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FARM

Comment upon farming operations invited.

Alfalfa from the Chemist's Standpoint

With the increasing popularity of alfalfa as a fodder Al crop comes an increasing desire to know all about this R plant, which already has done much for agriculture, and which promises to become a most prominent factor Co in improving soil, as well as in providing desirable Oa feeding material in large quantities. At an Institute Al meeting at Fort Atkinson, Wisconsin, Prof. E. B. Hart, in discussing the chemical value of alfalfa, gave W figures that place this crop very high in the list of those commonly used in feeding stock. Dealing with economic values, the Professor, touching on useful and non-useful or digestible and non-digestible constituents, showed that proteids in particular were necessary for life, for the building up of the animal, for fleshforming, and for taking part in all living processes It rests upon this fact, that when the alfalfa is about of the animal body. It is a characteristic that most one-tenth in bloom, or just coming into bloom—the farm crops are low in this material, so low that when time you are advised to cut it—it is then, everything fed alone they do not produce normal development, necessitating so often the purchase of large quantities content is high, sugar and starch content are very of concentrated materials—such as oil meals and wheat high, and the indigestible food fiber, the material that bran—as supplementary feeding materials. There is is of little use to the animal, is relatively low. no trouble on the farm in making plenty of starch, "As the plant grows older the crude fil sugar, fat and crude fiber, but it is a selected crop that is rich in protein.

When a farmer asks of the plant what does it do for me, is it making me an abundance of food material?" says Professor Hart, "he is asking that plant a proper question, but it is only by a proper selection of certain types of plants, whose power to produce protein is a large one, that he has at his command the power of increasing the protein production on his in bloom, it contains 18.5 per cent. of protein; when farm

"Following are the food values of several ordinary farm crops in relation to useful digestible food products:-

			Total	Diges-	
	Yield	Dry o	ligestible	e tible	
	per acre.	matter.	matter.p	orotein	
	Lbs.	Lbs.	Lbs.	Lbs.	
Alfalfa	. 34,100	8,000	5,280	875	
Corn	. 30,000	7,500	5,025	360	
Red Clover	. 18,000	5,200	3,200	491	
Oats and Peas	. 13,000	3,120	2,521	350	
Timothy	. 10,000	3,500	2,000	228	
Rutabaga	. 31,700	3,400	3,000	278	
Mangels	. 25,000	3,500	2,750	213	
Sugar Beets	. 17,800	2,500	1,800	213	

"Although in several cases the total digestible dry matter may be nearly alike, the alfalfa ranks highest among the forage plants in power to produce digestible protein. Even with red clover, which belongs to the same family as that of alfalfa, the yield is not so great, and, consequently, the amount of protein per acre that will be produced is not so large. Can you understand, then, why we emphasize the growing of ents, such as starch, sugar and fats, are likewise in some alfalfa? When we follow the table further we higher proportion in the leaves than in the stems. find that sugar beets, mangels and rutabagas, under but when you have 100 parts of crude fiber in the areas. Consequently, when the leaves and debris favorable conditions, often yield as much digestible dry stem, an equal weight of leaves will contain but about from this plant accumulate on the surface of the soil, matter as alfalfa or corn per acre, but with a com-paratively low content of digestible protein. There is nothing in the forage line that equals alfalfa in this coming into bloom is good philosophy, because it is tain amount of potash, phosphoric acid and nitrogen respect.

for protein would stand:-

hay is worth

Feedstuffs	\$3	per ton.
Alfalfa Hay (average)		\$ 9.08
Red Clover Hay		5.82
Timothy Hay		2.48
Corn Fodder (stover)		1.71
Oat Straw		1.37
Alfalfa Hay, containing 12.9% digestil	ole	
protein		11.05
Wheat Bran		10.53

CUTTING AND CURING ALFALFA

"Others have told you all about cutting and curing this great crop, but I want to give a few chemical reasons for the procedure that should be followed in the cutting of alfalfa. It rests on a chemical basis. considered, at its highest feeding value. Its protein

"As the plant grows older, the crude fiber increases in amount at the expense of the sugar and starch, until you have, approximately, 2,500 pounds per acre of this indigestible material, while if you had cut it back at the proper time the amount of fiber would have been materially smaller. So this is the point I want to emphasize to you, that there is a chemical reason, and a very good one, for cutting your alfalfa in the early stages of bloom. When one-tenth one-half in bloom, 17.2; while in full bloom its con-

tent of protein is 14.4.

The comparative relation of leaf to stem is greatest in the early part of the plant's history; at that time, for example, for 10 parts by weight of stem there is 73 parts by weight of leaves. In the late stages for every 100 parts by weight of stem there is approximately 49 parts by weight of leaves, and the leaves are the best part of the plant. It is in the early stage of the plant's growth that your cow or your pig will find in this plant its highest nutritive value. the plants keep growing its stem parts are increasing in greater proportion than is the increase in the leaf content, and in the early history of the plant the proportion of stem to leaf is less than it is in the later history of the plant. The reason I emphasize is this that the leaf is the most nutritive part of the plant, and contains a large portion of the protein.

"For instance, for 100 parts of protein found in the stem, in an equal weight of leaves you will find 250 parts of protein. The very useful nutritive constituents, such as starch, sugar and fats, are likewise in richest then in its most useful constituents, and the which act in a measure as a top dressing. Conseproportion of leaf is greatest to the stem-a fact never quently, when you break up an alfalfa sod and plant to be lost sight of because of the high nutritive value it to wheat, oats, potatoes, or corn, you generally have of the leaf.

"I have emphasized the great productive power of and the more water the greater the proportion that alfalfa. If we should allow, for example, on the basis dissolves out. So in making alfalfa hay, it should al-of their protein content, three dollars per ton for ways be urged that, after all the difficulty of getting prairie hay, what would be the value of some of our the crop to the stage of cutting, the greatest care other feeds? On such basis the comparative values should be exercised in proper curing. It is a waste of time and money not to do this. Below are some to do this time and money not to do this. Below are some figures Value per ton that actually show what will happen to alfalfa under when prairie the action of rain :----

Hay	not damaged.	Hay damaged
Ash	12.2%	12. 707
Crude Fiber	26.5%	38 807
Ether Extract	3.9%	3 807
Nitrogen Free		0.070
Extract	38.7%	33 607
Protein	18.7%	11 007
"This table shows	how the h	11.070

"This table shows how the hay was damaged and the losses it sustained. It shows that the hay that was damaged has practically lost in such things as the sugar and starch; the things that easily pass into solution, and that the protein content has been very materially reduced by the exposure. Under the best conditions of handling your crop, you will probably lose one-fifth of its weight by loss of leaves, so that if you have a five-ton crop, you will probably lose one ton, which is left on the acre of soil. Care, then, in its mechanical handling should be given proper consideration.'

ENRICHING THE SOIL

The question of benefit to the soil in adding nitrogen, and in bringing other plant foods from the deeper soil nearer to the surface also was discussed In this regard, the Professor said:-

"I have not any data at hand to show exactly what alfalfa will do in adding nitrogen to your soil, but I have some data on clover, a plant belonging to the same family as alfalfa, which will do. Remember this principle, farmers, a plant grows because it gets its food from the soil, and the food materials that are most liable to be lacking in our ordinary soils are nitrogen, phosphoric acid and potash. This class of plants, to which the alfalfa belongs, has the power of taking its nitrogen from the air, and, consequently, builds itself without drawing upon the source of "Another interesting feature about this alfalfa nitrogen in the soil. As a matter of fact, it leaves plant is the relation of the stem part to the leaf part. through its stubble and roots an increased quantity of through its stubble and roots an increased quantity of nitrogen in the soil.

"Here is a table showing what a member of the legume family, one of the clovers, did for a soil at a Canadian Experiment Station:-

	Contraction of Contra	Lb	S.	per acre.
Before experiment				533
After two years				708
After four years				742
After five years				841
Increase in five years				308

'The soil content at the beginning of the experiment contained 533 pounds of nitrogen per acre. After growing the crop for five years, and then subjecting the soil to another analysis, it was found that it had actually increased the content of the nitrogen by some In this same class lies 300 pounds per acre. alfalfa, with its power of enriching the soil by adding nitrogen

'Another point is that by its long root system it feeds deeply and secures its food from the lower soil increased growth, due in part to having increased the upper layers of a soil which the plant food elements brought from the lower depths. "By this accumulation near the surface, such substances as potash and phosphoric acid are brought useful materials dissolve in the water and run away; come from the vast sources of nitrogen in the atmos-

Founded 1866

It was claimed that five tons of well-cured alfalfa hay contained about the same amount of protein as forty tons of timothy hay, and also about the same as four and a half tons of bran. When it is considered that bran runs from \$20 to \$25 per ton, the value of alfalfa looms large.

"In the State of Wisconsin," said the speaker, "farmers spend as high as one million dollars for wheat bran every year. This is a conservative esti- sugar dissolved out. The sugar has simply been taken the soil with those plant food elements necessary for mate, and the fact that you buy wheat bran and other into solution by the water. This is also true of other the crops that follow. But I do not want you to beconcentrates, like cottonseed meal and linseed meal, for their protein content, emphasizes the importance of the high place alfalfa should take among the feeding material grown on the farm.

The use of the cap in curing alfalfa hay also was "This point," he urged advised by Professor Hart. rests upon a chemical basis. When you grow sugar beets and harvest them and take them to the factory, they are ground, placed in water, macerated, and the from the deeper layers and enrich the upper layers of plant tissues. There is not a plant grown that does lieve that alfalfa, or any legume, is a panacea for the not suffer some deterioration by water-soaking. The restoration of all soil fertility. Alfalfa obtains part more easily soluble, and, often, consequently, the most of its nutrition from the soil, while a part of it does



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