Agricultural Experimentation in Box Butte County

PROF. E. W. HUNT, DIRECTOR

CONSERVATION OF FERTILITY

Address of Prof. E. W. Hunt at Nebraska State Fair, Sept. 8, 1909:

I wish to call your attention to what seems to me to be the gravest economic problem now before the people of this state. We are confronted by other problems grave enough. Our social, our commercial, our industrial life each presents problems which tax to the limit the capacity of our keenest, deepest, most capable thinkers. The public press, the magazines teem with discussions of them; learned proffesors study them and lecture about them, and the public mind is kept in a continual ferment over the right solution of them. Tariff revision up or down, corporation tax, income tax, railroad and passenger rates, the control by the state of corporations created by the law of the state, have the women a right to the ballot, and if they have, is it best for them to exercise that right. These are some of the problems now engaging the public mind. I present to you today a problem greater and graver than them all. These problems affect only the mode of our life. The problem I bring to you affects the life itself. Unless the problem that I present to you is successfully solved, the time will come when we shall have no need to discuss these other problems, for we shall have ceased to be.

Agriculture is the basis of all our life. It furnishes all our other industries, it supplies all our other activities. Let agriculture cease and in a short time every wheel of industry would cease to turn, every business house would close, and the whole social fabric would crumble and fall. Agriculture feeds and clothes the world, and without it the world would go naked and starve. The prosperity of the world depends upon the prosperity of agriculture. The prosperity of agriculture depends upon maintaining the fertility of the soil, upon preserving undiminished the capacity of the earth to yield its increase. The problem of maintaining the fertility of the soil thus becomes the master problem of them all, affecting not alone the future weal or woe, but the very life itself, of the state.

God made Nebraska marvellously productive. He gave her advantages of soil and climate such as few other states have possessed. It used to be said that if you would tickle her soil with a hoe it would laugh with a harvest. The prodigality of nature was everywhere apparent. All that was needed to make it a perpetual well-spring of the necessities and luxuries of life was a careful husbanding of its imperial resources. But we have abused our privileges. The prodigality of nature has been more than matched by our prodigality of waste. We have assumed in direct opposition to the experience of all times and of all peoples, that the fertility of our soil was inexhaustible. The Americans have become the greatest soil robbers on the face of the earth except the Russians. Japan with a volcanic island inhospitable to agriculture maintains a population many times denser than ours, and yet her refractory soil is becoming year by year more productive. China has kept intact the fertility of her marvellous valleys since before the dawn of history. The soil of Germany is richer and more productive than it was a thousand years ago. In America the observer of economic life has a far different story to tell. In New England, the gradual impoverishment of the soil has driven the greater part of the rural population into industrial life, and the farm houses are being turned into sweat shops for the urban manufacturers. Abandoned farms may there be bought for less than one half of the cost of the improvements on them. The middle states are passing through a similar experience. Ohio, Indiana, Illinois, have felt the drain upon their soils. The line of soil exhaustion has been marching steadily west for a hundred years. It has reached us and its menacing shadow stretches across our state.

This is no time for buncome. We must look the facts squarely in the face. It is not long since a high dignitary of the nation asserted that our soil was not in process of being exhausted, and attempted to prove his statement by wrenching statistics out of their proper relation, and there was in our own state a chattering echo that the myth of soil exhaustion was at last exploded.

It will take only a moment and a little cerebral activity to settle that matter. Plants in order to grow have to build new plant tissues. In order to build new plant tissues they must have material out of which to build them. You can not make something out of nothing; neither can plants. Chemistry shows us that this material out of which plants build their new tissues comes, part of it from the air and the rest from the soil. If what is taken from the soil is not returned to it there will be less remaining in the soil than there was in the beginning. If this process is continued long enough this material will become exhausted. In the older settled portions of this state this drain upon the resources of the soil is already painfully evident.

This material for plant tissue, this plant food, is not the soil itself, but is contained in the soil, just as the 87 per cent of water in milk contains the 13 per cent of nutrient matter. The average crop takes from this plant food in the soil from every acre from 50 to 70 pounds of nitrogen, about 20 pounds of phosphoric acid, and from 30 to 50 pounds of potash. This has been going on in the older settled parts of the state for nearly 50 years, and in newer parts a correspondingly less time. Very little attempt has been made to return any of this material to the soil from which it came. Will any intelligent person claim that there is as much plant food in the soil after 50 years of soil robbery as there was in the beginning? No, and we have no argument with any other. Our soil is wearing out. The fact is evident. Even "the wayfaring man, though a fool, need not err" in this matter. We can no longer raise the crops we used to raise. We are face to face with an approaching crisis. This process of soil robbery must be arrested at any cost, for it threatens the source of all our prosperity.

And it can be arrested. There is no need that it should continue. I believe that this marvelous soil of ours may be continuously cropped and its productivity and its fertility be increased at the same time. Let me explain to you briefly how it may be done. By a wonderful economy of nature, animals make comparatively little use of plant food. The part of the plant that an animal uses is for the most part the part that the plant took, not from the soil, but from the air. If, then, the crop be fed in its entirety to animals they will return in their excretions what they cannot use. In these excretions will be found the major part of what the crop took from the soil. If these are carefully preserved and returned to the soil, there will be returned 95 per cent of what the crop took from the soil. The other 5 per cent and much more may be gained by the use of legumes in rotation. In this way the fertility of the soil may not only be kept intact, but may be actually increased.

The question naturally arises, "If the farmer feeds all he raises to live-stock, and markets nothing but live-stock, where will the world gets its cereals for foods?" Before I attempt to answer this objection let me cite a few facts. Whenever a farmer hauls a load of grain to an elevator he hauls the best part of his farm there. In every load of grain there is a certain definite amount of plant food, so many pounds of nitrogen, so much phosphoric acid, so much potash. These plant foods have a definite market value. If you take an average of the prices paid for grain during the last ten years, and the average price at which these plant foods have been sold during the same time, and compare them you will be astonished by the facts shown. The truth is that during this time the average farmer has sold his average crop for less than the plant food that is in the crop would cost him if he bought it in the general market. If you regard the fertility that is in the soil as a part of the farmer's assets, and that is the way in which it should be regarded, he has sold his grain during this time at an actual loss. Is it fair to ask him to continue to market his crop at a loss? Sometime I hope some inventive genius will invent a process by which plant food may be separated from animal food on the farm, so that the fertility that is in the crop may be kept at home and returned to the soil. Until that times comes, my advice is to market less grain, until the scarcity of supply raises the price to a point where it will pay for the fertility contained in the grain, and the interest on the capital invested, and for labor, and for depreciation, and still leave a margin of profit for the farmer. This is the true economic law of agriculture, and the sooner the farmer takes advantage of it, the better for the soil, the better for the future. Then the farmer can afford every time he markets a load of grain to take back to the farm and return to the soil the equivalent of the plant food that he sells. The British Association for the Advancement of Science at a meeting which closed last week at Winnipeg uttered a solemn warning that the governments of the United States and Canada must adopt a law forcing farmers to put back into the soil a percentage of chemicals extracted annually, or future generations will not have bread to eat. At least so the newspapers report. Unless the farmers of the state adopt the suggestion I have made, the time will come when the alternative advocated by the British association will be forced upon them.

Estimate if you can the enormous waste of plant food that is going on continually under our present system. Most of this waste can never be regained. Some of the corn that the farmer sells goes to the feed yards big and little scattered all over the state. It would not be so bad if this plant food though lost to the farm from which it came were saved for some other farm. But this happens to only a small percentage of it. Most of it is washed to the streams and is lost forever. If this seems unpardonable waste, what shall we say of the almost incomputable amount of cereals that daily go to supply the needs of our cities and towns. Think of the flood of agricultural wealth that is daily pouring from the sewers of our great cities into the insatiate maw of the ocean. Such waste is an economic crime. Must we be reduced to agricultural poverty before we begin to arrest it? In the city where I have been spending the summer they are putting in a system of sewers, with a purification plant, and the fertility from the sewage will be returned to the soil. Let other cities of Nebraska take lessons from this enterprising child of the elevated plateau.

But I am talking to the farmers of Nebraska, and I ask you to arrest this process of waste on your own farms. A little less than a year ago a farmer said to me, "You can have all the manure made in this county and the farmers of the county will help you to load it to take it away." You think this man short-sighted, but how many of our farmers the state over show any better foresight? In one of the wheat growing counties of the state I was told that 95 per cent of the straw piles in the county are annually burned. Less than a month ago I was told in another wheat growing county that fully 75 per cent of the straw piles are burned every year. If we are to give the soil fair treatment, the material in this straw that came from the soil should be returned to the soil. It is an economic crime to burn it. I want to live to see the time when it will be a penitentiary offense to burn a straw pile in the state of Nebraska. All of the waste roughage on every farm should be returned to the soil. It should first be thoroughly decomposed, because the plant food that it contains does not became available for plants until decomposition has passed to its last stages. Unless it is thoroughly decomposed before being applied to the soil it will work detriment in two ways: first, itg decomposition in the soil will rob the soil of moisture needed by the plants, and secondly, it will check the flow of capilary water on which the plants depend. The best place for preparing roughage for the soil is the barn lot, the corral. Bring it there, and let the cattle tramp it. It will absorb and preserve their excrements. Grade about the corral so that no water will rush across it, and put eve troughs on the roofs to convey the roof water away. Then all the water it gets it will get from the skies, and in this state it will generally hold all of that without leaching. Too many corrals are located on a knoll or hill, as if the aim of the farmer were to wash out of it into the streams all the fertility possible, and be rid of it forever. No farmer would think for a minute of piling up his sugar or salt in such a way, exposed to the wash of the rain, and yet the fertility in the corral has of course not as great, but as definite a money value on every farm as either salt or sugar.

Most Nebraska farmers are afraid of the manure heap. They say that it will burn or otherwise injure the land. Of cou.se it will if it is not thoroughly decomposed and rightly applied. But no well rotted manure applied a little at a time and often and thoroughly incorporated with the soil has ever yet injured any land. It has always benefitted it, and will always benefit it. I tell you that your greatest preventive of soil impoverishment and your surest protection against drought lies in the despised, neglected manure heap. It will not only add fertility to your soil, but it will materially increase its water holding capacity. Don't move your stables or your corrals to get away from it, don't haul it to buffalo wallows or sloughs to be rid of it. The time for doing that has long since passed, if it ever was. Give it to your soil which hungers for it. Give back to it what you have taken away, and it will generously repay you.

Another source of serious waste in soil resources is found in negligent and improper methods in cultivation. The plant food that is in the soil is as soluble as either salt or sugar. If it were not so plants could not use it, as they take their food in solution. Every time that water runs on your farm it carries fertility with it. It gullies out and carries away great bodies of the soil itself. Stop this wasting wash. Use your own ingenuity in devising means to prevent it. On one farm they fill the cuts with brush to catch and hold the escaping soil. On another they are planting willows for the same purpose. On all farms they should plow deeper so as to catch and hold more of the rainfall. Two inches of loosened soil will hold a certain amount of water without leaking; six inches will hold three time as much; ten inches will hold three times as much. Stop the wash. It is a serious menace. It works incalculable damage. It has stripped and denuded thousands of acres of as fertile soil as the sun ever shown upon. Our larger streams are constantly eating away our most fertile valleys. Along the Missouri Nebraska is trading farms with Iowa and Missouri every year. The same forces are at work on all our streams. How to prevent this loss constitutes a grave problem for the state, but the first step in the solution of the problem is to arrest and hold the water on the farm, and prevent such excessive feeding of the streams. Nebraska sometimes goes to sleep on her somnolent prairies. But she can also get terribly awake. Let her awake to this robbing of her soil and prevent it, and let every tiller of the soil do his share.

Did you ever think what will be the result if this process of soil depletion is permitted indefinitely to continue? Every year the land will become gradually poorer. Each succeeding generation will wring a scantier livelihood from a slowly dying soil. The time will at last come when it will no longer suffice for their needs. This is no melodramatic dream. Every economist, every serious thinker knows that this result is certain to follow a continuation of our present agricultural methods. A radical change in method must be brought about. Scientific agriculture is in its infancy. The coming true science of agriculture will concern itself less with teaching us how to grow the biggest crops, in other words showing us how to rob the soil more rapidly and systematically, and will devote itself more to maintaining intact, or better still, to replenishing the decreasing fertility of our incomparable soil. To this end every lover of the soil should lend his earnest co-operation.

This is more than a matter of expediency. It is a question of right, of ethics, of patriotism. No man can own more than a life use of the land he calls his own. It is entailed to succeeding generations. Those who are to come after us have a certain indefeasible right to the wealth that is in the soil. The owner receives it in trust for the great unborn future. It is his supreme duty to transmit that trust unimpaired to his successors. The ultimate prosperity of the state depends on his doing this. A recent sociological writer has said that the supreme duty of life is so to live that each generation may be better than its immediate predecessor, better equipped, with better facilities. That supreme duty is yours. See that you exemplify this law in your treatment of the soil.

I sometimes wish that I might come back here after a hundred years to see how Nebraska, with what will then be her teeming population, will be progressing. I should like to contribute, if possible, to her future glory. I should like to help make her children of that future day prosperous and happy. It is in that hope that I have spoken as I have.

"University of the Stomach."

"We need a university of the stomach," said a well known St. Louis physician recently, "with a full set of professors of nutrition, digestion, assimilation and waste, as well as of general physiology, anatomy and general biology, or, better yet, each college and every common school in the land should teach how to take care of the body and how to save the stomach, particularly in the summer months, when carelessness in diet and living renders a person especially liable to disease."

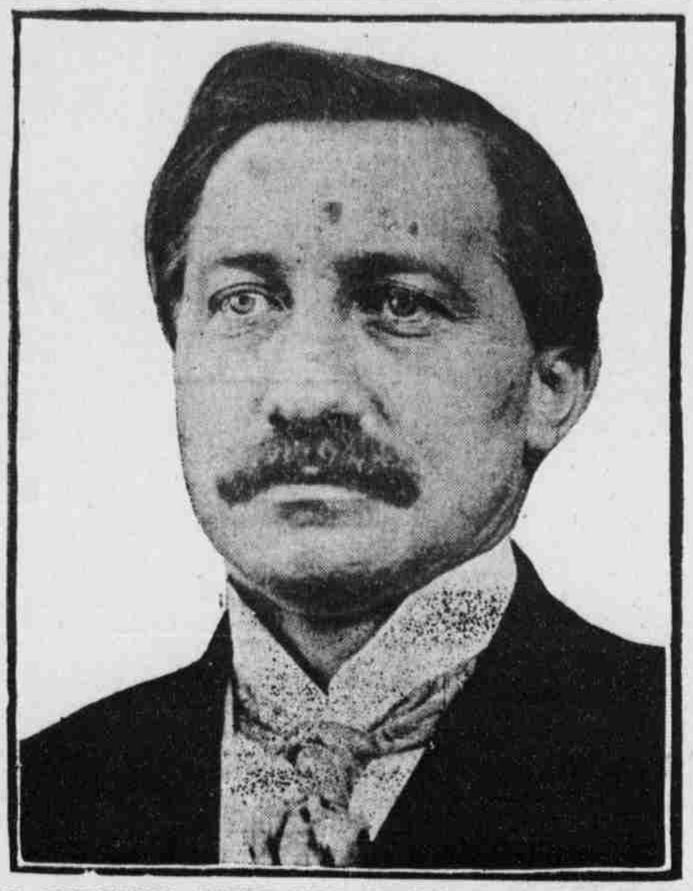
Dr. Cook and His Trip to the Pole

How His New Theory For Penetrating Frozen North Won Him Immortal Fame — Millionaire Bradley His Backer.

Secrecy Surrounded Expedition So as to Thwart His Rival, Peary. He Has Been a Lifelong Adventurer.

By FREDERICK R. TOOMBS.

WHEN the thrilling news was flashed underneath the oceans and across the continents of the world that Dr. Frederick A. Cook of Brooklyn had discovered the north pole it was notification of the greatest scientific achievement of modern times. For decade after decade daring explorers, self sacrificing scientists and steely nerved adventurers of a dozen nations have hurled themselves against the merciless ice barriers of the frozen north in attempts to discover the pole. Decade after decade the same result—failure—has been the only reward for the hardy voyagers who have made the exploits of the famed "hardy Norsemen" of old dwindle into insignificance. It is in words of death, of



DR. FREDERICK ALBERT COOK OF BROOKLYN, WHO DISCOVERED NORTH POLE.

seas. The ice hardened as he got to within fifty miles of the pole. The all prevailing silence and sameness were telling heavily on the tempers of the men. The Eskimos quarreled and threatened to knife one another. The pall of the hidden pole, jealous of the discovery of its long retreat, was working on the brains of its pursuers.

At this time but two Eskimos accompanied him.

On April 21 observations showed Dr. Cook that he was within a few hundred feet of the pole. A few seconds more and he stood upon it, the goal of scores of the world's bravest men, and, planting the American flag, he claimed for the United States over 30,000 square miles of territory—a 30,000 mile section of nature's scrap heap.

News Came From Copenhagen.

The first news of Dr. Cook's discovery to reach America came from the colonial office at Copenhagen, stating that with a few Eskimos, a siedging party, Dr. Cook reached the pole on April 21, 1908.

The Copenhagen authorities had obtained their information in a dispatch from Lerwick, Scotland, which also related that Dr. Cook was returning from the polar seas on the steamship Hans Egede, bound for Denmark.

Dr. Cook, who was surgeon of the first Peary arctic expedition and who is a mountain climber of wide experience, disembarked from the auxiliary schooner yacht John R. Bradley on Aug. 27 with his supplies at Etah, on Smith's sound, latitude 79 degrees north and about 750 miles from the pole. Smith's sound is at the northern extremity of Baffin bay. His idea was to winter somewhere in this general section and early in the spring cross Ellesmere Land and push onward and northward to the pole across the desolate polar sea, whence few men ever returned to tell the tale.

Provisions, clothing and ammunition sufficient for two years were taken ashore from the Bradley. The adventurer's party consisted of one other white man and about a dozen Eskimos. Mrs. Cook, the explorer's wife, accompanied him as far as Etah.

A Secret Expedition.

The Cook expedition was largely a secret one. Mr. Bradley, having a burning desire to have Dr. Cook outstrip Peary to the pole, insisted that no chance should be taken of letting Peary get wind of the venture. In his opinion, Peary, who was already within striking distance of Etah, would hasten his own operations if he heard of Cook's plans and probably secure all the available dogs at Etah, so that Cook would be unable to start over the ice on his sledges. "For those reasons," says Mr. Bradley, "we had succumbed to the strangling grip of the abysmal horrors of the region."

And it was in April that the orbit of the midnight sun carried its brilliant occupant over the horizon. The glitter on the green-white pack ice and the purple tinged bergs was a stimulant to the nerve worn invaders of the grim silence. The dogs began to sicken. Those that dropped dead in the stiffened harness were eagerly devoured by their mates. Thus the team of huskies became self supporting.

A temperature of more than 45 degrees below zero prevailed in spite of the rays of the midnight sun. The day came when but 100 miles of ice pack lay between Dr. Cook and the north pole—on, on, around, up, down, back and again on, circumventing the shifting barriers, outwitting the frozen starvation, of freezing torture and blighted hopes that the story of the search for the pole has been written. And it remained for Dr. Cook in the year 1908 to achieve what had become to be considered the impossible, to accomplish what so many dauntless men had attempted, to win immortal fame by actually penetrating to the north pole.

And also he played a sensational part in a battle of giants in as pretty a story of intense rivalry between strong men as has ever been imagined by the most romantic fictionists. In short, Dr. Cook fulfilled the dearest wish of his financial backer, John R. Bradley, a wealthy New Yorker, who had registered a grim determination that Commander Robert E. Peary should not be the first man to reach the pole. Bradley, a millionaire who has hunted and climbed mountain peaks with Dr. Cook, was confident that Peary could be beaten to the pole. Who was the man to do it? That was the question. Cook? The very man, thought Bradley—the very man to back with a million dollars in cash for such a venture.

And Cook made good.

An Account of the Trip.

During the early part of Dr. Cook's trip into the unknown, where the one certainty was the shadow of death's grim specter, he met with immense herds of big game—musk oxen, bears, etc. His eleven Eskimos and 103 dogs were in prime condition as in February, 1908, from Heiberg island they began a tortuous trek over the mysterious polar sea.

Averaging from ten to fifteen miles a day of progress, week after week passed. Strictest economy in the use of provisions was practiced, of course.

He discovered a large area of hitherto unknown land, seemingly many thousands of square miles in area, and reached the northernmost limit of rocky formation. From that point there stretched before him the gray expanse of the northern polar ocean, dulling to the eye, stupendous to the imagination, but treacherous as the quivering quicksands that softly and surely smother and kill.

Overpowering winds often drove the venturers into caverns or temporary ice huts. The cold was the coldest ever experienced by a white man who afterward lived. In April Dr. Cook was in latitude 85 degrees 31 minutes, longitude 86 degrees 21 minutes. No more land was to be seen. The ice pack was moving with the currents and threatened to sweep him far to the eastward. Change of direction, therefore, was frequently necessary.

On, on, on into the ghastly north plodded man and beast. No more seals nor bears nor even the minute creatures of the sea were seen. Even they