He compared Bill's nerve to the team's and asked the men if they were not ashamed of themselves. His closing sentence was: "Just play for Bill, Bill, Bill!"

When Columbia returned to the field, Bill, yelping furiously, led the way. All through the half the team heard him barking from the side-lines. Said Von Saltza, the big tackle, after the game:

"We heard every yelp, and it simply drove us."

Also, Bill's yelping was so good that Columbia won out, twelve to six.—American Magazine.

EARLY USE OF ICE SKATES

Holland Conceded to Be Birthplace of Skating and Undoubtedly First Practiced There.

To "necessity's sharp pluck," not to a desire for amusement, says the New York Evening Post, we owe the invention of skates and their early use. Holland is conceded to be the home and birthplace of skating, and it was undoubtedly first practiced there and in the far north.

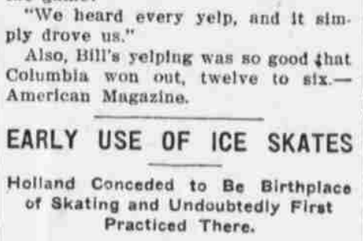
In a country of lakes and canals the necessity of walking and running on the ice must have been felt from the earliest days, and, indeed, they were found in one of the mounds on which a Friesland village was built. The skates were fastened to the feet by straps passed through holes made in the bones. A Danish historian mentions the sport in 1134.

The bone skates were also the kind first used in England. Fitzstephen, in his account of the amusements of the young people on the ice in London during the latter part of the twelfth century, notes that it was usual for them to fasten the leg bones of animals under the soles of their feet, by tying them around their ankles, and then taking a pole, they pushed themselves forward by striking against the ice, and moved with great rapidity.

SKATE BODIES OF ALUMINUM

Lightness Is Added Without Any Loss of Strength by Use of New Metal—Arrangement Is Shown.

Additional lightness without loss of strength has given aluminum a place in the manufacture of skates, a concern in Cleveland making skate bodies of this metal, says the Popular Magazine. A blade of steel about ⅝ inch wide and 1-16 inch thick is inserted in the aluminum. The illustrations show such a body before finishing, and a completed skate with blade in position.



Skates of Aluminum.

Playing Lady.

I have my best ne wbonnet on;
I've ribbons in my hair;
My skirt is very, very long,
And I'm grown up for fair.

VARIOUS AGENCIES CONCERNED IN FORMATION OF THE SOIL

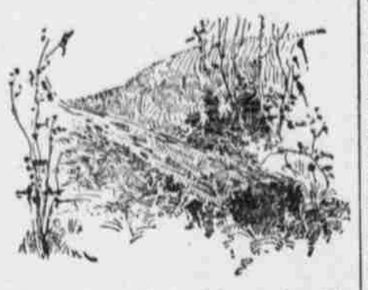
Two Things Suggested to Farmer to Prevent Exhaustion of Fertility—First Is to Assist Nature by Means of Good Tillage and Second Is Use of Manure and Fertilizers.

(By ALFRED VIVIAN.)

Vegetation begins with the very simplest forms of plants, such as lichens and mosses, and is, of course, very scanty at first. These plants on dying become a part of the soil, all of the plant nutrients used by them being thus returned.

Food that has once been used by plants is very readily made available to succeeding crops through the process of decay. The soil is now able to produce a larger crop, as it contains the plant food in the previous growth in addition to that added through the agencies detailed above.

In this way the growth gradually becomes more abundant. The plants upon decaying give rise to humus, and this increases the fertility of the land both by being a source of plant food and by increasing the water-retaining power. Humus is a very important factor in fertility. During the decomposition of the plants, acid sub-



Nature's method of increasing the humus and soil fertility. Notice the rotten log and leaves decaying, thus returning plant food to the soil.

stances are formed which act upon the rocks in such a way as to make more of the plant food available.

One of the products of decay or fermentation is carbonic acid gas, and this is dissolved in the soil water, and this gas-containing water is an important help in disintegrating the rocks.

As the nutritive materials increase from these various causes the lower simpler forms of plant life are gradually replaced by those which are more highly organized.

With the advent of plants, like our common crops, which bear roots, other factors in the formation of soils are introduced. The roots secrete an acid substance that has a solvent effect on the mineral matter of the soil, and the roots themselves also assist mechanically in breaking down the rocks.

All are familiar with the tremendous force exerted by plants in breaking apart rocks and stones if once their tender rootlets obtain a foothold in a crevice.

The roots penetrate the soil sometimes to great depths, and, as they decay after the death of the plant, they leave little channels in the soil which serve to carry down water laden with carbonic acid, as well as to introduce the oxygen of the air, that, in its turn, is a factor in bringing about chemical changes in the soil, which assist in making plant food available.

Sooner or later in the process of soil formation, plants of the pulse family (leguminous plants), such as clover, vetches, lupines, etc., are introduced.

If you dig up some of these plants you will find little nodules or tubercles on their roots. These nodules are the homes of numerous bacteria, which enable the plants to derive part of their food from the nitrogen of the atmosphere.

This peculiar property of leguminous plants is of great importance, for it is undoubtedly nature's principal method of increasing the supply of nitrogen in the ground.

It will readily be understood that the various agencies concerned in the formation of the soil do not act separately nor necessarily in any such order as that in which they have been discussed.

As a matter of fact all the processes described take place simultaneously. The lower plants do not wait for the rocks to be pulverized, for we see such organisms as the lichens growing on rocks from which one would think it impossible to obtain food.

If the lichen is removed, grooves or furrows will be found on the surface of the stone, due to the action of the plant.

Nor are all soils formed directly from the original rocks, for one of the effects of weathering, etc., is to separate such rocks as the granites into simpler substances, with the result, for example, that huge deposits of limestone are formed in one place, and in another whole hills of sandstone.

The soil is almost constantly moving, for some of the same agencies which form soils are continually carrying them away. Running water grinds the rocks, but at the same time transports the fine particles to lower levels. It cuts deep valleys in the surface of the earth and carries away the debris, depositing it at various distances from its source.

This study of the formation of the soil then suggests two things that the farmer can do to prevent the exhaustion of the fertility.

The first is to so treat the soil as to assist and hasten nature in the process of converting the plant food into available forms by means of good tillage.

The second is to return to the soil by means of manure and fertilizers an amount of plant food equivalent to that removed by the crop.

DAIRY LESSONS AT STATE FAIR

Care Taken By Operator in Handling Milk to Prevent Contamination Was Revelation to Spectators.

(By R. G. WEATHERSTONE.)

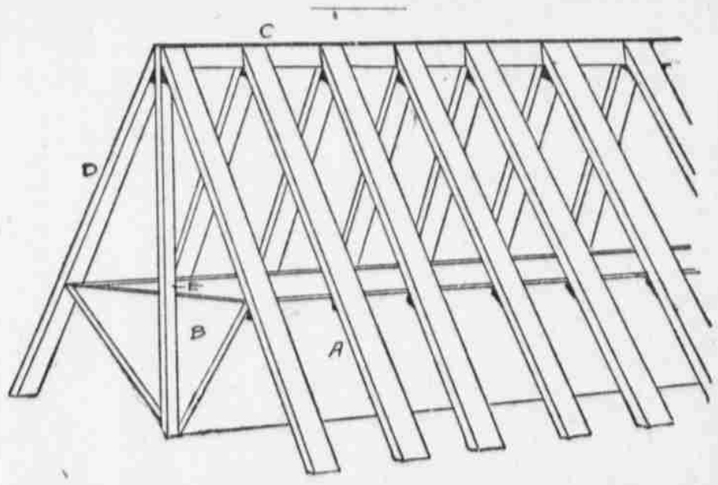
One of the most practical lessons of our state fair this fall was that taught by the state agricultural college which had set up in an amphitheater holding about 1,000 persons, a complete modern dairy. In this dairy all the operations of separating milk, testing it with the Babcock tester and making butter were performed daily and the amphitheater was never large enough to hold the interested crowds.

The care taken by the operator to prevent contamination of milk and butter was evidently a revelation to many of the farmers and their wives, as exclamations of surprise were frequently heard when the utensils were washed and scrubbed again and again, plunged into hot water and the whole process of butter making gone through without once having been touched by a human hand.

The spectators were for the most part composed of practical dairy workers more or less versed in their business. They asked innumerable questions upon every phase of dairying, often showing almost perfect knowledge of the business; but the operator in charge, a remarkably well informed and alert young man, never failed to give instant and satisfactory reply.

Two demonstrations daily were made in this dairy and during the five days of the fair it is safe to say that 10,000 persons received valuable instruction in the way of object lessons in good dairying.

EFFECTIVE PIG TROUGH GUARD



To prevent hogs getting their feet into trough the arrangement shown above is effective. The width of the side boards depend upon the size of the pigs to be fed. A small trough, with six inch side boards, may be used for the small pigs, and 12 to 16 inch stuff for breeding sows. The size of pieces C and D depend upon the weight of the animals and the strain likely to come on the frame. For pigs of ordinary weight, a piece 2 by 4 inches should be used for the ridge pole C and pieces 1 by 3 or 2 by 2 inches for the guard bars D. These should be securely nailed to the side of the trough in the pig house, spiked to the floor to prevent breaking off. The upright E, firmly spiked to B, secures endwise rigidity. For delivering slop to the trough, a spout or small trough is arranged to enter at the end of the feed trough. With this arrangement, when the distance between the bars has been properly adjusted to the size of the animal, only one can get to the trough between each space, and all sidewise crowding is prevented.