





THE

134

WESTERN FARMER

AND

STOCK GROWER.

BY

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1. The first part of the book is devoted to a general introduction to the subject of the history of the world, and to a description of the various nations and peoples which have inhabited it from the earliest times to the present day.

2. The second part of the book is devoted to a detailed account of the history of the world, from the beginning of the world to the present day, and is divided into several volumes, each of which contains the history of a particular nation or people.

3. The third part of the book is devoted to a description of the various nations and peoples which have inhabited the world from the earliest times to the present day, and is divided into several volumes, each of which contains the history of a particular nation or people.

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10. The tenth part of the book is devoted to a description of the various nations and peoples which have inhabited the world from the earliest times to the present day, and is divided into several volumes, each of which contains the history of a particular nation or people.

PREFACE.

I N apology for presenting this book to the public in face of the fact that the country already seems to be over supplied with farm literature, and other advice that is intended for the amelioration of the condition of the farmer, I am, I think, sensible of the fact that the present emergency growing out of the embarrassing condition of the western farmer demands special attention, and a thorough investigation of all the various subjects that have a relative bearing upon the prosperity of the farmer, as well as all other industrial interests, that are tending more or less directly in developing the material wealth of the west, which is lavished in unstinted measure in a normal condition, for the future growth of a vigorous and powerful nation. A sudden hegira of people from all civilized nations of the earth, suddenly precipitated upon the vast alluvial plains of the west, under new conditions of life, arising from different elements of soil, a changed condition of climate, and new commercial relations to the markets of the world, renders the condition of western life experimental and transient, as well as all the various industries connected with its development and prosperity, uncertain and conditional as to successful results. In adapting all these various elements of national civilization, that have each a peculiarity of its own, to this new condition of life, new ideas, new practices, and new systems of doing business, are necessarily demanded, that will tend to ignore many of the established principles of older states and older countries.

While our country is abundantly supplied with farm literature, it must be a recognized fact, that the larger portion of it has a special adaptation that is peculiar to the older states, and not applicable to the western prairie. It is also a fact that a large portion of our western farm literature originates from

a source necessarily impractical, abounding in theories but wanting in practical value. Successful practical results form the essence of scientific farming. Agricultural writers all over the country, such as never scented the new mown hay under a July sun, or had any appreciation of the real facts connected with farm life, are constantly sowing broad cast, many theories unfounded in fact or practical experience. It is with this understanding of the case that I attempt in this small volume to give some few facts that have at different times been suggested to my mind, from my own practical experience and connection with farm life, for the last twenty-five years, sixteen of which I have spent in the state of Iowa, and during the time taken cognizance of all the various interests in connection with the development of the country. And while I feel a great reluctance in presenting this volume to the scrutiny of an appreciating public, through a mistrust of my own ability to do justice to the various subjects herein treated of, I yet have faith to believe that it contains many facts of much value to the reader to whom it is addressed, and more especially to the inexperienced farmer of the prairie country. The fact of this work being prepared in the few intervals of time occasionally snatched from the active duties of a large farm that necessarily requires my whole time and attention, will account for its fragmentary and incomplete form. As much of this book is composed of articles previously designed for newspaper articles only, and essays on different subjects designed only for publication in our state agricultural reports, a repetition of various facts and arguments will necessarily occur that might otherwise have been avoided. While perhaps a portion of this work might be considered well adapted to the common reader, it is more especially devoted to that cause and avocation which at the present time, especially in the west, stands begging at the back door of commerce, while nearly all other interests enter in at the front door, and receive full protection that guarantees their prosperity. In the ideas herein presented that are deductions from the so called sciences, I have taken special pains to divest them of all technicalities and clothe them in such language as will make them easily comprehended by any one of ordinary education.

BY THE AUTHOR.

CHAPTER I.

INTRODUCTORY.

NEW facts and discoveries in physical nature which are constantly opening up new fields of thought and investigation, tend to develop new theories, new systems of education, and new principles of hygienic practice. The natural tendency of the conservative mind of man, is to run in a rut; in the beaten path that so clearly proves the saying that every man is only a quotation of some other man; and ideas however obsolete they may be, are entertained in opposition to established facts. The isolated farmer in his tread-mill round of duties is more essentially under a cloud of darkness through the respect of ideas and practices of a by-gone age, than any other class of people. The position of the farmer in the absence of any system of organization among the masses, is one easily taken advantage of by combinations of capital that are at all times tending to impoverish the farmer and reduce the avocation to one of mere drudgery, and dependence upon what seems to be a higher power, that holds in serfdom and bondage the very life of the farmer. This condition of the farmer should not and need not exist. The farmer, especially in this country that is

famous for the universal spread of literature among the masses, has ready at hand all available means furnished for the amelioration of his condition, if such means are only made available.

The farming class are in the majority and have the requisite power in their hands to elevate their position in the scale of humanity, if that power is properly brought to bear in their own behalf. But so long as our legislatures are made up of men selected from the professions of other callings in life, that naturally tend to alienate their minds from the industrial classes, they by a common principle of nature having no sympathy in common with the farmer, cannot be expected to do justice to the farmer. Their own aggrandizement is the idea uppermost in their minds, while any claims that the farming community or industrial classes may have upon their attention, are very carelessly investigated, or entirely ignored for the benefit of monied monopolies that are in constant attendance during their sessions holding out various temptations of reward for special as well as general enactments in their favor. Under this condition of things the farmer is called upon to foot the bills, that other interests may rejoice in the sunshine of prosperity.

While this is a fact in connection with our state legislatures to a greater or less extent, it is an established principle of our national legislature. The many monied corporations that are gradually but surely advancing and extending their power over the country, are all well calculated to control the various branches of our civil government, in their

behalf and prosperity, and thus place the heel of despotism upon the industrial classes, and more especially the agriculturist. It is through concert of action only on the part of the farming portion of the American people, that any obstacle can be interposed to the progress of corporate and individual aggrandizement of monied progress, to the detriment and enslavement of the masses. This principle pertaining to the government of all nations, in all ages, is more especially becoming notorious in the civil and political policy of the American government in the last few years.

And while this principle is fast gaining a foothold in our civil government, it is a principle at all times existing independent of any political party that may happen to have the ascendancy in the nation. Political revolutions while held out by the demagogue, the office seeker, and the outs that want to get in, as the true panacea for all the evils that are apparently made to exist; is always a dangerous expedient, and not usually attended with any promised good results. The inherent principle of all governments, from that of the most primeval or patriarchal through the most simple form of district, to that of township, county, state, and national, is a natural tendency to usurp authority by the strong over the weak, the wise over the ignorant. This principle of constant usurpation of power is the Alpha and Omega of all the sins connected with all forms of government.

The farmer, all-powerful in his natural position in the scale of humanity, is without power, without

protection, and without his due measure of justice, for want of proper concentration of forces, for want of proper organization, and directness in effort, and for want of a proper realization of the natural advantages given him.

Less hard labor bodily, and more thought, more discipline of the mind, more concert of action, a higher social position in community, more time spent in reading and investigation of all subjects and sciences pertaining to his calling, should be the motto of every farmer as well as mechanic and artisan. In this lies the road to his success and prosperity. On the farm is the true laboratory for the development of mind in man. It is here that nearly all prominent men in the world have had their earlier training, that was so necessary for the development of mind and body, that gave them power for future usefulness in the world. It is here that the mind, body, and habits of youth, are given a healthy development, untrammelled and undefiled by the many pernicious practices and conventionalisms pertaining to a village or city life. While the natural butterfly of the country amuses the child, with no contaminating influences, the fashionable butterfly of the village or city is developed from a moth that eats at the very vitals of social life, and imparts a poison to all surrounding social life. This moth of false pride finds its home in the families of farmers occasionally, much to their detriment in prosperity, and is fostered by shallow minded people in all callings in life. Although the invention of machinery has done much to ameliorate the condition of the farmer

in the past few years, and promises much in the future, still the axioms of Dr. Franklin in his day are just as applicable to the present age and condition of the farmer, "He by the plow to thrive, must himself either hold or drive." He must be there. Eternal vigilance, constant care and watchfulness, temperate habits, persevering industry, close economy of time, as well as money, a constant and faithful working for some definite object, with some pre-conceived plan of operations, and a faithful attention to all the details necessary for a final success, are some of the principles that are essential to prosperity in farming, as well as other callings in life. No farmer can afford to grope along in ignorance, or do without two or three good agricultural papers. While there is much that is written in these papers of little or no value, there is at the same time much that is of great value, even to the most intelligent and experienced farmer, and it frequently occurs that the value of one little article to the farmer will more than pay the subscription price of the paper.

CHAPTER II.

NATURAL FEATURES OF THE WEST.

THE continent is born of the sea. In the grand systems of evolution and change constantly going on in connection with the earth's surface, is manifested the active life principle of all terrestrial matter. The development of vegetable life from the most simple organic structure to that of a higher order in plant life, which culminates in the stately forest tree; the development of animal life in the ocean bed, from the lowest organic structure of the molusk up through the various forms of crustaceous life, to that of the whale; and the development of the higher order of animal life from the creeping land insect up through the great chain that culminates in man, are all characteristic of the vital principle of the earth's changing conditions.

The bed of the sea furnishes a grand laboratory of organic life, which by the accumulation and deposit of crustaceous animal matter with mineral substances that are so blended as to form a basis of a higher order of life that obtains on the future continent. Through countless ages this accumulation in the ocean's bed is carried on through an established law. Hence we find in the soil so elaborated

from the ocean's bed to form the basis of a continent, different formations that have each a special adaptation to vegetable as well as animal life. The drift formations of our continent we find better adapted to a higher order of vegetable life, and are more generally characterized by the growth of timber. Animal life in a normal condition obtains a higher development on the drift formations, from the fact of more congenial elements of the soil. The finer or lower sedimentary deposits being more simple in their nature, have their natural adaptation to a more simple form of vegetable life, and are usually characterized by the absence of timber. It is directly with these two formations that we have to deal, in showing up the natural adaptability of the western prairie. The whole formation of the prairie country of the west, writes plainly and legibly the fact, that at no very far distant period of the earth's existence this whole country was in a condition of entire submergence. Aside from the boulders of granite rock that were detached from their native beds in the volcanic regions of the north and west, and carried by the ever moving iceberg, always tending to a warmer climate, and depositing on its way whatever of solid matter, as appendages, that it may have carried with it, there is no formation but that characterized as sedimentary, which forms the basis of the soil of the great Mississippi valley. The limestone formations in this whole country are all characterized by the evidence of a common crustaceous origin, while the few sandstone deposits, limited to the more elevated or drift form-

ation, are all characterized by the simple deposit of sand, usually in horizontal strata. The absence of timber on the great plains of the west, is doubtless owing, first, to the nature of the soil not being specially adapted to timber growth, from its peculiar geological composition; and second, from the fact of the newness of the country, it not being developed by time through the chemical forces of nature that would eventually have fitted it for a higher order of vegetable life, and encumbered the ground with timber instead of the simple form of vegetable life, in the character of the wild grass that covers the face of the country and renders the scenery so monotonous to the traveler. The absence of timber on the prairies is by some thought to be caused by the dry climate of the country. In answer to such I will refer them to the region of the Sierra Nevada mountains, in a climate where about one half the rain falls that we get here. In this dry climate of California, where the average rain fall is about eighteen to twenty inches, and no rain for six months of every year, a greater growth of timber is found on the same area of land than on any other portion of the earth's surface. We find on the drift formation of the western country, various kinds of timber are covering the ground and making an active and healthy growth, and spreading from year to year wherever a congenial soil is found. The western farmer, by imitating nature and growing fruit trees on such land, will be aided in his efforts and meet with greater success in growing fruit. While certain soils of the west seem to be adapted

to most any kind of timber or fruit trees, other soils have their special likings, and interpose an objection at once to the efforts of the tree planter. While certain kinds of timber seem to be well adapted to all of our prairie soil, and make a healthy growth, other kinds will only succeed in certain soils peculiarly adapted to their nature; and only by observing these different peculiarities of the soil, will the farmer make a success in tree planting or fruit growing. And while we are in a measure restricted in tree planting and fruit growing, by the natural elements of soil and climate of the western prairie, it is no less a fact that the same principle applies in grain raising as well as all other farm crops. While one person on a certain quality of land will make a success in growing pears or any other kind of fruit, he is quite apt to think that another can do the same without any regard to the prerequisites of success that are found in the soil, but not generally understood, even by the successful fruit grower. So another in growing a wheat crop is greatly elated at a certain success of his own, or some other person, and invests largely in that crop, often to his great loss and disappointment.

FRUIT GROWING AND TREE PLANTING.

This subject is one perhaps that demands the attention of the western farmer as well as horticulturalist, in advance of any other subject, as connected with the general welfare of the people of the west. In presenting this subject for investigation, it be-

comes quite important to have something tangible to the mind as a basis to predicate theories and assertions, otherwise any theories that we may set up will only pass as theories, and give no satisfactory proof to those seeking this information. In the great versatility of soil and climate pertaining to the western portions of America, is found a corresponding versatility in the spontaneous productions of the country; and in the introduction of the various plants, trees and vegetables for cultivation, as well as the different domestic animals so necessary for the advancement of civilization, as well as the support of the various industries of the people, we must necessarily observe all these natural conditions and elements that will surely control and have a material bearing in the success of the agriculturist. The best means of opening up this subject in its true light, and presenting it to the mind understandingly, are found in the fact that certain sections of country under certain conditions of soil and climate, are found to produce certain articles, and all countries have a limit in their variety of productions, either naturally or artificially. For a subject in contrast we will refer to the Pacific coast, in the same latitude of the western states, including California and portions of Oregon. As some of my readers are supposed to be ignorant of the phenomena and general appearance of the country, a few words by way of description become necessary:

The first appearance of the country will naturally indicate a soil entirely different from that of any portion east of the Rocky mountains, and presents

the appearance of barrenness, or an almost entire absence of organic matter which forms the soil of the western prairie. A reddish cast to the soil of the whole country denotes the volcanic nature of the soil, and during a large portion of the year, for the want of seasonable rains, the general appearance of the country would indicate a vast desert, with no signs of vegetable life except in the timber that covers the mountains and gives relief to the monotony, by its evergreen foliage. This whole country, extending east to the Rocky mountains, a distance of about one thousand miles, is all of very nearly the same appearance and same character, denoting volcanic agency in its upheaval into mountain peaks and mountain ranges, with now and then a narrow strip of land in the shape of river bottom, that winds around between the mountains. These river bottoms of alluvial soil that have been formed from the decay and decomposition of the rock of the mountain, and generally impregnated with alkaline substances as well as various mineral matter that gives the soil a strong mineral basis, are found to be the richest soils, probably, on the globe. But that word "rich," when applied to soils, has only a relative signification. While these volcanic soils are rich, it is usually in the elements of various minerals of which it is composed, and almost destitute of organic matter. Where sufficient moisture can be obtained to produce a crop, no country in the world can grow a more abundant crop. But as the arable portion of the country is quite limited, and consists of these alluvial soils, or what might be

called drift soils, the larger portion of the country is not capable of producing vegetation, except in the form of the vast forest trees that usually cover the mountains, and throw their roots down to the bed rock for sustenance and moisture. In noticing the adaptation of this mineral or volcanic soil of California, we find it peculiarly adapted to all kinds of fruit trees, and the staple crop of the country naturally consists of fruit, which is grown with so little care that it becomes almost a spontaneous product of the country. In addition to fruit, in such seasons as the winter rains favor a crop of wheat so that it can be advanced in its growth through the winter and spring, and come to maturity, a full crop is produced; and what is understood by a full crop is fifty to sixty bushels per acre of a quality that is not surpassed anywhere on the globe. But these wheat lands are the alluvial lands, and not very extensive. Barley is also produced successfully on these wheat lands. There are also in California, tule lands, so called from their growth of a coarse grass, or rush, called tule. These are of the nature of swamp lands, bordering the large rivers, which overflow and produce rank vegetation on these low lands, and by that means accumulate organic matter, which forms a muck soil quite similar to river bottom lands on the western prairie. By draining these swamp lands at such part of the season as the water becomes low in the rivers, corn is raised, and most garden vegetables, such as turnips, cabbage, onions, &c. These lands are richer than our western bottom lands, from the fact of having the wash

of mineral matter from the mountains, and consequently contain a great variety of elements that fit them for producing such vegetables as seem like Gulliver stories, when we hear the account of them. But these lands are only garden patches, comparatively, and not extensive. The remarkable character of the timber in the volcanic regions of the west, is again indicative of the basis of the soil. Mostly evergreen, but very dense and compact in fibre, and comparatively very heavy for its bulk; the live-oaks usually small, dense and compact in fibre, with a strength and hardness nearly equal to iron. The small undergrowth of various kinds, in the form of shrubs, that is found through this mountainous country, is hard and brittle, and like the forest trees, contain oil and resin as a sap principle, instead of water, and for that reason burn more readily when green. The scant herbage in the shape of a dwarfed wild grass that starts with the winter rains, makes feed for stock the latter part of winter and fore part of summer, but dries up and becomes dead in the latter part of the season. The soil, climate, and rich quality of feed of this region, are peculiarly adapted to the nature of the merino sheep. It is their natural home, and sheep husbandry is the most profitable business connected with this country, if properly managed. The scarcity of feed requires a constant traveling from one place to another, which was the original habit of the merino. Some of the severe dry seasons have caught the California herdsmen overstocked, and brought great loss and disaster to their flocks.

To return from this mountain scenery to the western prairie, and take a retrospective view of this region extending for a thousand miles east of the base of the Rocky mountains, and about a thousand miles north and south, and we behold what was at no far distant period of time in the world's history, the bed of the sea, which is still unbroken by any upheaval of volcanic action, or other cause, to displace the original strata of sedimentary and drift deposits, that are the special geological formation of this extended garden of the world. The extensive fine sand deposits along the eastern base of the Rocky mountains indicate the western shore of this body of water, and the beating waves of many centuries were the means of these extensive fields of sand deposited as drift in contradistinction to the sedimentary formations that characterize the alluvial soil of the prairies farther east, or more especially in the vicinity of the Mississippi river.

The gradual receding of the waters southward, as this vast country was elevated from the ocean's bed, has left the action of the waves plainly delineated in the drift deposits so created in various places on the western prairie. The receding wave to the southward, brought in its train the various rivers that have followed in the rear, and which continue to drain the country as well as point out the course taken by the receding waters. The immense bed of sand on the west is being drifted down by the muddy waters of the Missouri and its tributaries, which, with the aid of the Mississippi, Ohio, and other converging streams, are fast filling up the gulf

below, and constantly adding new territory in the form of the drift deposits that constitute the basis of a large portion of the southern states.

This vast field of alluvial soil covering the western prairie, is remarkable for the entire absence of any volcanic agency that characterizes the whole mountain regions on the west. In the fact of these two extensive fields, composed of a soil wholly unlike each other in their constituent elements, of a different climate, in the same latitude, and all other surrounding conditions so various, we find a basis for illustrating the principle of natural adaptation of different soils, and the varying influence of climate, that probably cannot be found anywhere else on the globe in such entire contrast.

The high and extended range of the Sierra Nevada mountains forms a barrier against the balmy breezes of the Pacific, that produces the remarkable climate of California. The Rocky mountain range on the east forms an equal barrier to the searching winds of the western prairie, also the trade winds of the south-east, that furnish us our periodical rains in spring and fall, and give fertility to the western prairie.

The great interior country of the mountains between the Rocky mountain range and the Sierra Nevada range, cut off from either the western winds or eastern winds, that carry moisture and furnish the rainy season, is unprovided with rain to such an extent as to cause almost entire sterility to the soil of this region of country. The great distance of the western prairie country from any large body of

water to modify the extremes of heat and cold, leaves it subject to these two extremes, which are the most remarkable features of the western prairie.

This vast field of volcanic country on the west, limited in its productions as it is, can never support a dense population, nor increase her population beyond a certain limit, except by the aid of cheap transportation, for the interchange of products with their neighbors east of the mountains. On the other hand, the immense surplus of agricultural products that will ever be seeking an outlet from the western prairie, can be, with proper facilities for transportation, exchanged to some extent, with the mountain districts of the west. The great surplus of fruit that can be raised in such great variety at so little cost and trouble in California, will always be seeking a market away from home, and will find a market to a greater or less extent among the vast population of the western prairie states.

CHAPTER III.

THE PRESENT CONDITION OF THE WEST.

I N the sudden migration of humanity from the countries of Europe, as well as from the Atlantic and middle states of the union, to the vast inviting fields of the west, so rich in agricultural resources, the records of history fail to give us any parallel in the past. This vast multitude of people drawn from different countries, and from different callings in life, to overspread the vast plains of the west, which in an early day furnished precedents of what seemed to be fortunes, made in one or two years by cropping and selling surplus crops to incoming settlers, at great prices, who were necessarily compelled to purchase for immediate wants. The low price of land, and the bountiful crops so easily produced, were incentives to people of all the older countries to emigrate and avail themselves of these great natural advantages of sudden wealth so easily acquired. With the rise of this vast empire of agriculture, with no accompanying loom, anvil, smith, tannery, hattery, cheese factory, or other mechanical industry, the vast products of the country are suddenly found to be out of balance. Agricultural products, from their general preponderance, are compelled to go

begging for want of a market. The vast railroad systems that have penetrated with most gigantic strides throughout the whole western country, opening up suddenly to settlement and cultivation a vast amount of land, and affording market facilities for the surplus products of the country. These extensive railroad systems, fostered by government aid, and direct subsidies levied upon the people, have prospered and become wealthy by the very system of transportation and exchange of commodities with distant markets, that is constantly drawing the life blood from the farmer, and depleting his natural wealth instead of adding to it.

The railroads, however, are a source of national wealth, and have been the means of the sudden development of the country of the west, as well as concentrating wealth into cities that have suddenly grown up from small paper towns to great marts of trade and commerce, and support large numbers in great affluence, in the capacity of merchants, commission men, and other agents, who live on the profits of the exchange of produce, from the farmers to the consumer or manufacturer. This great wealth which is aggregating and concentrating into cities and villages, comes directly or indirectly from the labor of the farmer. The wealth of the farmer does not consist in the great amount of his produce, but in the purchasing power of his produce. It is this fact of sending his produce a long way to market, through the hands of a number of middle men, and transportation charges, that consume the principal value of his produce, and the small margin that is

left in the shape of profits, is paid out for goods that go through the same system of exchange, and come to the farmer at twice or three times their cost of production. To illustrate: I, this 28th day of January, A. D. 1873, at the town of Kellogg, in Iowa, sell five thousand pounds of wool at fifty-three cents per pound, to a traveling agent, who at a safe calculation will get five cents per pound commission; a Chicago commission man will probably get another five cents; the railroad companies will get another five cents; it finally gets to the manufacturer in Massachusetts at a cost of sixty-eight cents per pound, and is there manufactured into cloth at a cost of seventy-five cents to one dollar per yard. This cloth goes into the hands of the jobbers at five or ten per cent profit, and again into the hands of the Chicago wholesale house, at ten per cent profit; again into the hands of the local retailer at twenty-five per cent profit, and with transportation added comes to the farmer at \$1.50 to \$2.00 per yard. And then to cap the climax, we find the cloth instead of being the product of the fine, strong staple of merino wool, is composed of part cotton, part shoddy and part wool, of comparatively little value for service on the farm, or any other service. Now, a farmer in Iowa, cannot leave his farm and go on a pilgrimage of two to three weeks to the Atlantic seaboard to market his crop, but is forced to sell at home or ship to some commission man and wait the result of sale and return of proceeds, which hardly ever proves satisfactory.

This example here given instead of being an over-

drawn picture, is a veritable transaction, and illustrates and solves the problem in a great measure, of the dependence of the western farmer at the present time. Now, while wool can be produced in Iowa at fifty cents per pound, and even less, with a fair profit to the farmer, provided we could receive cloth in return at the cost of manufacturing, say a good article at eighty cents to one dollar per yard, it would set the matter all right with us. But to leave the article of wool, which can be raised and transported to the best advantage of any commodity in the west, and come down to that of grain, and we find that the average market price at home will not even pay current wages for labor for its production, to say nothing of the dead capital invested in farm property, and the requisite machinery for carrying on business. To leave this part of the subject now and refer back to the commencement of the subject.

With the vast extent of country suddenly opened up to agricultural productions, with no home manufactures to correspond and retain a healthy condition of the country financially, we are placed in that position which seems to forbid any hope of a change for the better, until by a natural process of time, capital will seek its proper level, and manufactories of all the different varieties demanded in the west will be established at home, and the exhausting condition of middle men and transportation charges be obviated.

This healthy condition of a country that naturally obtains in time by the proper growth of all reciprocating industries being properly sustained in connec-

tion with each other, is a feature of all countries of a slower growth, and consequently healthier growth, but does not pertain to a country of a sudden growth, like that of the "great west." The picture of the west is young America grown out of his coat and pants. But while the bone and sinew, and that of the right material is forming, with vigor and power it is no presumption to believe that the comely portion, the full dress, the manly strength and intelligence, will supercede the uncouth form of the awkward youth. But while fate seems to rule the west and hold under a cloud of adversity, for an indefinite number of years to come, the reader will naturally inquire as to any means of immediate escape from our present thralldom, as the indefinite future modification of our embarrassing condition would seem to be somewhat uncertain and unconditional. Many of our leading men of the west have been investigating the problem that seems to be so prominently before the people for a solution, as to the proper means of improving financially the condition of the western farmer. Some of the plans recommended as promising relief to the west, we will here investigate.

While the price of produce in the eastern markets would give the western farmer a living price for his grain after paying transportation, there seemed to be little disposition to find fault with the railroads, and the middle men who handled our surplus products. But when the condition of the country brought a change in the value of such articles as the west had usually relied upon for export, so as

to give no profit above transportation, these items of large profits to railroads and middle men, suddenly loomed up before the people, and became a source of great aggravation.

Now as to the prospect of relief by a modification of freight tariffs, and calling upon our state legislature, as well as national government, to put the railroads upon their good behaviour, as well as to furnish additional facilities of transportation, something can and should be done in that direction. But as to a means of immediate and permanent relief, I am not disposed to give any very great credit, or place very high hopes of good results from such a source. The railroads are all worked to their full capacity, and additional facilities for transportation are demanded. But with these added facilities of freight carriage, we should bear in mind that it costs money to build railroads and canals, as well as to keep them in repair, and running expenses. The very idea of freight tariffs is now, and is quite likely to continue, the great obstacle to western prosperity so long as we depend upon them. The practice of raising grain in the west and depending upon a distant market, is a suicidal policy, and should be as far as possible abandoned.

While through the present accidental circumstance of the failure of crops in France and Great Britain, has given an export demand for our surplus wheat for two years, and enabled the western farmer to obtain a barely living price, this market can very seldom be relied upon, as we export very little wheat comparatively, during a series of years, and any-

thing beyond a home market is merely accidental. Added to this fact we find also that the wheat crop is not one to be depended upon on the western prairies. The growing of wheat as in the past, will doubtless in the future be an uncertain crop—not more than one year in three paying more than expenses in raising. The article of corn will not bear transportation any great distance. But as we have got to meet this question of transportation and be governed by its dictates in the future as in the past, let us meet it at the best possible advantage. As the reliable and staple products of the west are corn, oats and grass, and as these are produced in great abundance, with little cost comparatively, the idea of concentration into a form that will bear shipment, presents itself at once. To meet this idea of a distant market for our produce, we must concentrate all of our crops into cattle, horses, sheep and swine. But many will say this has been tried and proved a failure to a great extent; and admitting that it has, it is not necessarily so. The leading classes of stock can be raised on the prairie of the west, with no more care and protection than is required in the same latitude in the eastern states, or the countries of Europe. In the older states where land is much higher than in the west, and less productive in the essentials for growing stock, sheep, cattle, and swine, are the leading staples from which the farmer relies for steady and reliable incomes.

Allowing the facts that the eastern farmer receives a better price for his stock than the western farmer, this is more than offset by the larger crops grown

in the west, and the difference in expense in producing the same crop. While the western farmer can grow corn at twenty cents per bushel on the farm, the eastern farmer must have from thirty to fifty cents to cover cost. In the state of Ohio, for example, corn can be produced at the rate of thirty to forty bushels per acre, with a cost of one half more labor than is required to raise corn in the west that will average fifty to sixty bushels to the acre.

While cheese is produced on land in Ohio worth \$60 to \$100 per acre, and sold at twelve to thirteen cents per pound, with a satisfactory profit, it costs no more to produce a pound of cheese in Iowa, where land may cost from ten to thirty dollars per acre.

While pork is produced in Ohio for \$4.00 per hundred gross, with corn at forty cents per bushel, pork is produced in Iowa for \$3.00 per hundred on corn that can be raised for twenty cents per bushel. While sheep are raised in Ohio with a satisfactory profit, on land worth \$60 to \$100 per acre, and wool sold at fifty cents per pound for washed fleece, with the comparative price of western land, and the cheapness and abundance of feed in the west, wool can be produced at twenty-five to thirty cents, with the same margin of profit. When wool is sold for fifty cents in Ohio, the same article will bring forty-seven to forty-eight cents in Iowa, if put into market at its actual value. While fifty cents per pound will give a satisfactory price for wool in Ohio, an equal success in growing sheep in Iowa with the present price of land and produce, will give at least three hundred per cent more profit.

Although the alluvial soil of the western prairie may not be as well adapted to dairy products as the best dairy districts of Ohio and New York, a good article of cheese or butter can be produced in the west at much less cost per pound than in Ohio or New York.

While the Ohio farmer realizes about one dollar more per hundred for beef cattle of the same quality, than the Iowa farmer, cattle can be raised in Iowa with at least fifty per cent less cost.

Allowing these propositions to be correct, we have here furnished a means of modifying our plan of operations, in farming so as to adjust ourselves to the surrounding conditions, that seem to control us, and at the same time prove that western farming will pay. This plan of farming in the west which demands a system of feeding our grain and shipping our produce in a more concentrated form, will necessarily have to be adopted in order to meet the present emergency of low prices. With the building up of the various manufacturing interests in the west, our condition financially will be improved quite materially, and just in proportion as the various interests are fostered and sustained, in that same proportion will we become independent of that demoralizing element, freight tariffs and commission men.

PROTECTING HOME INDUSTRY.

Under this head we have one of the most important subjects connected with the welfare of the west. It is an imperative duty demanded of every farmer

individually or collectively, to hold out inducements to all manufacturing establishments to come among us. We should not wait for the wheels of fortune to roll round, with the expectation that a favorable breeze will bring us wealth and prosperity. The gods help those that help themselves. Every man is the architect of his own success or failure in life, and as it is with the individual, so it is with neighborhoods or states. While one man sits down waiting for something to turn up for his benefit, Micawber-like, another goes to work and turns up something without trusting to any freaks of fortune.

It is the will to do, and the perseverance to carry out, that sets luck aside and pushes right forward to success. When one person cannot accomplish much comparatively, in any one enterprise, a number of persons properly organized can accomplish wonders. This word "organization," is the key to the whole subject of success and prosperity of the western farmer. This is the key that locks up the wealth of the country into various forms of monopolies in controlling freights, controlling the price of manufactured goods, and controlling the price of nearly every article the farmer produces or consumes. Organization by the farmers of the west becomes necessary to counteract the various combinations that are constantly tending to reduce the avocations of the agriculturist to one of slavery. The fact that the west is generally settled up by people of different states of the east, as well as foreign countries, and having so many different elements among the people, tends to an exclusiveness in their social relations, and an

indifference as to the welfare of each other. This isolation and exclusiveness is also fostered by a difference in their sectarian relations, as well as difference in political views. The absence of a common sympathetic and fraternal feeling among the people, arising from these various causes, retards very much their welfare, and is a great obstacle to successful organizations, that might be effected and result in great good to the community at large, in many different ways.

Farmers clubs for the discussion of all the various subjects connected with farm life, are of great value, and should be maintained in every school district, especially in the winter season, when the farmers' time is usually spent during the evenings with no special employment. Not being identified with the Patrons of Husbandry, I cannot speak knowingly of what is expected to be accomplished through that order. But from all appearances the plan is right and is calculated to result in much good.

Where the individual alone cannot do much in the way of starting manufacturing enterprises, by the coöperation of different ones in the same neighborhood, nearly all the various manufacturing branches so essential to the prosperity of the west can be introduced and successfully maintained. Skilled laborers can be procured in all sections of the country where the various manufactures are carried on, and where wanted can be easily obtained.

CHAPTER IV.

MANUFACTURES.

AMONG the various manufactures that can be introduced and established on a paying basis for the investment, I note a few that should have special attention — and first is the cheese factory.

Every county in the state can at least support one, and many counties are so favorably supplied with running streams of water as to permit of the larger portions of the farms being devoted to pasture, and by reason of such favorable conditions can well support three or four factories to the county. As to the idea of failure or success in cheese manufacturing in the latitude of Iowa, there no doubt has been many failures where an attempt has been made at manufacturing. But when we look back upon the pathway of human life, we find strewn all along the road of human enterprise, wrecks and failures upon every side, which denote the incapacity of the adventurer in his efforts that have been put forth without properly investigating the surrounding conditions which were necessary to guarantee success. Where one party will engage in an enterprise even under the most discouraging circumstances, and make a complete success, another party will make a partial or complete failure.

While many attempts at cheese manufacturing in Iowa have made but a partial success, others have succeeded in manufacturing a good article of cheese and finding ready market at satisfactory prices. Having myself been brought up in what is called the dairy district of Ohio, and had occasion to investigate the subject of the factory system so successfully adopted in northern Ohio, as well as other portions of the country, I can speak from some positive knowledge of the business.

While the plan of manufacturing butter and cheese by the farmer lone-handed, with a few cows, and without proper facilities for any success in producing an article of either butter or cheese that is fit for market, the natural result of such a system is attended with no pay and no object to the farmer.

While "western grease," the name given to western butter, is worth perhaps ten to fifteen cents in market, a good article of factory butter is worth thirty to fifty cents per pound, according to the market where the article is sold. Under the present practice of keeping the average common cows of the country, and selling the few pounds of butter or home-made cheese to the retail shops of the country, an income of \$20 to \$25 per cow is a liberal estimate. The price that is usually realized for milk by the farmer in the west where sold to cheese factories, is seven to eight cents per gallon. Our common cows yielding say thirty to forty pounds of milk per day, or three to four gallons for six months, or one hundred and eighty days of the year, will give for the lowest grade of cows five hundred and forty

gallons, which at eight cents per gallon is \$43.20 for the increase of one year. A cow that will give four gallons per day for one hundred and eighty days, is a good common cow, and the result is seven hundred and twenty gallons for the year, at eight cents per gallon, giving \$57.60 per cow as increase. A good lot of grade short horn cows, as my own experience has tested, will give on liberal feed, fifty pounds per day, or five gallons, which for one hundred and eighty days is nine hundred gallons, or an income of \$72 per year for each cow.

Now to be safe in these calculations and put the income one quarter less for any reasonable decline in price, and we have a better income than anything now engaged in by the western farmer, considering the amount of labor employed and capital invested. A farm of eighty acres improved land will furnish feed for both summer and winter for twenty-five cows, which with a low estimate of \$30 income for each cow is \$750. With forty-five acres in pasture, twenty acres in meadow, and ten acres in corn, twenty to twenty-five cows and one pair of horses can be kept, leaving five acres for timber and orchard. On a farm of one hundred and sixty acres, forty to forty-five cows can be kept, with one span of horses to do the necessary work, and employ two hands to a good advantage. Half as much ground at least should be put into corn as is devoted to meadow. The dry seasons so common in the west that often prevail so disastrously to the grass crop, and become such an obstacle to the success of dairying, can be in a great measure met with successfully

by the production of a corn crop, which is most always reliable in the west. Corn should be sowed in drills three and a half feet between rows, so as to permit of plowing one way, and the seed of some early variety used so as to mature early, and be cut up as soon as the grain begins to harden. Cut up and throw on the ground in small bunches to cure for two to three days, then put into shock for winter. The object in raising corn for the dairy is the fodder, and should be sowed thickly in drills, so as to produce a larger amount of feed, which can be cut up and fed in the summer in case of drouth, or the failure of pasture. In raising fodder in this way and soiling, a larger number of cows can be fed on a farm both summer and winter, and at the same time a full and regular flow of milk be secured through the summer. In growing corn for fodder a crop is produced that is better adapted to producing milk than any other crop. The small ears of corn that grow on the stalks will give a better quality to the feed and produce more milk when fed green than any other feed, and at the same time a crop can be produced of eight or ten tons to the acre, which will make it a better paying crop, as well as surer, than the hay crop. Pastures for dairy purposes are improved by age and should consist of all the different varieties of grass that can be grown on the ground. Not all farms can be devoted to the dairy with profit, as pure running water on the farm is a necessity, and shade of some kind must be furnished for stock.

The high temperature of summer that carries the

thermometer up to eighty and ninety degrees for many days in succession, on the open prairie, is considered a great obstacle to success in producing cheese. But by the proper construction of curing houses and an abundant supply of cold water, which is always necessary for the success of a factory, this obstacle can be met successfully, and the manufacture of cheese made a safe and reliable business in any portion of the state of Iowa, or any corresponding latitude in the west.

As to any danger of the overproduction of cheese or the business being overdone, there seems to be no such conditions attending this branch of industry as are common to all other products of the country. Twenty-five years ago, in northern Ohio, cheese making by the old fashioned dairy process was the most paying business of the farmer, when cheese brought six cents per pound in the market at wholesale, and farms were worth \$25 to \$30 per acre. It was then feared that the business would be overdone and farmers have to resort to some other business. But what has been the condition of the market since? Instead of any decline, the price of cheese has steadily increased to the present time, as compared with other farm products, and as the supply has increased the demand has increased in a greater ratio, and with no danger of an over supply. While the manufacture of cheese seems to be limited to a certain latitude, and is more especially the business of the Yankee, the product finds a market in every civilized country on the globe. The article of cheese will bear shipment to tropical coun-

tries, and in a warm climate or in the summer season in the north, is a more healthy article of diet than meat. From the fact of its containing more nutriment in the same bulk than any other article of food, it has an advantage over all other farm products, in shipping to a distant market. A ten-fold increase of the product in the next five years would doubtless find a ready market with very little decline in the price. As there can be no increase of the product in the eastern states, and the only locality that will permit of any increase in the product is limited to a comparatively small extent of country, comprising northern Illinois, Wisconsin, southern Minnesota and Iowa, and the demand is quite likely to increase with any possible increase of the product, we shall doubtless in the future as in the past, notice the congratulations of success of the manufacturers of the north-west, at their annual conventions.

While most other branches of farming in the west seem to be languishing under the impression of a tight money market and low prices, the product of cheese finds a ready market at good paying prices, and the manufacturer is rejoicing in his prosperity, with his money in his pocket, ready to commence another year's business, under the most favorable prospect of a sure reward for his trouble. The manufacture of cheese in the west at the present time, under the conditions of soil and climate that are new to the operators in the factories, are circumstances that necessarily prove a failure in some cases, and hence we find a great portion of the

cheese that goes into the market of a very inferior quality. But as this cheese mostly goes into the hands of Chicago commission men, and is branded New York factory, the reputation of the western manufacturer is luckily sustained and New York takes all the censure. New York factory is doubtless a good brand in some markets, but in the west is losing reputation. A little time and experience with more skilled laborers, will correct this defect without doubt, and by a proper concert of action on the part of western manufacturers, the conditions of success will be better understood, and *Western Cheese* will be a reliable brand in the market. The small amount of cheese that is manufactured in New York does not seek a market in the west, but is moved in another direction for market, while the surplus cheese of the west goes into the hands of the consumer under false colors.

The common wild or prairie grass of the west, is of very little value comparatively for dairy produce, and as the alluvial soil of the prairie will become adapted to tame grasses after being reduced by cropping a few years, the older countries will have the advantage over the new countries in introducing the cheese factory.

The rough and rolling lands of the west will produce a richer and better quality of feed, and this fact together with the fact of pure water, and more running streams on rolling land, gives such localities a great advantage over the more level lands for grazing purposes. Nearly the whole surface of the state of Iowa, from these peculiar natural advanta-

ges, is well adapted to dairying as well as all kinds of stock growing. For want of the tame grasses in newly settled portions of the west, a good substitute is found in growing rye for pasture. It even has advantages over the tame grasses, by producing late fall feed and early spring feed, and is well adapted to the wants of the dairyman as well as the wool grower. By sowing rye in with corn, the last time of plowing corn, and harvesting the corn as early as practicable, a good pasture is furnished, even into winter, for both cows and sheep. This same ground, after furnishing early spring feed, can be plowed in time for replanting to corn, or can be seeded down to clover and timothy, by sowing the seed in February or March, and good pasture can thus be secured for the whole season following; as the rye is eaten off in the spring, the timothy and clover will be coming on and take its place, and so furnish continuous fresh pasture through the season.

Any essay or writing in detail, on the practical business of cheese making under the factory system, would be of little value to the novice, as it is only practical experience in the business that will qualify any one so as to justify him in making an attempt at success. And even a practical success in one locality does not guarantee a success in a different locality, with different material to work with, and different feed for cows as well as different climate. Any parties contemplating the erection of a factory, if not skilled in the business, must necessarily visit one or more factories and obtain knowledge from practical observation and advice of skilled opera-

tives, as well as employ a skilled and trusty person to superintend the erection and starting of a factory.

The most important matter in connection with the subject of the dairy, in order for success and profit, is procuring good cows. A cow that will give \$50 per annum as income for milk, will cost no more for keeping than one that will give \$25 to \$30 income. While there are some marks and indications that will distinguish a good milker, these outward signs are not always reliable; and while a light colored cow will usually give as large quantity of milk as a dark red one, a dark red cow is much more reliable for superior quality of milk, as well as being a better constituted animal. While we can place but little dependence upon our common native cows for either quantity or quality of milk, a high grade short horn cow is sure to give a good quality of milk, and probably a higher average in quantity than any other breed. As far as I have observed the testimony of every one who has experimented on different breeds for dairy purposes, the preference has universally been given to the short horn family. A dairy composed of grade short horn cows will give a uniformity in quality of milk, and much better than the average quality of the native cows. While short horn cows fed high as show cows are not usually the most profitable milkers, on the contrary, when bred and fed for milk purposes are found to be more profitable, from the fact of giving a uniformly good quality of milk, as well as possessing an advantage over all other breeds for beef purposes, when they are no longer useful for milk.

A high grade short horn cow will usually feed off with more profit for the feed consumed, and usually bring the same price as high grade steers in the market, which is one to two cents more per pound than the best native stock. Another important advantage in favor of the short horn cow is found in changing from dairying to stock raising, which can be done at any time if short horns are bred for the dairy.

In this land of cheap corn, beef must necessarily be an item of produce, and if not the leading object with the dairyman, it at least will demand a secondary object in producing dairy products in the west. In preparing for the dairy in the west, the best native cows, or grade short horns should be selected, and always bred on full blood short horn bulls. The calves of the best milking cows should be raised and retained in building up a superior herd of milkers, to take the place of the older stock, which should be sold out or fed off for market, when they are no longer profitable as milkers. By this process of weeding out and raising only good animals, a herd can soon be produced that will be better worth \$75 per head, either as milkers or for stock purposes, than our common cows are worth \$30. While engaged in the business of producing milk for dairy purposes, it should always be made a leading idea with the farmer to improve his stock at the same time.

The manufacture of sugar from beets has proved an extensive branch of industry in France

and other countries adapted to the growth of the sugar beet. No one experiment connected with the welfare of California has proved more successful than the manufacture of sugar from beets. From the experiments made in the state of Illinois in this enterprise, it has been practically demonstrated, that sugar can be manufactured from the beet on the western prairie for six cents per pound, and a saving thereby made to the west that will amount to millions of dollars annually. Although there have been failures in the attempt at manufacturing beet sugar on the prairie, there also have been failures in all branches of manufacturing as well as in other industrial enterprises, and in all countries. Success in any kind of business we find depends upon a proper knowledge of the business, as well as all the surrounding circumstances that have a material bearing upon that special branch of business. In the manufacture of sugar from beets the most important prerequisite of success is found in the locality of a factory as to quality of soil for growing beets. While the prairie soil of the west is well adapted to the growth of all the different varieties of beets, and while the yield is found to be equally as great as that of any other country, if not greater, there are certain facts that govern the quality and sweetness of the beet as well as the sorghum plant, that must be understood by the manufacturer, in order to secure success.

While the beet as well as the sorghum plant will make a prolific growth on the deep black alluvial soil of the prairie, that is destitute of sand or other

mineral substance, it will be found that sugar cannot be produced from any plant growing in such a soil, and hence it is that people differ so much about the value of our western sorghum, or sugar cane. The more elevated lands of the prairie that have a sufficient amount of sand, and other mineral matter, and usually on lands where timber or underbrush makes a spontaneous growth, the soil will generally be found adapted to the production of sugar, either from cane or from the beet root. The soil of river bottoms in many places is found to be quite sandy with gravel sub-soil, and in such places a success can be made in the production of sugar from the beet or the cane. A soil that is well adapted to growing wheat or fruit trees successfully, will be found well adapted to the production of such plants as produce sugar profitably.

It is with a proper understanding of these facts that the manufacture of sugar from beets can be made a success on the western prairie as it has been a great success on like soils in other portions of this country as well as in Europe. This branch of manufacturing industry, while it requires a higher order of skill and scientific investigation on the part of a head foreman or manager, is not subject to the same necessity of employing skilled workmen that many other branches of manufacturing require. No country probably in the world can produce the beet so cheaply as the western prairie, and a larger proportion of the agricultural resources of the west can be readily converted into this channel, with no extra outlay of expenses for machinery in cultivating or

harvesting, and no previous fitting up or other preparation for the business. The expensive machinery that is requisite in raising the cereals is not required in the production of either beets or sugar cane. The pulp of beets is found very valuable for either hogs or cattle, and will add quite an item of income to the manufacturer.

While individual capital or individual enterprise will not generally accomplish much in the establishment of manufactures in any country, we find by a proper combination of capital, skill, and enterprise, the business of manufacturing can be made a success to any desired magnitude. It is by the proper combination and co-operation of farmers of the west, that these various manufacturing industries must be introduced and sustained, to relieve them from their present condition of thralldom and bondage to the various monied corporations and monopolies of the country. While it would seem futile for inexperienced farmers to undertake to organize and engage in any manufacturing industry, it will on the contrary be found not only expedient but profitable in most cases, and not divert from the established business of the farm if properly managed. The contribution of capital in small portions from a certain district of country, and the employment of the proper skilled labor to conduct the enterprise, which can be found in this country at all times, will suffice to make a start and establish the desired manufacturing establishments which can usually be sold to some party competent and able to carry on the business, and thus the object gained with no pecuniary loss to the original proprietors of the enterprise.

Our fabrics of leather should all be made at home, where the best raw material from the hides produced in our own vicinity can be converted into the best quality of leather, at a much less price than that paid for the imported shoddy article that is manufactured from the cheap and damaged hides of tropical countries. The various fabrics of cheap and damaged leather combined with paper in the manufacture of polished boots and shoes fitted up for the "western trade," supply in a great measure the demand for this trade in the west, which amounts to millions of dollars annually exchanged for fifteen cent corn and other farm products at half the cost of production. The constant tendency of the farmers as well as the people of the villages and cities to ape the dandy and patronize the shoddy manufacturers of wearing apparel that is of no real value for either comfort or durability is constantly draining the west of her material resources of wealth, and bringing poverty to the door of every western householder. This is an item of great proportions, and so long as it is continued, will the people grumble about hard times, and a want of ability to educate their children, or support the educational institutions of the country, that are so much demanded to keep pace with the advancing age of civilization, and the arts and sciences, that foster the wealth and prosperity of the country. The woolen mill, the tannery, and the country shoemaker are wanted in every county in the west, and capital invested in this branch of industry with ordinary ability in the

management, is sure to pay a good profit. In the fostering and support of these manufactories, as well as that of agricultural machinery and other products of the artisan, so much used in the west, is found the cure for the low price of agricultural produce, and the cure for the common complaint of hard times. The war that is necessarily made upon the railroad monopolies by the western people, can be obviated in no other way but to seek the most convenient as well as the most speedy method to so adjust the various reciprocating industries of the country that will render them no longer dependent upon the railroads or other transportation lines of the country.

“We are fast becoming a nation of schemers, to live without genuine work. Our boys are not learning trades; our farmers’ sons are crowding into cities, looking for clerkships and places in post offices; hardly one American girl in one hundred will do housework for wages, however urgent her need; so we are sending to Europe for workmen, and buying of her artisans millions worth that we ought to make for ourselves. Though our crop of rascals is heavy we do not grow our own hemp; though we are overrun with lads who deserve flagellation, we import our willows. Our women (unless deceived) wear European fabrics; our men dress in foreign clothes (shoddy); the toys which amuse our younger children generally reach us from over the sea. Hence it is that we plunge deeper and deeper in debt to the old world. We are like the farmer who hires his neighbor’s sons to cut his wood, feed his

stock, and run his errands, while his own boys lounge at the grog shop, playing billiards, and then wonders why, with his best efforts, he sinks annually deeper and deeper into debt, till the sheriff cleans him out, and he starts west to begin again."

"We must turn over a new leaf. Our boys and girls must be taught to love labor by qualifying themselves to do it efficiently. We must turn out fewer professionals, and more skilled artisans, as well as food growers. We must grow and fabricate two hundred millions worth per annum that we now import, and so reduce the foreign debt that we have so long and successfully augmented year by year. We must qualify our clever boys to erect and run factories, furnaces, rolling mills, tanneries, machine shops, etc., to open and work mines, improve and fashion implements, and double the present product of their fathers' farms. So shall we stem that tide of debt that sets steadily against our shores, and cease to be visited by hard times."

We are situated in a country that, wherever we travel we are passing over the rich mines of all the various ores that enter into the various trades and manufactures of the country, and that furnish an essential element of prosperity and welfare in all civilized nations. With all our natural wealth in the form of the various minerals, and other resources that constitute the wealth of civilized nations, carelessly trod under our feet, we continue to patronize the artisan of the old countries, and import to a great extent, that which can be manufactured at home for less than one half the price now paid for it.

“Rich in resources, but poor in purse,” was a remark made by a leading British statesman while on a visit to this country, and this remark applies more especially to the west than to the older states.

CHAPTER V.

TIMBER GROWING.

THIS subject is one perhaps that demands the attention of the western farmer, as well as horticulturist, in advance of any other subject, as connected with the general welfare of the people of the west. In presenting this subject for investigation, it becomes quite important to have something tangible to the mind as a basis to predicate theories and assertions; otherwise any theories that we may set up will only pass as theories, and give no satisfactory proof to those seeking this information. No person will pretend to dispute the great advantage that would arise from planting timber as a universal thing, throughout the prairie country of the west. On the investigation of the subject as to the beneficial results that would naturally follow the general planting of timber, so that every farmer could have all the timber needed for the practical purposes of the farm, it seems almost impossible to determine the various uses and benefits that would accrue from timber thus planted. While the individual farmer would realize the direct profits that would accrue from timber by its use as fuel, fences, shade, and protection against winds that are a source of suffer-

ing to both man and beast; the climatic conditions of the country would be so modified as to result in a great benefit to the general welfare of the state. I find by experiment during this cold winter of 1872-73, while situated in a position where my house is well protected by being surrounded with timber, and all my stock having this protection by a body of timber so situated as to break the winds in either direction; I have hardly realized any severity in the winter, and my stock have gone through the winter with no signs of suffering or inconvenience from the severity of the weather. While the thermometer only indicated twenty degrees below zero the coldest morning of the season, and only marked fifteen degrees below on a few of the coldest mornings; at a distance of one mile from this timber on the open prairie the same thermometer would often mark twenty-five to thirty degrees below, in a wind almost fatal to animal life. In making an estimate of the advantages to my stock, of this one winter, I could not estimate this timber protection at less than one thousand dollars in value to my stock. The pleasure derived from this protection, in caring for stock, and carrying on the operations of the farm in winter, as well as summer, is of great value, and calculated to make the avocation of farm labor one of pleasure instead of one of almost constant aggravation.

While a very important advantage of timber consists in its absorbing power in correcting any bad condition of the atmosphere, a no less important utility is manifested in its agency as a conductor of

electricity, in drawing off constantly from the atmosphere the overcharged electrical condition, and thus modifying the violence of storms which are of such frequent occurrence, and so destructive of property, as well as life, on the open prairie. It seems to be an acknowledged fact that in the older states, where timber has been cut off, the loss of property by lightning is much more frequent than formerly, and gradually increasing with the decrease of timber. While the owners of buildings are induced to pay for artificial conductors, in the shape of lightning rods; and these conductors seem to be no reliable safeguard against lightning—on the contrary, a few trees growing in the vicinity of a building are a safe and reliable defense against lightning. While a tree standing alone on the open prairie, or in the open fields, is often struck by lightning and completely demolished, we find no such occurrence in a body of timber. In traveling through a forest, we notice the marks of lightning frequently; but in such a modified condition as to produce very little damage. The history of nations for the last two thousand years has illustrated and demonstrated beyond controversy, the effects of cutting off timber, as manifested upon the products of the country, that necessarily depend upon rain for their successful growth.

The modern nations of Europe in accordance with the evidence furnished by the older countries of Asia that have been depopulated through the influence of drouth and consequent famine, have provided for growing timber, in order to escape the

inevitable calamity that has befallen all the older countries, by reason of the devastation of their forests. Great Britain at the most opportune age of her advancing civilization, planted extensive parks and forests of timber, and whatever motive prompted the English nobility in this work of national improvement, the results have no doubt been entirely beyond their anticipations, in the beneficial effects upon her climate and fertility of soil. Sardinia and Sicily, once the granaries of Italy, have suffered the penalty of their thoughtlessness in exterminating their forests. Two thousand years ago, those lands were celebrated for their wonderful productiveness, and were said to be the most beautiful in the world. In 1800 Humbolt visited Venezuela, South America, and was informed by the natives living in the valley of Paraguay, that they had noticed, with great astonishment, that a lake which lay in the middle of the valley had decreased in volume every year; the cause of this is clearly traced to the falling of a great number of trees which grew on the surrounding mountains. In Hungary the periodical drouths are universally attributed to the annihilation of the forests. In Cairo, Lower Egypt, a great many years ago, rain fell but seldom, only once in three or four years; but since the time of Mohammed Ali, twenty to thirty millions of trees have been planted, and the result is now that the people have from thirty to forty rainy days every year. Surely these few of the many examples are warnings sufficient to put us on our guard. In visiting the old homestead of my youthful days where twenty-five to thirty years ago

I followed behind the plow among the stumps and rocks that would at the present time, in the west, be considered impossible to plow, I now notice that large portions of the country that at that time were swamp lands, of no value whatever, from the excess of water that covered them, are at the present time the most available and valuable lands in the country. And this change has not been effected by artificial cultivation or drainage, but by constant drying up of the wet places, caused by the cutting off the heavy timber, that thirty to forty years ago covered the entire country. The few small patches of forest that are left in the old states, so thinned out as to let in the sun and winds, are constantly being depleted by decay and wind-fall. The seeming economical practice of the farmer, in seeding down and pasturing their woodlands, is also fast destroying their timber; and the natural consequence of the general depletion of the forests of the older states, is fast tending to long seasons of drouth and scarcity of water, as well as a marked decrease in the average yield of all grain crops. On the western prairie it is plainly more perceptible that the land lying adjacent to the timber that borders all of our streams is much more productive in all grain crops, as well as cultivated grasses, from the fact of having more moisture, which is so essential for the development of full crops.

With a proper realization of the facts herein stated, as well as many other facts that might be cited, of the value of timber to the treeless portion of the west, it would seem of the first and utmost

importance to all permanent settlers on the prairie to secure as fast as possible the growth of timber. The general overturning of the prairie soil, and exposing the alluvial soil of the prairie to the burning rays of the sun, tends to increase the excessive heat of summer, as well as check the otherwise natural flow of moisture that is given off by the vegetation of the prairie, in a natural condition. This condition of the atmosphere of the prairie, as well as the miasmatic condition arising from the decomposition of vegetable matter in the soil, is greatly modified, and its injurious influences counteracted by the growth of timber.

The suicidal policy of allowing stock to run at large on the prairie, militates greatly against timber planting, and necessitates a heavy expense to the farmer in building and keeping up fences. With the growth of timber and live fences, which can so easily and cheaply be accomplished, in a few years, if protection against stock is given without the expense of fencing, the value of real estate would probably be enhanced from fifty to one hundred per cent. Timber would also furnish a large element to the building up of various manufacturing industries so much needed to keep pace with the agricultural branch of industry.

In the great variety of timber that seems to be naturally adapted to the alluvial soil of the prairie, we will notice a few as deserving of the most importance.

Among the deciduous variety we find indigenous to the soil and climate, are the soft or silver maple,

cottonwood, honey locust, black and white walnut, the different varieties of oak and elm, in fact most all the different varieties growing in the older states; all of which can be propagated either by seed or cuttings. The introduction of Lombardy poplar and white willow as fast growing timber for live fences, and wind breaks, has been of great value to the prairie country. The introduction of all the different varieties of evergreens has also proved more or less successful. One controlling principle in the planting and growing of forest trees, as well as fruit trees, should be observed; which is this: that all the slow growing and hard wood trees necessarily require a hard clay or gravelly soil, and generally succeed best in the drift formation, while all the softer varieties, such as white willow, cottonwood, Lombardy poplar, silver maple and some other varieties make a healthy and rapid growth in the alluvial or black soil of the prairie.

The common disease called blight throughout the prairie country arises from an abnormal condition of the tree, caused by a want of proper elements in the soil, for its healthy growth. This condition of blight also arises from the attacks of parasitic and insect life, that has a spontaneous growth in the decomposition, going on in all new lands of the prairie. After a few years cropping the alluvial soils, so as to remove the organic matter from the soil as much as possible, tree planting and fruit growing will be attended with greater success.

In propagating trees from cuttings, wood should be used of not more than two years growth, as a

general rule; and all crooked side branches rejected. The main or straight stalks should be used, and the strips or cuttings made from the most vigorous growing sprouts. The cuttings of the Lombardy poplar should be cut about ten inches in length, and the but end sharpened so as to be pushed into the ground by hand, at an angle of about forty-five degrees; and the cutting set in so that only the top end will be exposed above ground. As a usual thing all will grow and throw up sprouts from the top buds, usually to five or six in number. These sprouts after growing three to six inches high must all be pulled off by hand except the strongest one to be left to form the tree. This operation of pulling off sprouts will have to be performed at least twice during the early part of the summer, so as to have but one stalk to each root; and must be kept hoed clean during the first year, and no weeds allowed to grow. These cuttings should be set in rows about three feet apart between rows, and about ten to twelve inches apart in the row. The first year's growth will usually be about five to six feet, and two years' growth in the nursery is generally best. After three years' growth, two in the nursery and one in the field, the poplar will usually be large enough to sustain itself against the attacks of most animals.

The Lombardy poplar forms a very beautiful tree for a border tree along roadsides, and division fences, and is one of the most valuable trees for a wind-break about buildings. It is usually clean and free from insects and not as apt to throw up succors from the roots as many other kinds. When set

along the fence row, it will form a basis for a fence, that can be made cheaply of boards, and hung on to the tree by means of iron spikes, or wooden pins driven into the tree to answer as hooks to support the fence, that can be made in movable panels. The cottonwood can be propagated the same as the poplar, and is a fast growing tree, always hardy; but it has its objections that arise from the throwing off blossoms in the form of lint. It is a branching tree, and valuable for its hardiness and adaptation to all the various soils of the prairie.

Balm of Gilead, quite similar to the cottonwood in its habits, is propagated by cuttings and is a valuable tree. It is a branching tree like the cottonwood but always clean, and is a very good shade or border tree. To multiply cuttings for a wholesale business of propagating trees, probably the best plan is to take trees at three or four years of age, and cut the main stalk off a foot or eighteen inches above ground, during the winter season. The succors that will sprout from this stalk in great numbers, will make the best of cuttings, and only a few trees will be required to produce any amount desired.

White willow can be grown from cuttings produced in the same way, and if properly managed will make a reliable fence as well as shade and wind-break. Although the white willow has lost reputation with some, I am satisfied that it is one of the most valuable plants for the western prairie. Its rapid growth and hardiness as well as adaptation to all of the prairie soils, gives it great merit for both timber and live fence. The best plan of producing

live fences from white willow is to grow them thickly in the nursery, and when the stalks are about ten to fifteen feet high, and two to four inches in diameter, cut off at the ground and trim off all branches from the main stalk. This main stalk can be divided into cuttings or stalks, four to five feet in length and sharpened at the butt end, then driven into the ground eight or ten inches in depth, and six to eight inches apart in the fence row. The ground should be plowed deep the year previous to setting the fence, and the work of constructing the fence should be performed as soon as the frost is out of the ground in the spring. The cuttings should be selected so as to have all of the same size, as near as practicable in the same row. After one year's growth in the fence row, this fence will turn any kind of stock, and not be liable to be browsed down by cattle.

This plan of fencing I think the cheapest and probably as reliable as any live fence that can be constructed on the prairie. And while the willow performs the office of a fence it will at the same time produce more timber than is needed in the fence row, and afford great protection against the wind as well as furnish shade to the fields, so much needed by all kinds of stock. For timber and shade, the silver maple demands as much attention as any other tree on the western prairie. It is easily propagated from seed, is perfectly hardy and adapted to any kind of prairie soil. This tree grows along the banks of our rivers, and the seed dropped in the month of May should be gathered and kept moist

until planted. The seed taken out of the ground will soon dry out and lose its vitality; and for this reason should be planted immediately in rich mellow soil, not more than one inch deep; and like all other nursery stock, be cultivated and kept clean of weeds for two years, when it will do to transplant.

The black and white walnut are also valuable timber for the prairie, and easily produced from seed, planted in the fall, which will split by the action of the frost and sprout in the spring.

The chestnut is also propagated from seed planted in the spring. The seed is quite liable to lose its vitality by drying, and requires careful management to retain its vitality through the winter. The seed should be gathered as soon as dropped and packed in sand, and boxed tight for shipping. The tree is indigenous to the drift formation of the older states, and likes a stony or sandy soil. Our highest or ridge lands of the west such as are sandy and gravelly, or peculiar to drift formation, are more especially adapted to the chestnut.

The honey locust is indigenous to the west, and makes a valuable timber, as well as reliable live fence, when dwarfed and raised as a hedge plant. It is propagated from the seed, quite similar to the osage orange; and in its natural habit is quite similar to the latter plant, but has the advantage of being better adapted to a cold climate. The honey locust, like the osage orange, is more adapted to the drift formation, and thrives best in a dry, gravelly, or sandy soil.

All plants will stand a higher climate and greater

severity of freezing if grown in a soil that is natural for their healthy growth. It is on this principle that people will honestly differ, in their views as to the merits of different trees and shrubbery, on the western prairie. With this glancing view of some of the more important varieties of deciduous trees, we now notice some of the advantages of growing the various evergreens. This class of trees, when considered as to their various merits and value, are, I think, of greater value than is usually credited to them. Their growth for winter protection, against the driving storms of the prairie country, is of such value as would seem to make them almost indispensable. While the wild animals of the mountain regions of the west seek the evergreen timber in the mountains for protection in winter, of far greater importance as winter protection, would be the result of growing evergreen timber on the prairie. All the leading varieties of evergreens, especially those from western nursery stock, thrive well on any of our prairie soils. The deep porous soil of the prairie seems well adapted to the healthy growth of this class of trees. Their peculiar resinous nature seems to protect them from the attacks of parasitic life in the prairie soil, which is so destructive to fruit trees. In many instances where the planting of an orchard would otherwise have proved a failure on the open prairie; by the planting of evergreens in connection with fruit trees, a success could be made in growing fruit.

It apparently seems to be a fact, that planting corn in the orchard tends to give a healthy growth to the

fruit trees, but the sequel of such success, I am inclined to believe, is not generally understood.

The leading cause of failure in fruit growing on the alluvial soil of the prairie results from the superabundance of organic or vegetable matter in the soil. It is this same element that gives the abundant corn crop that is always reliable on our deep black soil of the prairie. By the constant cropping of corn on the same land this element in a measure becomes exhausted. The planting of corn in the orchard, tends to exhaust this element of organic matter, and at the same time counteracts the natural tendency to the spontaneous production of sporadic and parasitic life, which is so fatal to orchards on new lands. Thus we see that by planting corn in the orchard, the soil is rendered more healthy for the growth of fruit. On this same principle the growing of evergreens in alternate rows through the orchard would tend to give greater health and vitality to the fruit trees. In addition to this, the winter protection given to fruit trees, by evergreens as a border around the orchard, and alternate rows through the orchard, would secure them against all danger of winter killing.

The great beauty and relief from dead winter scenery, that is afforded by the evergreen, makes it very desirable to the homestead. The cheerful surroundings of home are greatly promoted by the evergreen scenery, that naturally breaks up the monotony of winter life. The modification of cold, resulting from an evergreen border, is very remarkable and would hardly be credited until tested by

the thermometer. It is this protection for both man and beast, that renders the evergreen so valuable as a border and door-yard tree.

As to the different varieties, they are all desirable, and variety adds beauty to the scenery. The Scotch pine and Austrian pine, the Norway spruce, and balsam fir, are leading varieties of standard trees. The European larch is also valuable, while the arbor vitæ makes a valuable hedge, and has no equal for a garden fence.

All evergreen trees should be taken up and transplanted early in the spring, and the roots must be kept from drying or death is sure to follow. For this reason they are very difficult to ship, and if shipped any distance are liable to get dry on the road and be entirely lost. It is much safer to set only small trees if they have to be shipped any distance; as small trees can be packed solid and the moisture retained, while large trees cannot be so packed. The expense of setting and growing evergreens is not as great on the whole as growing fruit trees.

In the conclusion of this subject I will submit an idea to the reader for future investigation, and if discovered to be founded in the nature of things, perhaps it may be of value in conducting many of the various operations of the farm, as well as growing fruit and forest trees. We will first, to present this subject in its true light, imagine that we are in the month of June taking a walk over the prairie, where we find on every hand the great diversity of plant life, in full bloom, and each species perfect in

its structure and organization, and the greater the diversity of surrounding conditions of moisture, and elements of soil, a corresponding diversity of plant life. We leave this natural scenery and go into the forest where we again find the various forest trees promiscuously intermingled as to the various species, and kinds, and each possessing a peculiarity of its own, distinct and different in organic quality and structure. We take a view of different countries, under various conditions of soil and climate, and we behold the same condition of variety and diversity manifested in the natural growth of vegetable life. We look again and investigate the condition of animal life, in a normal condition, and behold the great diversity of types, and characters in the animal kingdom. We stop to reflect a moment, and ask the question, Is this all chance work? a matter of mere accident? Or is it by design? by fixed laws that are all founded in nature, and never varying in results? If we take the latter view, which our reason will certainly dictate to us, What, again I ask, does the lesson teach us? Does it not teach us that there is a fixed principle that underlies and governs the development of organic life? and that this same principle is carried out through the vegetable as well as the animal kingdom? If this logic is sound, this reasoning correct, where should we go for lessons, but to the economy of nature, to prepare ourselves for the desired success in tree planting, in fruit growing, and in the reproduction of animal life, which has for its highest type man, created in the image of his maker? We set about growing the forest tree

or growing an orchard. Why set all one class of trees on the same land? Nature does not plant in that way. The soil is composed of various elements; in plant life we behold the natural results of this condition of soil. Nature carries on the system of routine in vegetable life to some extent in the lower order of animal productions; but the common rule is promiscuous productions, and diversity of plant life on the same ground at the same time. Is not this an essential principle for a more perfect success in growing crops as well as growing timber or forest trees? The various elements in the soil require an adequate diversity in plants, or trees, to take up from the soil at the same time these various elements, and by this principle only can we make a perfect success in tree and fruit growing. In planting our orchards, various kinds of forest trees, together with various kinds of fruit trees, interspersed through the orchard, would, I think, furnish the sequel of success in fruit growing on the prairie.

The most perfect specimens of fruit and fruit trees, if my observation is correct, are found growing under these same conditions in the state of Iowa. Many cases are on record where mixed grains have produced a marked increase in the crop, as well as a better developed and more perfect grain in all the different kinds grown together.

CHAPTER VI.

FRUIT GROWING.

IN presenting this subject to the intelligent reader, I shall advance ideas in opposition to the opinions of many that are even successful fruit growers. While the pride of the western farmer would like to have the opinion go out on paper, that the western prairie is well adapted to fruit growing, and that the production of fruit is a general success on the prairie, yet the discussions at our horticultural conventions seem to disclose the fact that there are great obstacles and impediments to growing fruit throughout the west. Notwithstanding this fact, there are some portions of the prairie country that are now producing a surplus of apples and other fruits for the market. Comparatively speaking, a large share of the fruit trees planted on the western prairie have died out, and a system of replanting is necessarily required to keep up the supply in the orchard. In the early settlement of the west, nursery stock was usually brought into the west from the older states, and the celebrated Rochester nurseries of New York supplied a large share of this trade.

The promiscuous and careless manner of planting this stock on the newly turned soil of the open prairies, without protection from the winds, was sure to

result in a general loss of the trees that followed as a natural result of such planting, and the tree peddler and eastern nurseryman become very unpopular in the west. Coexistent with this condition of the fruit business in the west, these same Rochester nurseries furnished trees by the ship load that were transported clear around Cape Horn to California, and there transplanted with the greatest possible success, and came into bearing within three to four years, or about one-half the time required in the older states. While all the different varieties of these trees proved to be vigorous and healthy in California soil and climate, they at the same time proved to be very prolific bearers, and the quality of the fruit was such as could scarcely be recognized by the eastern fruit growers, the same species producing an entirely different and superior quality of fruit to that produced in the older states. All fruits except the apple seem to be improved in quality, as well as size, by transplanting in the volcanic soil of California. The California climate doubtless has much to do in giving the superior flavor to fruits of that country. The apple, as an exception, loses in flavor in California climate and soil, and is found in its more perfect flavor on the sandy or gravelly lands of Michigan, Northern Ohio, and portions of New York.

The brackish or bad flavor of the apple grown on the prairie is doubtless caused by the alluvial soil, and planting on lands that have been tilled for a number of years will obviate this difficulty. We find the soil of California, which is destitute of or-

ganic matter, and composed mostly of decomposed volcanic rock, and especially mineral in its nature, especially adapted to all the different kinds of fruit which grow in the greatest abundance and of the most luxurious character, while the main staples of the western prairie, such as corn, oats, and grass, cannot be raised there with any success. The pear tree finds in the California soil its natural home, and proves a success beyond anything ever known in the experience of that fruit in any other country. The pear tree is but a partial success on the prairie except on the hard or bluff lands bordering the rivers, or such lands as are, in a great measure, destitute of organic matter. What is essential to the pear is also more or less essential to the cherry or plum. A few varieties of these three species of fruit seem to be sufficiently hardy to stand the climate of the more northerly portions of the western prairie, but in latitude south of about forty-one degrees, the different varieties of pears and plums, as well as cherries and peaches, are grown successfully on such soil as has a special adaptation to fruit growing. The small fruits seem to have much the advantage in their adaptation to the alluvial soil of the prairie, and make a better success on new lands than standard trees. The nurseries that are becoming now established throughout the whole western country are able to supply each locality with all nursery stock that is adapted to the locality where the nurseries are located; but there are many of these nurseries that are located on lands not well adapted to growing sound

and healthy stock, and what is produced is of little value comparatively for transplanting. Such nurseries as are located on the level prairie land, on a soil that is deep and black loam without sand in its composition, but redundant in organic matter, will not furnish good, healthy stock that can be relied upon to grow an orchard.

Many of the western nurseries, for a want of practical knowledge in fruit growing by the owners of these nurseries, are unwisely located, and therefore of little value to propagate fruit from. To produce healthy nursery stock, as well as grow fruit successfully, land should be selected that is sufficiently rolling to give natural drainage, and the rougher lands that receive the most wash, or such as are naturally inclined to grow timber or underbrush, are better adapted to fruit growing. In the preparation of ground for an orchard, land that is rolling should be selected, and much better to have three or four crops of corn or oats taken off before planting to trees, unless the land is of that quality that is common to most timber lands in the west, or containing plenty of sand. No person should expect to make a success at growing fruit trees on the prairie without proper protection, by planting fast growing timber as a belt around the orchard, and also every alternate row through the orchard of some timber tree of the soft wood varieties. In planting in this way the rows should be twelve to fifteen feet apart each way, and only every other tree a fruit tree each way. In the course of time, as the timber became too much of an incumbrance and encroached upon the

fruit trees, it could be gradually cut away to be used for various purposes on the farm. In the early growth of the fruit trees, the various kinds of timber growth would give protection from winds, as well as to counteract in a measure the injurious effects of insects that seem to forbid the successful growth of fruit on the prairie. The softer varieties of timber planted through the orchard in this way would make a rapid growth and operate as an absorbent of such elements in the soil as are not taken up by fruit trees, on the same principle of growing corn or oats for correcting the redundancy of organic matter in the soil. Neither wheat or potatoes should ever be grown in an orchard, as wheat takes up in its growth the elements, silica or sand, lime, potash, and phosphorous, while potatoes depend in a great measure upon potash, and all these ingredients are the essential elements of growing fruit.

The orchard should be seeded to clover by the fifth or sixth year of its growth, and from that time forward should be the swine pasture of the farm. The early dropped fruit of the orchard is more or less infested with worms and insects of various kinds, and their complete destruction by swine would in a measure prevent their increase. The destruction of fruit trees by borers and other insects as well as by blight, is a source of aggravation and opposition to fruit growing on the western prairie.

While there is much speculation and diversity of opinion as to causes and remedy, it seems quite obvious that one common cause lies at the foundation of the whole trouble, and while a remedy is not per-

haps to be found that can be relied upon as a cure, at the same time much can be done that will tend to remedy these evils. As one of the means of success, I would advise planting orchards on land after it had been cropped for a few years in corn and oats. As another means of success, grow fruit trees in connection with timber trees or evergreens on the same ground. As a third source of security against all insect and parasitic life and the consequent blight, I would advise the use of ashes and carbonate of lime, or common quick lime. The application of these articles by sowing or scattering over the surface of the soil, if used in sufficient quantity, or used in a small quantity annually for three or four years, will correct this condition of parasitic life in the soil, and at the same time give to the fruit trees the proper food and nourishment that is so essential for healthy growth and a bountiful crop of fruit. An experiment by the application of these ingredients to one tree will satisfy any one of their practical value on most any soil, and on the alluvial soil of the prairie is almost indispensable to success in fruit growing.

The article of fruit, from its peculiar virtue as a hygienic necessity in all civilized nations of the earth, has a more important value perhaps to the people of the prairie country than to any other locality on the continent. The common habit of eating meat, which is so cheap in the west, especially with farmers, and the appetite created by our cold winters for meat and other hearty food that is consumed by people engaged in out-door labor to great excess, naturally

induces a bilious condition of the system, which, as the hot months approach, is aggravated by any miasmatic condition of the climate, and the various febrile diseases follow as a natural result. As a counteracting influence to this morbid condition of the system, fruit, as an article of diet, becomes a matter of necessity, and tends to keep the human system in a healthy tone, and so avoid the prevailing diseases that are both epidemic and endemic in character. Fruit through the hot months of the season is an indispensable necessity, and at whatever cost procured, should be used plentifully by every family. It is from the neglect of these timely precautions in diet that many families of all new countries are necessarily under the care of physicians, that tend to exhaust the purse of the unfortunate invalid, and destroy in a measure all hopes of prosperity in business, as well as mar the social life and well-being of the individual or neighborhood. Good health is the mainspring to all human prosperity, and makes life an object even under the most discouraging circumstances of misfortune. Throughout the whole western country, where fruit has not become a common article of diet, from its scarcity and consequent cost, and by the economical principle of living necessarily required by the poorer classes of people that are seemingly deprived of its use, we behold the result of this deprivation in the frequent sickness among that class that is constantly tending to check their onward progress in wealth and prosperity. For want of a proper knowledge and appre-

ciation of the facts as to the necessity of using fruit by all classes more or less able to purchase where fruit is not grown, much loss and suffering by ill-health is common throughout the west.

In cases where the early settlers have not been able to raise fruit so as to have the necessary supply, the dried apple in market is probably the most valuable as well as the cheapest for consumption. While the several varieties of fruit are all good in their time and place, the apple, as a common article of diet, either fresh or dried, has no equal in value and no substitute in its peculiar adaptation to the human system.

For summer fruit, the strawberry, currant, raspberry, gooseberry, and blackberry, each in its season, can be easily cultivated on most all western soils, and every garden throughout the land should be supplied with them in sufficient abundance for all wants of fresh fruit, and each can be successfully dried or preserved for winter use. In the absence of the various fruits from standard trees that necessarily require time to grow, these small fruits can be substituted and grown so quickly that no one can excuse themselves for not having plenty of fruit after two or three years' location on a farm. For a strawberry, the Wilson's Albany is undoubtedly the best variety for general cultivation through the west. The grape should also be cultivated by every one, as a wholesome fruit and one well adapted to most all prairie soils. While there are many varieties in cultivation, and all more or less valuable, the

Concord is the main stand-by, and will pay for cultivation better than any other variety. All the wild fruits found in the country can be transplanted to the garden and improved by cultivation, and usually, on new lands, grow successfully and prove more profitable than cultivated varieties.

CHAPTER VII.

GRAIN GROWING.

THE subject of grain growing on the western prairie is one of no secondary importance, as all farmers on new farms must necessarily make this a leading business, until at such time as the farm can be fitted for handling stock to an advantage.

The stock grower also finds it a necessity to grow grain extensively for both summer and winter feeding. With the very large crops of corn and oats, so easily raised on the alluvial soil of the western prairie that will not bear transportation any great distance, the growing of grain is found to be generally unprofitable under the present prices, as well as those that are likely to prevail in the future. The great extent of country that is being suddenly opened up to grain culture in the west, is sure to have its effect on the grain markets of the world; and if transportation could be furnished to throw our annual surplus into the markets suddenly, the consequence would be a glut in the markets of both the old world and the new.

With the extensive progress being made for facilities of transportation, it is found entirely inadequate

to the demands of the west; and while the country demands twenty-five millions of tons freightage annually, only nineteen millions of tons are furnished in the aggregate.

And while the natural remedy for this condition of things consists in building up all the reciprocating industries of the various manufacturing interests, so much demanded in the west, to obviate this great demand for transportation, this remedy cannot be brought to bear suddenly so as to give immediate relief, or give promise of a better price for grain in the immediate future. The very idea suggested by the word transportation, naturally implies the fact of the agricultural wealth of the country being concentrated into cities and villages by the various lines of transportation that tend to impoverish the western farmer, and by this process of concentration of capital to cities, build up unproductive wealth, that supports a vast population in luxurious living, all at the expense of the farmer.

The only condition of immediate relief for the western grain grower consists in that close alliance of stock growing that will consume the surplus grain of the country to a great extent, and thus concentrate the bulky produce of the country into a form that will more profitably bear transportation to distant markets.

On farms newly broken up, a fair crop of wheat can be raised, on the prairie, but after a few years' cropping, wheat is no longer a reliable crop. In all that portion of country north of forty-one degrees north latitude, it costs about one dollar per bushel

to raise wheat on an average, and south of that parallel, in the corn growing region, it costs nearly two dollars per bushel to raise wheat. But the prices are very seldom realized, and hence the unthrifty and poverty stricken appearance that characterizes the farm of the western wheat grower.

While on new lands a crop of twenty or twenty-five bushels per acre is occasionally produced, and a small profit is realized, the best wheat districts of the west only average about thirteen to fourteen bushels per acre, and a large portion of this is of such inferior quality, that a deduction below market price is necessarily made that still curtails the profits; and the average crop of the western prairie is only ten bushels per acre. The European markets have for the last two years afforded an outlet for the surplus wheat of the country, so as to give the western farmer eighty cents to one dollar per bushel for wheat; but even this market cannot be relied upon more than one year in five on an average. And while a temporary market will occasionally give the wheat grower a living price for wheat, this is an inducement to greater outlay in growing wheat that is calculated to bring ruin upon the wheat grower. These facts, though apparent to the most careless observer, do not seem to be heeded, and a repetition of the same routine of cropping is followed from year to year, by a large portion of laborers throughout the west, "that live from hand to mouth," and do not seem to realize that any better opportunity is afforded them for obtaining a livelihood.

While the cost of raising oats and hauling to market in the west is not less than twenty-five to thirty cents per bushel, allowing the average distance of each farmer from market to be six miles, it will be seen readily that there is no better pay in hauling off oats to market than there is in wheat, as the price of this grain will seldom give satisfactory compensation for producing and marketing off the farm.

And what is true of wheat and oats is also true of the corn crop. As a basis for getting at the facts in the shape of figures, we will estimate the average value of an improved farm in the west at twenty-five dollars per acre, and take one hundred acres as a basis for calculation, as follows:

100 acres of land at \$25 per acre.....	\$2,500
Necessary teams and farm tools.....	1,000
	<hr/>
Capital invested.....	\$3,500

WHEAT CROP, DR.

To interest on capital at 7 per cent.....	\$245
To amount taxes in all.....	100
To cost of breaking at \$3 per acre.....	300
To cost of 200 bushels seed at \$1.00.....	200
To putting in seed at seventy-five cents per acre.....	75
To harvesting, including board, at \$4.00 per acre.....	400
To threshing fifteen hundred bushels, at 12 cents.....	180
To hauling to market, at 5 cents.....	75
	<hr/>
To cost of fifteen hundred bushels of wheat.....	\$1,575

WHEAT CROP, CR.

By fifteen hundred bushels at 85 cents.....	\$1,275
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A loss on wheat crop at the average yield per acre in the best wheat districts, we find by this esti-

mate is \$30, while the average yield of the prairie is about ten bushels per acre, and costing for production not less than \$1.25 per bushel.

We will now suppose he gets twenty bushels per acre, or two thousand bushels at eighty-five cents per bushel, and we have \$1,700, but deduct seventeen cents per bushel on this five hundred bushels added, for threshing and marketing, it being \$85, leaves \$1,615, or an apparent profit of \$40; but the business of wheat growing necessarily requires a certain capital in machinery that depreciates in value very fast, and horses, that are an expense to the owner for nearly one half of the year without any profit, and when we consider the loss by death on work horses, and all other items of contingent expenses, it is not safe to estimate any less than twenty bushels per acre to make a wheat crop pay for raising. The cost of hauling six to twelve miles on an average, cannot be estimated safely at less than six cents per bushel. The cost of threshing wheat I have figured for myself a number of times, and find that the cost is about twelve to thirteen cents per bushel, everything included.

Now when we ascertain the fact that the average yield of wheat in the west is only about twelve to fourteen bushels per acre on the best land, and that the average price realized by the farmer is only about eighty cents per bushel, the fact becomes plain that the wheat grower gets no pay for his labor, that is any object or inducement to continue the business.

Again, if a man lives near a station so as to save the expense mostly incurred in hauling to market,

the additional value on his investment in land will offset the gain in distance to market. In estimating the cost of labor in this statement, we cannot take any other basis than the price of labor by the day at the time the work is done, and for a number of years in the past, the cost has been fully up to the estimate here made.

The actual expense of keeping a reaper and keeping in repair, will make the cost of cutting usually twenty-five cents per acre besides the interest on the money invested, which item is not entered in the statement here furnished.

In contrast with wheat growing we will give a statement showing the average cost of oats, as follows:

100 acres of land at \$25 per acre.....	\$2,500
Teams and farm tools.....	1,000
	<hr/>
Amount of investment..	\$3,500

OAT CROP, DR.

To interest on capital at 7 per cent.....	\$245
To taxes in the aggregate.....	100
To cost of plowing 100 acres, at \$1 50.....	150
To cost of 200 bushels seed, at 20 cents.....	50
To putting in seed, at 60 cents per acre.....	60
To harvesting, at \$4 per acre.....	400
To threshing 4,000 bushels, at 8 cents.....	320
To hauling to market, 4 cents per bushel.....	160
	<hr/>
Cost of 4,000 bushels of oats.....	\$1,485

OAT CROP, CR.

By 4,000 bushels, at 15 cents.....	\$ 600
	<hr/>
Apparet loss on crop.....	\$ 885

Now we will make an allowance of \$285, that by economy and overestimate of taxes for certain places, and we still have \$1,200 cost, or thirty cents per bushel for cost of oats in market, or at the lowest cost on the farm in granery is twenty-five cents per bushel threshed, or seventeen cents per bushel in stack on the farm. As an essential food for most animals on the farm, fed in the straw, with the value of straw for bedding, oats are a good crop, and will pay well to raise for feeding in this way, and for growing sheep successfully, are a necessity for winter feed.

For an estimate in growing corn, we will take the same basis of estimation as heretofore:

100 acres land at \$25 per acre.....	\$2,500 00
Stock and tools.....	1,000 00
Capital invested.....	<u>\$3,500 00</u>

CORN CROP, DR.

To interest on capital, at 7 per cent.....	\$245 00
To taxes in full.....	100 00
To plowing 100 acres, at \$1.50.....	150 00
To fifteen bushels of seed, at 50 cents.....	7 50
To preparing and marking ground.....	40 00
To planting 100 acres, at 60 cents.....	60 00
To tilling ninety days at \$2.50 per day.....	225 00
To picking and cribbing 4,000 bushels, at 5 cents.....	200 00
To cost of 4,000 bushels in crib.....	<u>\$1,027 00</u>
To hauling to market at 5 cents per bushel.....	200 00
To cost in market.....	<u>\$1,227 50</u>

CORN CROP, CR.

By 4,000 bushels, at 15 cents.....	600 00
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Deduct for any over estimate that might be saved in favorable localities, and we still have a cost of twenty-eight to thirty cents per bushel in market, or twenty-two to twenty-four cents in crib on farm.

It will be readily seen from the foregoing statements, that the raising of the three leading staples of grain in the west will not pay a price that will give prosperity to the farmer if hauled off to market. But on the contrary, as a means of growing good stock, grain is an essential crop on the farm, and where farming is carried on intelligently, in the form of mixed husbandry, there is still ground left for a reasonable profit in western farming, even under the present depressed prices of all farm produce. While the western farmer cannot suddenly produce wealth with his own labor, he can at least with the proper intelligence and economy in managing a farm, grow up wealth under the various natural advantages that surround him in a rich and wealthy country, that furnishes all the facilities for growing superior live stock, sufficient fruit and timber of all the varieties essential for the practical wants of the farm, as well as the benefit of the country at large.

From the natural advantages of cheap land already fitted for immediate culture, no country in the world offers equal advantages for the beginner in life, who has a proper zeal and ambition for prosperity in life. The important principle that underlies western prosperity in agricultural pursuits, is embodied in the words "growth and development."

In reiterating the fact or principle that furnishes the actual sources of wealth to the tiller of the soil,

the ground plan should be properly established in the gradual fitting up of the farm, with permanent and cheap live fences, and timber for the use of the farm and protection against winds, as well as the varieties of fruit that furnish the table through the different months of the year with fresh, luxurious, and necessary food. With these permanent fixtures that soon grow up into a source of wealth for the individual, as well as the country at large, the various classes of domestic animals that thrive so well, and are grown so cheaply, will always give a source of profit if properly fed and cared for, and of the right kind for the natural adaptation of soil and climate, as well as demand of the markets. As a means of success in agricultural pursuits, a competent understanding of all the principles that guarantee success is essential; and while the novice can perhaps drive a team, hold a plow, or do other hand work about the farm, a success in agriculture naturally implies an ability, judgment and discrimination that is not given to all men. A wider comprehension of facts, of cause and effect, and of physical science, is demanded of the agriculturist, than is demanded by any other calling in life.

While the merchant may be able to conduct trade successfully and profitably with a proper understanding of his business, he would fail in managing a farm successfully for want of ability and practical knowledge of the business. While the lawyer from his extensive reading and practice in his profession becomes skillful at the bar, or as a statesman, he would at the same time lack the acquired, as well

as the natural ability, to manage a farm successfully. And while each profession has its advocates and followers who are supposed to be skillful in their various callings, the agriculturist has a no less important and responsible position in the scale of humanity. While the professions are filled with men egotistical as to the importance of their several callings, from the fact of their training in certain narrow channels of thought and investigation, the farmer on the contrary has a broader field of thought and investigation, and from direct contact in every day life with greater diversity of resources of thought and investigation, a higher training on broader principles fits the farmer for the more responsible positions in human life.

It is from these facts that we notice nearly all prominent men of the nation had their early training that so stamped their minds and fitted them while young to grapple successfully with the various obstacles that necessarily overthrow men of weaker minds. It is not the hot-bed culture of college education, or a training in the lore of the professions that gives power and strength to the mind of man, or fits him for the higher positions in civil life. On the contrary, these agencies, if not properly made use of as a means of development to the intellect in a healthy and natural channel, are only a source of imbecility and incapacity in the individual. The common source of failure in all classes of business, is a mania for speculation. The farmer is no less liable to this prevailing fault than the merchant or other tradesman, and the whole American people

are notorious for vacillation and a spirit of speculation. A want of some settled policy in business pursuits is the great obstacle to success with the individual, while the want of a settled financial policy in the general government tends to give distrust and discontent in all branches of trade, as well as agricultural pursuits. An unsettled policy of any government as to financial affairs, necessarily creates an agitated and uncertain condition that naturally follows through all the various channels of trade and commerce, and prevents a decided and settled policy on the part of individuals in all the various callings in life. The financial as well as social condition of a country is suddenly changed and broken up by the emergency of war, that is the common curse of all nations.

The artificial values created by the late American rebellion, the vast fields for speculation so suddenly opened up to all classes of trade and industrial pursuits, that resulted in fast living and liberal spending of money by all classes of people, necessarily operate as a great evil to the country at large; and when all the various channels of trade and business pursuits, as well as values, return to a normal and healthy condition, mankind are disposed to find fault and complain of hard times.

The nation returning to a condition of peace, and all the various industries of life being restored to that regular order that is calculated to give permanent and healthy growth and development to the country, the various sources of speculation and sudden wealth to individuals are necessarily curtailed,

and however unpleasant and unpalatable the fact, a change in economy and expenses in living is found to be a necessity.

The sudden change of the industrial population of the country to agriculture, as well as the liberal investment of capital in this direction, on the restoration of peace to the country, has resulted in an over productiveness of agricultural produce, and consequently thrown this industry out of balance for the time being, and the relative values of all other commodities are greatly disproportioned with the value of farm produce.

The natural channels of trade, with the various commodities of production, will gradually assimilate and find a level, and the natural tendency of the law of equalization that governs all industrial pursuits, will surely in time regulate any disproportion in the products of a country.

The liability to extremes that naturally attaches to all classes of business, should be studied, understood, and appreciated by the farmer, as well as all other men engaged in the production of wealth, through the common agency of industry and labor. Although the avocation of the farmer is temporarily under a cloud of adversity, he should bear in mind the fact that in this country, all other branches of business are predicated on the growth of agricultural wealth, and only in the prosperity of this branch of business is found a guarantee of prosperity in other dependent branches of trade and industrial productions.

Again I would caution the farmer against this

common tendency to speculation, and promising to pay that which he has not got to pay. This is the common cause of ruin, so eagerly sought, by inexperienced and unthinking people, in all business callings in life. Spend no money until you have earned it, and have it to spend, and then spend cautiously, prudently, and carefully, as this will be found the only reliable sequel to success in any business.

A common fault with all classes of people is found in the fact of their presumption to be able to pay in the future what they do not at the time possess. A disposition to gratify immediate wants by borrowing and promising to pay in the future, is the great and important obstacle to success in business with all men. A man gives his note at ten per cent interest—this by the holder is looked upon as so much property in his possession; on the contrary, it is not property, but a presumption on the part of the giver that he will produce or create property to pay, or fulfil the promise; but in nine cases out of ten that presumption fails of a full realization, and the note maker is in a condition of bondage, a slave at the mercy of the one giving him credit. He has used the property of another without a proper appreciation of its value, or a proper knowledge of his own ability to meet the demand.

While the proceeds of capital invested in agriculture, under ordinary times of prosperity, will only pay three to six per cent interest, with good management, the farmer that promises to pay ten per cent interest, promises that which he has not got, and is therefore a loser in nearly every case, and his

credit a damage to him ; while the holder of ten per paper, with *bona fide* security, has a better investment than any class of business engaged in by mankind. Isolated cases, through good luck or good management, give to the business man an income of more than ten per cent ; this furnishes an inducement to others to try the same experiment, which in nine cases out of ten falls short of the anticipated result, and the borrower or adventurer on credit is most always the loser.

A large portion of the people occupying and working lands in the west, are young and inexperienced, and not a few of these are men that have failed in other branches of business, and resorted to farming as a necessity. Of these two classes, it is quite evident that a large portion of them are laboring to a great disadvantage, not comprehending fully the facts and conditions of success, often changing about from place to place, hunting for better countries where imaginary fortunes are easily acquired ; these habitual emigrants forming a class of floating population that are of little real worth to the country or to themselves.

This element of population is common to all new countries, and is a characteristic of frontier life that is only remedied by time and the development of the country. To this class of people here referred to, as well as to young men who have an ambition and desire to accomplish something in the world, I would here offer a few words of advice. In the first place, stop traveling. "A rolling stone gathers no moss," and "three moves are as good as a fire."

The natural features of the whole western country are so nearly of a sameness, that no one locality presents advantages of any great importance; and aside from the object of getting hold of cheap lands on the frontier, there is no great advantage in locality. Secondly, all young men without a proper training on the farm, where they have had good practical discipline under experienced and able men, I would say at once, seek such a position and maintain it for such a number of years as will enable you to both lay up a small competence at least, with a practical knowledge that you will have obtained, which is worth much more for the future management of a farm than the wages obtained for labor. Under the guidance of competent and successful business men, the young man for a few years will acquire that which is of much greater value than the wages obtained for labor. No young man, however ambitious he may be, or however self-conceited as to his own ability, can reasonably expect to make any success, in any calling or business, without that due preparation which can be had only through the advice and experience of older persons. While no young man can expect to set up in any mechanical trade, or in any profession without proper study and application to business, under the guidance of experienced masters and teachers, it is no less important that the same system of apprenticeship should be served on the farm, to fit the young man for future success in that avocation of life.

While a certain amount of skill and practical knowledge are essential for success in the mechan-

ical trades, or professions, a more comprehensive knowledge and judgment, as well as practical training and education, are necessary for success in the various branches of farming. A wider field for investigation, and one calling out the various faculties of the mind, to a more complete development of both mind and body, is here presented on the farm. The full development of physical strength so essential in any calling in life, is obtained no where else except on the farm; and for this reason it is, that from the farm is supplied to the various professions and other positions in life, the most able and successful men. Many of our fast young men are attracted to the towns and cities, that have their allurements for simple-minded people; and as the moth is allured by the bright light of the candle, to go in and get scorched, so it is with our young people that are attracted to the cities — they go in and get scorched. The demoralizing habits that are so sure to be acquired by young and weak minded people in the association of city life, are calculated to unfit young people for any usefulness in life. The character and habits formed on the farm, and in the district school under the care of strong-minded parents and competent teachers, is of greater value to the young, and better calculated to give that qualification which fits them for valuable and useful citizens in a civil community. The proud and sensitive feelings of young men from the farm, dressed in their homespun and coarse apparel, cannot quietly receive the sneers and scorn of the village dandy; and often from this cause, young men are attracted

away from home on the farm, to gratify a sensitive pride and ambition that so frequently proves the ruin of people in all situations in life.

The young man in his homespun should realize the fact that the glossy garb of the village dandy is usually the shoddy of the cast off clothing of the old countries, which is reproduced and fitted for the "western trade," and the clothing itself is a fit emblem, in many cases, of the person wearing it.

The young lady that will refuse the hand of the industrious mechanic or farmer boy, by reason of his rustic garb and manners, for the city loafer, will in nine cases out of ten, before many years, be found engaged in washing, or some other menial labor, to support a miserable life. Narrow minded and egotistical people so often found in the various professions, and fluttering about villages and cities, are very apt to treat with scorn and contempt the rustic farmer, or other workman in his appropriate dress; but the more sensible portions of even city inhabitants, have a better appreciation of moral worth, as well as the intrinsic value of the various elements of society.

CHAPTER VIII.

FARMING IN THE MOON.

THIS subject I find is one that gives rise to various opinions, and probably no one subject connected with every day life calls out so many contradictory opinions as the subject of the moon's influence upon the atmosphere of the earth, or its otherwise having a bearing upon the growth of vegetation. A noted divine, when asked his opinion of the truth or falsity of modern spiritualism, replied that there was doubtless some truth in it, but no good resulting to mankind. This subject of moonology is looked upon very much in the same light by many people, and like most other subjects based upon natural phenomena, that are not clearly comprehended by the intelligence of man, give rise to various opinions and theories, concerning their origin, cause, and effect, and moral bearing upon civilized people.

I take the ground that any principle of nature that is manifest to the sensibility of man, or is in any way cognizable by the senses, is one that calls for an investigation by man's intelligence; and if any good can be found in it, or any practical utility can be

drawn from it, we should endeavor as far as possible to avail ourselves of these advantages, instead of standing aloof and allowing the superstitious faculties of the mind to condemn and ignore, in fear of some great moral catastrophe dawning upon the earth, through the discovery of some new fact or principle in nature. The effects of the moon's influence upon the earth, are plainly recognizable in many ways, but the agency of this influence upon the earth, as well as the extent of this influence, seems to be involved somewhat in mystery, and scientists disagree as to both causes and effects produced through the influence of the moon. I take the position that the direct agency of this principle, and all the various phenomena growing out of the moon's influence upon the earth are all traceable to that common principle of nature, magnetic power. Some scientists maintain the idea that magnetism, electricity, heat, and light, are only synonymous, and are one common principle of nature, depending upon the sun for their generation and continuation. While magnetism and electricity are one and the same principle, and heat and light have a close affinity to magnetism, I am of the opinion that magnetism, or electricity, is a coexistent property of all matter, and independent of both heat and light. The magnetic power of all planets seems to be proportioned to their size and density combined, and all the primary planets of the solar system, with their satellites are effected by each other's magnetic power or influence when in such a position in their orbits as necessarily brings this power to bear upon each

other. Our most able astronomers have foretold the events of certain conditions to take place in the earth's atmosphere, through cosmical agency, and the certain relative positions to the earth, of some planet necessarily producing an agitated and unusual condition of the earth's atmosphere. These various influences are brought to bear upon the heat and light pertaining to the earth, and through a changed condition of the atmosphere a corresponding change is manifest in both animal and vegetable life. Also a change of condition in the sun's heat and light through planetary influences, often causes man to mourn, and animal life to suffer, through the agency of epidemic and epizootic diseases.

Vegetation also is effected, and the special interests of the farmer are more or less governed by these agencies.

The effects of the moon upon the earth are more easily comprehended and definable than those of the primary planets of the solar system. The regular tides of the ocean are traceable directly to the influence of the moon, as well as the rise and fall of water in wells and springs; remitting springs flowing at certain times, under certain conditions of the atmosphere, then ceasing entirely, are facts that seem to be incontrovertible, and these facts all dependent upon certain conditions of the atmosphere. A weather table, said to be dictated by the eminent Dr. Hirschel, and predicated on certain changes of the moon, at a certain hour of the day, having an influence upon the weather that could be foretold and provided for in advance, was for about sixteen

years closely observed by myself, and found to be quite correct and reliable.

The moon's influence in controlling the condition of the atmosphere, to a certain extent, is probably true; but instead of its depending upon the light of the moon in any way, I am much inclined to doubt, but on the contrary is owing entirely to the electrical condition of the atmosphere. A person who is nervously affected, and is very sensitive or passive in receiving magnetic forces, will notice readily all these various changes in the atmosphere, and often comprehend the changes of the moon without any reference to the subject from any outside or apparent influences. A more settled condition of the weather, and a more bracing condition of the atmosphere is plainly perceptible at about the full of the moon; and in the dark of the moon the contrary condition is more often true. Many people seem to think that planting in the wane of the moon has been discovered to prove quite advantageous in producing good crops. What is called moon-blind in horses, is a periodical blindness that occurs at a certain stage of the moon, and the sight again restored, and these periodical changes continue regular with the change of the moon. Horses thus affected are called moon-eyed, and this periodical affliction is doubtless caused by a defective nervous organization of the horse. Many diseases peculiar to the human family seem to be periodical in their nature, such as many types of fevers, running fourteen, twenty-one, and twenty-eight days, these periods of time corresponding with the changes of the moon as to duration.

CHAPTER IX.

DISEASES OF DOMESTIC ANIMALS IN THE WEST.

SOME twenty years since, while on a farm in Ohio, the disease called milk sickness among horses and cattle, was quite prevalent in some portions of the country. Cattle and horses were attacked suddenly and usually died in twelve to twenty-four hours with all symptoms of poison.

Investigation by a certain farmer led him to believe that a common weed called snake weed was the cause of it. This weed, growing two to three feet high, with a white blossom on the top, was a common weed in most woods pastures, before the domestic grasses took root and covered the ground. To prove this theory of his, the farmer took a horse of little value and forced him to eat this weed. The result of it was death to the horse with the same symptoms attending the disease in other animals.

This test was satisfactory to that portion of the country. Cattle in grazing would accidentally get this weed mixed with their food and death was usually the result. In subsequent years this same or a similar disease prevailing in portions of the state of Indiana became a subject for investigation by the

farmers, and a certain one believing that it was produced by the malarious fogs that arose from the ground in certain places deemed sickly, and this fog or dew falling upon the vegetation where cattle grazed, so poisoned the feed as to produce this fatal disease. To test this theory a few bundles of sheaf oats were spread upon the ground so as to receive the falling dew for a few nights, and then raked up and fed to a cow. The result of this experiment was death by milk sickness. This test seemed to settle the fact as to the cause of milk sickness in that vicinity.

In connection with this disease among cattle, murrain has also afflicted cattle on the frontier settlements of the older states, which has usually been attributed to poisonous water abounding in parasitic life. Swine also have had their scourge under various forms of disease in the same condition of life. In connection with the various diseases of animals, mankind have also suffered from the various febrile diseases induced by the same common cause, the decay of vegetable or organic life.

“Death is the beginning of life,” and when viewed through the established laws of nature, means only a change of organic structure. To refer back to the two apparently different causes of one common disease, we find poison from eating a certain plant and poison resulting from a falling dew resulting in the same symptoms of disease.

This is easily explained under the following hypothesis: The soil of both localities was quite similar, in that condition when decomposition was going on

to the fullest extent. In Ohio clearing was performed by cutting down timber which was commonly left on the ground to decay, together with forest leaves that had gradually accumulated through a long period of years, forming a deposit of organic matter, that fostered the growth of various plants that made their appearance as soon as the timber was cut off.

Now it is a settled fact that the various kinds of forest trees act to a greater or less extent as absorbents, purifying the atmosphere of any malarious conditions that would otherwise be injurious to animal life. By cutting away the timber, nature interposes again and furnishes new plant life, that performs this same office of absorbing the poisonous condition of the atmosphere and soil, purifying the same; while the plants themselves partake of this poisonous nature extracted from both the soil and the atmosphere.

This principle seems to be ever active in nature, and conduces directly to the benefit of animal life. Where these plants are destroyed by plowing new lands, the poison is set free to rise in the atmosphere and become injurious to animal life. This principle of absorbents seems to be ever acting in nature, and tends directly to the benefit of animal life. While these poisonous plants are interposed as a mediator for the benefit of animal life, all animals are given an instinct to shun them as food. The common domestic sunflower is known to be one of the most valuable absorbents of impure air. Throughout the western prairie, on low bottom lands abounding in

organic matter, we notice the wild sunflowers and many other plants, some of which are used by the medical faculty for (killing people) curing diseases on account of their active poison. These various plants, all to a greater or less extent acting officially for the benefit of animal life, either as absorbents of malarious poison, thus becoming poisonous themselves, or acting as food for animals. Thus we see harmony prevails throughout the animal and vegetable kingdom in a normal condition. But as the hand of man is interposed and these natural absorbents destroyed by turning over the soil, and greatly increasing this process of decomposition and setting free the resulting poison to be wafted over the country by the winds that carry disease broadcast over the land, we behold as the result of this, the various diseases that afflict mankind and our domestic animals. While diseases were more local in the timber states, they become more general but less fatal on the prairie. No large bodies of timber to interpose or correct any baneful influence of the atmosphere, disease becomes more general. With the early settlement of the prairie when but little breaking was done, animals as well as mankind were more healthy, and cholera among swine was not known. With the general turning over the sod and exposing vast fields of vegetable matter to decay with no adequate relief by natural absorbents, all the various febrile diseases arising from malaria in the atmosphere afflict the human family, and more especially so when we get rain in the hot months; thus hastening de-

composition and producing a more poisonous condition of the atmosphere.

While various fevers prevail among the human family, cattle and horses seem to be more or less afflicted, and especially swine, by coming directly in contact with the source of the disease, the decaying soil, are more generally and more fatally afflicted than other animals. The common disease called "black leg" among cattle is caused by poison in the blood arising from this same malarious poison. Cattle and swine are often in a diseased condition from this cause, when but little outward indication of disease is observed in the animals. The sudden change of feed with cattle when they are in a diseased condition, taking them from green pasture and turning into stock fields often terminates fatally. Swine should be kept off from new breaking and if possible allowed to run in timber, which to them is a paradise. Pure running water is healthy for swine as well as all other stock, but stagnant water, always infested with parasitic life in warm weather, is injurious to all stock.

During the summer of 1871 I broke about one hundred acres river bottom land and sowed the same fall to rye and seeded to timothy; turned in cattle and hogs in the spring of 1872 and had a heavy growth of feed during the season. It being broken deep and being tough sod did not rot the first year, but as the warm weather of 1872 approached it was quite evident from the bad stench arising from the ground that decomposition was going on to such an extent as to endanger the health of all stock in the

field. I removed my cattle to a more healthy locality; one colt was left in the field and about two hundred head of grown hogs, also about two hundred pigs. I provided plenty of slack coal and salt, which was placed so as to give them all they desired, also poured on some coal oil; this they devoured greedily. After the heavy rains in August I noticed the stench from this ground was very bad, and concluded my hogs would all die if not taken off to a more healthy location. As the pigs were about old enough to wean I took one hundred and fifty of them and put into a ten acre clover field for the purpose of feeding; about fifty remained with the old stock, and these were turned into a timber lot and furnished with plenty of coal and salt with coal oil, and fed corn all they would eat to fit them for market.

The pigs that were turned into the clover field, being out of the timber and without water except what was given them, had been well inoculated with disease before removing to their new quarters. About this time I was myself attacked suddenly as I had feared would be the case from the two or three days' exposure in getting the hogs off this bottom field, and was not able to be out for a number of days, and did not recover so as to be able to do any work for about three months. As I could not attend personally to the pigs turned into the clover field, cholera broke out among them and destroyed the most of them. The older hogs and pigs in the timber remained free from disease apparently, but did not make as much gain for their feed as they should have done.

After feeding about thirty days I concluded to sell all my hogs, about one hundred and fifty being fed for market, but as they were not at this time in proper condition to ship, the purchaser put them into a field on the open prairie and continued feeding. In a few days the cholera broke out among them and destroyed a large share of them.

These hogs were mostly blooded stock, Poland China, and Berkshire, and crosses between the two, and had been well cared for and were good stock. The colt left in the field was the only animal left after taking out the hogs; and when taken up in the fall for the purpose of breaking and fall plowing, was observed to have a swelling in the bony part of the head, that was the beginning of a disease common in portions of the west called "bighead."

Taking all things into account, this field did not pay a large profit for 1872. I give these circumstances in detail to corroborate the theories herein advanced.

The excessive amount of sickness in the west during the autumn of 1872 seemed to be more aggravated in that portion of country covered by the August rains; and more especially where drouth had prevailed the year previous. Scab and foot rot in sheep may have their origin in the same common cause, parasitic life originating in the decomposition of organic matter. While the loss of swine annually is a large item in the west, a loss fully as great not usually noticed results from the bad condition of health of both cattle and hogs by which probably one-third the profit is lost in feeding off for market.

While good hogs in a healthy condition will make ten pounds gain for each bushel of raw corn fed in warm weather, the average bad condition of hogs in raising and fattening for market in some portions of the country I think will not make more than five or six pounds gain for the bushel of corn fed. Hence the anticipated result of profit in feeding hogs is not realized through the west. Many experiments in cooking feed for stock have been made, which go to show that where a bushel of raw corn will make a gain of ten pounds, the same amount of cooked corn will make a gain of fifteen pounds. For feeding pigs or calves in weaning them off, I find it pays well to cook corn or other feed, but to cook corn to feed to fattening hogs or cattle I am satisfied with the present price of labor and price of corn, cannot be made to pay. The practice of feeding cattle corn in the ear and having hogs to follow is the most economical of any plan of feeding. In observing our native cattle in the west under their present stunted growth, arising from scant feed and a diseased condition of the system, we have a very poor foundation to build upon in making beef; and feeding low priced corn to such stock results in little or no profit to the farmer.

From the relative situation of the state of Iowa to the market of the world, it seems a necessity that we should convert our produce into meat and wool as far as possible; but in adopting this system of farming in our climate, we must observe certain prerequisites in order to guarantee success. The first of which is to procure good breeds of stock in

a healthy condition. The second is to keep those animals in a healthy growing condition up to their original standard of excellence.

The common cause of disease in the west, malaria arising from the decomposition of newly turned sod, is but temporary, and will be remedied by time, while the same cause of disease in the older states arising from stagnant ponds and marshes, is with them to remain as a continued cause of disease not to be remedied so quickly.

With a proper understanding of the causes of disease by the farmers of the west, their baneful influences can be to a great extent counteracted. As a mitigating agency, every farmer on the open prairie should grow timber, which will pay him in so many ways that it is quite difficult to estimate the value of it. All live stock should be supplied with plenty of salt and sulphur at all times; sulphur is probably the best antidote to parasitic life within the reach of the farmer; but as it is a poison, must be used with great caution to avoid any bad effects. Swine can be treated successfully by using slack coal where convenient, which is cheap and furnishes the needed sulphur as well as other valuable properties that are beneficial for swine. Salt should always be given by mixing with coal. A compound of sulphur, black antimony, nitre, and copperas placed where swine can have access to it, has proved a successful preventive of hog cholera. Carbolic acid is probably the most valuable article known to the medical faculty as a disinfectant, and every farmer should keep it in his house. I have cured very obstinate

cases of hog cholera with carbolic acid in connection with coal oil.

The mode practiced in the west of feeding corn to swine as well as other animals, often produces worms of various forms in the stomach and intestines; I have observed these worms in some instances working in the flesh of swine. The usual symptoms attending this condition of worms in swine are coughing. The free use of coal oil will effect a cure usually.

Tobacco fed to horses is said to perform a cure for worms. Salt and sulphur if used freely will prevent this condition of animals. Mange in all animals, including scab in sheep and lice on animals is a condition of parasitic life in the skin, and can be treated successfully with a decoction of tobacco applied to the skin. Coal oil is also good, but has to be used more carefully. White animals are more subject to this condition of the skin than those of a darker color.

Sporadic life, or fungi upon plants, is often a cause of disease or a bad condition of animals. This condition of plants, usually called rust, is produced in hot days in June and July. This rust may be produced by the excessive heat, producing an abnormal condition of the plant, and fungi that attaches to the vegetable or organic matter in the incipient stages of decay is the natural result; or it may arise from sporadic life in the atmosphere, occasioned by decomposition in the soil going on during the hot days of summer. This rust usually attaches to the straw of most of our cereals, thus injuring the crop of

grain as well as the straw. Timothy meadows on new land are often badly injured by this rust, and for this reason, as well as the bad effects of drouth in the autumn months on timothy, I would always sow clover and timothy together, for both meadow and pasture; clover seems better adapted to our soil and protects the timothy.

This fungi or rust upon hay or straw is an active but slow poison, and will, if fed liberally, show its effects. In horses the kidneys seem to suffer from this poison, and kidney diseases among horses are common during the winter while feeding on such hay. Abortion among cows and other female animals is often produced by this rust. Feeding corn to excess is a frequent cause of abortion in all of our domestic animals; and where corn is fed as in the prairie country of the west, injury by foundering often results to both horses and cattle; or a condition of the system is produced that is derogatory to the breeding qualities of the animals.

The principle of adaptation of animal life to certain climates is illustrated in the Texas cattle disease. All tropical countries abound in parasitic and insect life to a much greater extent than in a more northern climate. The parasitic life so common to vegetation in a warm climate, while it seems less fatal to animal life that becomes adapted to the country, is a fatal poison to animal life adapted to a northern climate. Texas cattle, under this condition of infection, are seemingly healthy, but, brought in contact with northern cattle, especially in the summer sea-

son, impart this parasitic life, which becomes a deadly poison to northern animals.

This was the theory advanced by Prof. Gamgee, who was appointed by the United States Government to investigate the disease. During the month of December, 1851, while spending some time in Central America on the Chagres river, in the vicinity of where the Panama railroad was being constructed, I took some lessons in animal economy, that are perhaps worthy of notice in illustrating this subject of the natural adaptation of animal life to different climates. The Panama railroad company were constructing their road by driving piles to bridge over the swamp that extends for a number of miles along the Chagres river. The laborers employed were Irishmen that were enlisted in this work by the promise of high wages, and transported there by the ship load. The climate of this locality, although abounding in animal life, in a normal condition, to a greater extent and in greater variety than most any other portion of the earth, did not permit a northern man to live longer than about thirty days on the average, unless by the constant aid of medicine. These laborers were buried in the swamp, and the supply kept up by importing a ship load every few days, until the work was completed. Yet here were various animals and birds that enjoyed their condition of life to the fullest extent imaginable. Also a species of the human family, more brute than human, manifesting a sagacity very little above the monkeys that sported among the tree tops in countless hordes. These semi-humans, in appar-

ently perfect condition of health and enjoyment, living on the spontaneous products of the earth as natives of the country, illustrating the fact that all conditions of animal life have their corresponding condition of climate, and are governed by fixed laws of nature, that seem to harmonize all physical life in a normal condition. This field of animal life would afford lessons that a Darwin might take advantage of in illustrating the development theory of mankind.

In the month of June, 1850, while crossing the mountains to California, our company stopped in the region of the foot hills of the Rocky Mountains, where feed was rich and abundant, for the purpose of recruiting our stock and preparing for the siege to come, of crossing the mountains and desert beyond, where feed could not be obtained. In sojourning upon this field, prolific with animal life in a normal condition, which were feeding upon the rich verdure of the soil, and which our stock enjoyed to the utmost, an idea came to my mind that destroyed the harmony of the occasion to some extent, which was caused by the great number of poisonous reptiles that threatened death to our animals while feeding. And while our cattle and horses were many of them bitten, the idea struck me that the wild animals were not so much molested, or, if bitten by these rattlesnakes, did not suffer from any poison. I have since entertained the same idea in traveling over different countries.

The idea of the poisonous rattlesnake inhabiting the same nest with the "prairie dog," and all the great

variety of animals here congregated, living together in peaceful harmony, suggested the fact that each of these, even the poisonous viper, was created by a wise providence for some beneficent purpose. The fact of the venom of the rattlesnake increasing with the heat of summer, suggests the idea of a very useful office held by the rattlesnake, in absorbing the poison from the soil or atmosphere, that other animals, of a more noble position in the economy of nature, might the better fulfil the destiny assigned them.

A corroborating fact to sustain this principle is found in the extermination of the rattlesnake from all countries where the soil has been cultivated long enough to destroy the poison arising from malaria that attaches to all new lands, and is developed by the decomposition of organic matter, that necessarily takes place to fit it for a higher civilization in mankind and a higher order of domestic animal life. As to means of resistance that may be wisely given to animals in a wild state, to counteract any malarious poison or poison resulting from the bite of poisonous insects or reptiles, an idea in support of such a principle arises from the fact or existence of what is called the mad-stone. At this idea of the so called mad-stone, the medical profession will of course answer with an incredulous smile, as they do not find it in their books, and the profession do not recognize any such principle in nature, and miracles are not given to modern times. But the medical faculty all live in "glass houses." What one school upholds another denies; what seems to

be an established fact at one time, is proved by subsequent investigation and discovery to be false, and the doctors disagree. The facts concerning the mad-stone, as I have been personally acquainted with them, are as follows: Certain parties in Linn and Cedar counties, Iowa, have what appears to be a small stone that resembles a piece of porous calcareous lime stone, the history of which seems to be somewhat traditional, but purported to be a substance taken from the inwards of wild animals, of the deer species. A number of instances have come within my observation, where parties were badly bitten by dogs, at the time raving mad with hydrophobia, and by application of this stone to the wound all symptoms and sickness arising from the wound were immediately removed, and a perfect cure performed in every case. The stone is applied to the wound, which draws so as to produce a marked sensation throughout the whole system. This stone clings to the wound until it fills itself by absorption, full of what appears to be a green matter, and when full drops off. It is then washed in sweet milk, by which process this green matter is cleansed from the stone, when it is again applied to the wound and filled again, until it will no longer cling to the wound, at which time it is considered a cure. This seems to operate the same in cases where people have been bitten with rattlesnakes. Some cases of long standing, where persons had labored under the influence of poison from the bite of rattlesnakes, have been cured by the application of this stone.

CHAPTER X.

EPIDEMIC AND EPIZOOTIC DISEASES.

I N a previous chapter a glancing view is given of some of the diseases common to the country which are attributed to causes local or endemic in character. And while these endemic diseases seem to come within the comprehension of man's intelligence in their origin and hygienic treatment, on the other hand there seems to be aggravating causes in different seasons, and causes not so easily comprehended that change the character of the many local or endemic diseases to that condition of general prevalence that renders them national or epidemic in mankind and epizootic in the domestic animals. This prevalent condition of various diseases that seem to affect a large portion of the animal kingdom to a greater or less extent, and become national in character, seems to forbid the intelligence of man in revealing their origin, cause, and treatment. And as the origin and final destiny of physical life would seem to be forever a mystery not to be comprehended by the intelligence of man, so the seeming inharmonious condition of life as manifested by disease in mankind, as well as the lower animals, would seem to defy the ingenuity of man in endeavoring

to form a solution that would give a reliable basis for a system of hygiene or therapeutics. It seems quite probable that the aggravating character and general prevalence of the various epidemic diseases of all countries must be attributed to a principle which is cosmical in its nature, and can be understood in no other light except from a more positive knowledge of the physical laws that govern our planetary system. In the investigation of the various phenomena in connection with the solar system, the nebulous origin of all planets seems to be the accepted theory of most, if not all, of our astronomers. This nebula, occupying the regions of space naturally concentrating and forming spheroids, that are by an all-seeing eye set in motion in their orbits around a common centre, the sun, which seems to be the source of life and heat, the great vitalizing agency of physical life and the common source of all motion through the common agency of the all-pervading principle of electricity. The several primary planets of the solar system being accompanied with this nebulous matter from which secondary planets or satellites (moons) are being evolved and continued on their motion around their common centres, and thus having a secondary motion, with their planets, around the sun at regular periods of time, each in its own respective orbit. The luminary rings at certain intervals of space surrounding the planet Saturn are, no doubt, of this nebulous character, and as an illustration tend to corroborate the theory of the nebulous origin of the planets. This nebulous matter, under the attractive influence of

the planets, seems to operate as an agency in modifying the influence of the sun's light and heat, and thus give cause for greater extremes of heat and cold in our atmosphere, as well as greatly changing the electrical principle that seems to be connected with and govern all physical life. The conjunction of the several planets at regular intervals of time by reason of their revolution around the sun, produces an agitated condition of the atmosphere surrounding the earth that can be foretold and accounted for in advance.

The fact of an eclipse of the sun by our moon coming in conjunction with the earth and the sun, is usually characterized by a disturbed and agitated condition of the atmosphere, especially in the path of the eclipse. People in a debilitated condition from chronic disease notice readily the changing condition of the atmosphere, and from a low and desponding condition one day, suddenly change with the atmosphere to a condition of apparent health and buoyancy of spirits. An approaching cold season is usually accompanied by diseases occasioned by a sudden change of temperature closing the pores of the system, and thus retaining the effete matter that nature requires should be thrown out of the system. This low temperature of the atmosphere, which is often produced through various planetary influences combined, tends to aggravate and induce various diseases in the animal kingdom, and make general or epidemic such as would otherwise prove to be only sporadic or endemic. A special regard to the principle of hygiene and keep-

ing free from all local causes of disease will usually avoid any bad effects resulting from epidemics. The great and leading value of medical or hygienic knowledge consists in the fact of our being able to guard against disease rather than relying upon any curative art.

In the investigation of this principle of electricity in connection with physical life, it seems an established fact that the ubiquitous nature of this life principle cannot be denied. And while it is an all-pervading principle of nature, it seems to be operated upon and intensified by latent forces, the more important of which is the sun. The earth itself, in the capacity of a magnet, imparts this principle to all matter in connection with its surface. Magnetic forces seem to control all vegetable as well as animal life. A current of electricity governed by the heat and light of the sun is constantly passing around the earth parallel with the equator or nearly so, and this current of electricity is the controlling influence of the compass needle, which at all times vibrates at right angles with this current of electricity. The mariner, with his compass set to the north star as a guide in traveling over the ocean in different longitudes, finds a variation in his needle with no apparent cause. This current of electricity is the governing power, and accounts for variations in the needle. In high latitudes a greater intensity of electrical forces is apparent in the atmosphere, and the phenomenon of the northern lights is based on this principle. In north latitude, between thirty-eight and forty-four degrees, we notice a greater intensity

and vivacity in physical life; mankind are more intelligent, more ambitious, of greater nervous power and energy. The western prairie country is peculiar for its electrical storms that arise almost instantaneously, and move, as a general rule, from west to east, at a speed of twenty-five to forty miles an hour. With very little timber to draw, as conductors from the atmosphere to the earth, this overcharged condition of the atmosphere gives rise to numerous storms, and producing winds that sweep over the country unobstructed by any obstacle to break their force; and the impure atmosphere of any miasmatic district is wafted over the country, and thereby disease becomes epidemic and general instead of local in its character. This idea suggests the very great importance of growing timber for protection against these prevailing winds, as well as acting in the capacity of absorbents purifying the atmosphere. The peculiar nervous tendency of most all diseases throughout the west is characteristic of the climate, and is caused by the highly intensified electrical condition of the atmosphere.

CHAPTER XI.

ORIGIN OF DISEASES.

AFTER writing the two previous chapters with reference to the cause of endemic and epizootic diseases, and not being satisfied that the theory therein advanced was generally accepted, I made further search for authorities on the subject, and accidentally came across the reports of Dr. Gamgee and H. W. Ravenel, who were appointed by the Commissioner of Agriculture to investigate the subject of the Texan cattle disease. From these reports, as well as from the comments of Horace Capron, the then Commissioner of Agriculture, I herewith submit a few extracts. Dr. Gamgee, after investigating this disease for about a year, by traveling in the South and dissecting many animals, with the aid of the eminent Dr. Ravenel, of South Carolina, comments as follows:

“Scientific men have hitherto failed in tracing the distinctive characters of organic poisons which differed from each other, and only recognized by the very different effects produced on the animal economy. Some attack a single species of animal; others induce the same disease in a number of species. The lung-plague poison induces its character-

istic effects on cattle; the poison of hydrophobia most readily communicated among feline and carnivorous animals, is deadly to the omnivora and vegetable feeders. Of the peculiar principles which tend to the diffusion of those diseases which are known to us as indigenous in certain latitudes, and which we must distinguish at all times, in classifying diseases, from the contagious maladies of no known primary source, we have two equally remarkable instances in the splenic fevers of the south, and the carbon or anthrax of many parts of the world. The one passes from cattle to cattle; the other is deadly to man, horses, dogs, pigs, and other warm-blooded animals.”

In the quite lengthy report of Dr. Gamgee on the lung-plague and Texas cattle disease, with other allied diseases, arising from what is usually called a malarious atmosphere, the doctor does not give his opinion as to their origin, but refers to the report of Dr. Ravenel, which was made at the same time and under the same investigations, with the express object of ascertaining the cause or origin of the disease. I here give the most essential part of the report of Dr. Ravenel, as follows:

“Attention has been drawn in the last few years to the ‘Texan cattle disease,’ and much interest has been elicited as to the nature and cause of this disease.

“In the voluminous and very able report of the New York State Commissioners, in connection with the ‘Metropolitan Board of Health of New York City,’ this subject has been very thoroughly investi-

gated, and one of the results which seems to be definitely reached is the constant and universal presence in the blood and bile of the diseased animals of certain cryptogamic forms of vegetation, primordial spores or cells, and which under the skillful manipulation of Professor Hallier, of Jena, have developed themselves into distinct fungus plant, which he names *Coniothecium Stilesianum*, after the distinguished microscopist on the New York board, who first discovered them. Professor Hallier, in his letter of December 18, 1868, to Dr. Harris, of the Metropolitan Board, says in regard to the plant: "Perhaps you may succeed in finding out the places where this *Coniothecium* grows in nature. At all events, it is a parasitical fungus growing on plants, and to be looked for in the food of wild bullocks." Whether my examination of a limited portion of the flora of Texas, and comprised in so short a time, will throw any light upon these interesting questions, I cannot tell. My observations were made with as much diligence and care as I could command, and present, as faithfully as I am able to give them, the true condition of the pastures and the cryptogamic vegetation of the region of country I visited. As far as I was able to examine, I found no species of *Coniothecium* on pasture grasses or on the dried hay. This I know is only negative evidence. The spores of these minute fungi, when they exist, are generally in great abundance, and may be wafted about by winds and carried by rains into rivers and pools of surface water which the animals drink. The *modus operandi* of these subtle

agents of mischief, and the manner in which they gain access to the animal system, have long baffled the scrutiny of scientific men. To establish the fact of direct agency in any of these forms of vegetation, and trace satisfactorily the connection between cause and effect, will require cumulative proof of very strong and unquestionable character.

“The phases through which they pass, and the different forms they assume at various periods of their growth, suggesting an analogy with the *partheno genesis* in the animal kingdom, is another element of difficulty in the solution of this question. Such investigations, however, as those undertaken by the New York commissioners, conducted as they have been in a truly scientific and philosophical spirit, must necessarily result in throwing light upon the subject and be ultimately crowned with success.”

In addition to this portion of the report of Dr. Ravenel I will here notice that he collected, according to his report, two hundred and eighty-five different species of fungi while in Texas. While Dr. Ravenel, and others that accompanied the expedition to Texas, failed to trace out the facts in a manner that was calculated to satisfy them of the truth of the theory of sporadic agency causing disease in animals, and at the same time seem inclined to admit the principle of the origin of endemic and epizootic diseases, being allied with the agency of sporadic life. Commissioner Capron, in reviewing and summing up the history of cattle diseases, in past ages as well as in modern times, and the evidence adduced in favor of

the theory of animal poison having an origin in vegetable matter, comments as follows: "Efforts are indeed being made to demonstrate the vegetable origin of many animal poisons, and it is supposed by some that 'cryptogamic plants, fungi, etc., not only approach more the nature of many forms of specific virus, but actually constitute the contagion or active principle which breeds or propagates in the development of small-pox, cholera, the plagues of the lower animals,'" etc. Mr. Capron again states that "there is one grave objection to all that has yet been done in this interesting field of inquiry." "The vegetable forms into which poisons are said to pullulate, have not, in a single instance, been successfully employed in the reproduction of the diseases they have been supposed to generate." It would seem to be a question with the commissioner whether the agency of fungi, so commonly found in connection with the diseased condition of animals, is really the principle of contagion, or, whether it is only the result of disease that has some other cause or origin for its generation.

In the evidence as to the condition of imparting the Texas cattle disease, it would seem a settled fact that no other agency except that of parasites voided in the excrement of Texas cattle could furnish the contagion principle that is imparted to other cattle coming in contact or rather feeding on the same ground.

The commissioner seems to ignore the fact of the spontaneous origin of disease in any form; but that it is only perpetuated by seeds that never die. As

to this principle of spontaneous origin in disease, or in the origin of vegetable or animal life, I have, after many years investigation and study, been compelled to admit the truth of it, in order to satisfy my own reason.

It does not seem reasonable that there should be a living and latent principle in nature breaking out in the form of disease under certain conditions, but on the contrary that disease is only a negative while life is a positive principle of nature.

And as to the theory of microscopic life being the direct principle or agency of contagion, or whether the principle of disease is so subtle as to baffle all investigation and experiment, I am inclined to admit the former principle, and further believe that science will finally settle the question in the affirmative. This principle of sporadic germs having direct connection with the origin of disease is limited to local diseases, or those having a local cause that seems to be easily accounted for.

Mankind, as well as the lower animals, are often visited with affections in various forms that are not traceable to any special or local cause. Epizootic diseases often prevail, as in this last winter of 1872-3, moving across the continent with the speed of the wind, and attacking almost the whole family of the equine race, throughout the country as well as extending into the western wilds and attacking the deer and other wild animals. Almost simultaneous with this wide-spread epizootic, an epidemic among mankind, with similar symptoms, prevails generally, both of which indicate a disturbed electrical condi-

tion of the atmosphere, and the resulting change of a physical condition of mankind, as well as certain kinds of animals, is generally apparent.

To refer again to the prevalent diseases of the western prairie, we notice that they are local in character, and consequently preventable in a great measure, if not entirely so in time. When the western prairie shall have been entirely settled up, and divided into farms, with permanent improvements, and the alluvial soil shall have undergone the change that will necessarily follow from cropping, and the growth of timber on every farm becomes a fixed principle of improvement, by established laws of our state government, and that higher order of civilization that is sure to result from the combined elements of natural surroundings, then disease will be rare, and the endemic fevers among men, and epizootic hog cholera among swine, and black tongue and similar diseases among cattle, will be a thing of the past.

In the meantime it becomes a necessity to investigate the causes, mode of prevention, and means of cure, if there is any curative principle that can be brought to bear. It is a question probably settled beyond a doubt, that the prevalent diseases among cattle and swine, and the various types of febrile diseases among mankind, have a close alliance in their origin; and the system of hygienic and medical treatment, as well as means of prevention, necessarily applied in the one class of animal life, would be good in the other.

With regard to the common disease, typhoid fever,

and its various allies, it has become a settled question with the most eminent medical men of the country, that no mode of treatment will prevent its natural course or run, which usually terminates in twenty-one or twenty-eight days; and that instead of calomel and quinine, the most efficient mode of treatment is strengthening soups, wine, and fresh air.

A cotemporaneous debility among cattle, that is liable to break out in the form of disease at any time, by sudden exposure and change of feed, should be counteracted by a constant supply of pure water and plenty of salt at all times. I am inclined to think that there is more value and virtue in salt than most people seem to realize, and an increased use of it in a great many instances will save a "doctor bill," as well as the life of many a person, and valuable animal.

Cattle should not be turned into stalk fields in the fall, and allowed to gorge themselves with dry husks and corn, until congestion and inflammation set in and destroy the animals. Where cattle are turned into the stalk fields in the fall, they should only be allowed a short run at a time, and changed to green feed with plenty of salt, and then no injury will result. The fungi or smut on corn stalks is poisonous, but acts only as a slow poison, and no immediate bad results will follow from its being eaten by stock. Cholera among swine, the great bane of the western farmer, has called out a great many opinions as to its cause and treatment; but what is successful treatment in one case fails in another; what has succeeded as prevention on one farm has failed on

another. As I have gone over the ground in another chapter, I will add but little here on this prevalent disease.

As a primary cause, having its origin doubtless in the decomposition going on rapidly in certain soils during the hot months, a condition of debility is first established that eventually results in the various symptoms attending the disease, that affects swine, and often a bad management in feeding suddenly develops disease that proves fatal. As in the cattle fever of the south, so among swine in the corn districts of the west, very few healthy animals can be found in cholera districts, and a condition of general debility is the rule instead of being an exception. The attending symptoms of this disease or condition of debility are found to be almost universally a diseased liver, accompanied with ulcers, ague cake, and abscesses in the flesh. Various forms of worms also are found penetrating the flesh in different directions; these probably make their way through the intestines of the animal and become incorporated in the flesh. The various transformations attending the development of parasitic life, as well as the peculiar agency of this principle of contagion, are not yet comprehended by the science of man.

CHAPTER XII.

STOCK GROWING IN THE WEST.

UNDER this head I propose to comprise a territory for investigation that naturally divides itself into three separate divisions, from the fact of the difference in soil and climate that characterize these different localities, as well as their different relative positions to the markets of the world. For the first division of this field of investigation, we will refer to that region comprising Texas, Arkansas, and other states adjacent to or bordering the Gulf of Mexico. Texas at an early day became noted as a field for cattle raising on a large scale, from the natural advantages of a climate without the obstacles of winter to check the grazing of cattle, at all seasons of the year.

The abundance of rain that is furnished to the gulf states, gives feed in a great abundance on open ranges, for cattle, so that feeding is scarcely ever resorted to in any portion of the year. These natural climatic conditions give scope to the extensive herds that range over the country in a half wild condition, and the natural tendency of this kind of life is shown in the semi-barbarous condition of humanity,

as well as a semi-barbarous race of cattle. New elements of a higher civilization from the north, transplanted to this country, will naturally assimilate with this lower order of physical life; and while new elements from the north will for a time tend to improve the condition of both animal and human life, the natural laws controlling all physical life, hold supreme control, and tend to reduce and assimilate all the various elements to one fixed type of life in man, as well as the lower animals. The heat and moisture of this southern climate, together with the organic matter of the soil naturally creates an excessive condition of sporadic life that attaches to all vegetation of the country, in the form of *fungi* in great variety of species, as well as poison the atmosphere to a greater or less extent. This condition of *speres fungi* and parasitic life, resulting from the peculiar condition of climate and soil, and existing in such great abundance, has its natural tendency in a debilitated condition of animal life that is common to the country.

The higher order of physical life in both man and the lower animals, that obtains in the superior atmosphere of a more northerly climate, and especially on the drift formation of soils, that is more especially favorable for greater vitality in animal life, is not found and cannot be maintained in the climate of the south.

In a report to the United States Commissioner of Agriculture, by John Gamgee, M. D., who was appointed to visit the south and investigate the Texas cattle fever, I find the facts set forth as herein stated,

and as this report is probably the most scientific and reliable of anything that can be found on the subject, I will give in the language of Dr. Gamgee, a few ideas in connection with this subject of animal life in the south :

“ The splenic or periodic fever commonly known as Texas fever, Spanish fever, or cattle fever, and which has been observed whenever cattle from the states of the Gulf of Mexico have been driven north during the summer months, is a disease peculiar to the ox tribe, which has never been described as attacking the southern cattle, and which occurs, in a more or less latent form, among them. Its distinguishing features have been most marked in the cattle of Georgia, Tennessee, Virginia, Kentucky, Missouri, Kansas, Illinois, and Indiana, wherever these have grazed on pastures previously or simultaneously occupied by herds from Texas and Florida. It is, so far as we have yet ascertained, incapable of communication by simple contact of sick and of healthy animals; and, in the strict sense of the terms, is neither contagious or infectious. It is an epizootic disorder, probably due to the food on which southern cattle subsist, whereby the systems of these animals become charged with deleterious principles, that are afterwards propagated and dispersed by the excreta of apparently healthy, as well as obviously sick, stock. It is not one of the epizootics proper, and in its origin and distribution, differs from the plagues due to specific animal poisons which are common in various parts of the Old World and the New. The malady is probably incapable of com-

munication by inoculation, and the flesh, blood, and secretions of such cattle, have been handled and consumed by human beings without the manifestation of untoward results. In Texas, cattle of all ages, from the time they begin to graze, are afflicted with the malady in a somewhat latent and mild form. Early in the year many animals die, especially when the wet deteriorates the grasses; and the mortality, of which any one can gain evidence in crossing Texan prairies and seeing the carcasses, is ascribed to poverty.

“ It is, however, a feature everywhere, that cattle do not attain the same weight in the south, even on the best grasses, that they do in northern latitudes; and this is, no doubt, accounted for by the uniform signs of irritation, and even erosions of the stomach, enlarged spleen, fatty liver, and sometimes echynosis in the kidneys. The liver is often congested, and the gall bladder distended with viscid bile. The spleen is twice, three, or even five times its natural size; and, according to the duration and severity of the attack, is more or less broken up and disintegrated in its internal structure. In one case the spleen had given away at its base, and hemorrhage had taken place into the peritonæum. The kidneys and suprarenal capsules are usually congested.

“ In its course in the south, it resembles the periodic fevers of man; is usually sub-acute in form, and varies in intensity at different times. The expression I have proposed to designate this disease, is splenic fever of cattle, from the fact that the disease is readily distinguished, as a rule, by the

enlargement of this organ, coupled, no doubt, with other lesions. It is an epizootic disease, allied and corresponding to the endemic periodic fevers of man, for which the southern states are remarkable; and it may be deemed prudent to use a more general expression than splenic fever, viz., that of periodic fever of cattle. Splenic fever is readily prevented, in all cattle north of the Gulf States, by protecting them, during the summer months, from the pastures and roads on which southern cattle have traveled and fed. The prevention of the disease in Texas would call for a further and more extended inquiry into all the local causes in operation; but, generally speaking, the condition of soils and grasses might be altered by thorough cultivation, drainage, deep plowing, &c.

“In Texas I have found that feeding corn tends to modify the conditions of cattle, and invigorate their constitutions; and much may be expected from the corn feeding system rather recently introduced on a comprehensive scale.

“No specific means of cure have been discovered for the malady; and palliation measures consist in allowing animals which suffer from the acute form of the disease, abundant mucilaginous drinks, neutral salts, and occasional diffusible stimulants. Animals have recovered when left to nature, as indeed, also, when they have been profusely bled and purged.

“Splenic or periodic fever, evidently occurs in two forms, and its course may be sub-divided into four stages. The first form is an insidious, latent,

and usually more fatal one. There are few fevers that do not at times attack animals in such a way as to produce so little general disturbance as to prevent their recognition in the living animal. Cases of this description occur in rinderpest. I have alluded to them in an official report on the lung plague, the contagious bovine pleuro pneumonia, of Europe, and have witnessed them, in outbreaks of small pox in sheep; but in epizootic maladies, and especially in the various forms of anthrax, it is not unfrequently found that animals from districts where such diseases arise, indicate, after death, that the healthiest and strongest have suffered, or are suffering organic changes, which a special systemic vigor or constitutional resistance hides so long as the animal is in life.

“Whether we study the malady as seen by me in Texas, or on Smoky Hill, in Kansas, where a sudden shock to the system of a steer, on the occasion of its being stampeded, developed symptoms and induced death, or look to the other animals, apparently fresh and grazing, which indicated an abnormally high temperature of the body, it is evident that a large herd, traveling from the region whence splenic fever is propagated, carries not only the active cause of such propagation in the systems of animals composing it, but the evidence of specific disease induced, which remains for an indefinite time latent and unobserved.

“In those parts where the splenic or periodic fever of cattle is epizootic, the prevailing influences are such as favor the development of intermittent dis-

ease in man. There are parts more healthy than others, and the beneficial effects of constant winds, a dry soil, adequate elevation, and the introduction of good systems of culture, tend to make many regions in the vast countries over which malarious conditions prevail favorable for the health of man."

"In the most swampy parts these diseases annually recur with the intense heat of summer which are known to characterize low and unhealthy lands in all parts of the world, and these often persist even in the winter season. The bilious remittent and intermittent fevers in man are represented in animals by the deadly charbon or anthrax, the black tongue of domestic and wild ruminants, as also by a marked form of the splenic fever which I am describing. Texas and Florida have been chosen as resorts for invalids—for consumptive people during the winter. They are countries, that to cast a doubt over the salubrity of Texas might lead any one into difficulties in that state."

"It is not too much to say of the state that its acclimatized inhabitants prefer to live there rather than choose what might be viewed as a healthier climate farther north. But it is impossible for an unprejudiced stranger traveling through the state, not to observe the usual spare habit of body, the sallow, yellowish complexion, and the want of activity that prevail among the inhabitants. There are exceptions and exceptional spots, but any one traveling from Maine to Texas can satisfy himself that some condition, whether of soil or climate, is unfavorable to the health of man.

“I had not anticipated witnessing the universal indication of a low standard of health in animals.

“Inquiries as to the diseases of Texan cattle in Texas are almost always met by people of that state by the declaration that cattle are never sick there; yet a “norther” may sweep down and drive the cattle into a narrow neck of land, where they have to starve at times for want of food; while in the winter excessive wet destroys the grasses, favors diarrhœa, and unless the cattle can get in the woods and eat swamp moss, wild onions, or other products of the river bottoms, they must occasionally succumb. We hear so much of cattle being only worth a few dollars a head in the summer, and people killing them by the thousand for their hides and tallow, that the only reason to be given for heavy winter prices is the scarcity of really fat stock, and the great distance it has to be driven, even to such a port as Indianola.

“I have seen many large herds of Texan cattle that had been wintered in Illinois, Indiana, or Missouri, and have made myself acquainted with the average run of weights of cattle in Texas, and one most important fact appears; viz: that a Texan steer will increase, in twelve months, on the grasses of a more northern latitude than his native state, by one, two, and three hundred pounds over and above the highest weight he will ever attain in Texas. Let us take the cattle fed on the Mesquite, said to be fat all the year round—and where, therefore, an animal has not to make up for lost condition—and age for age, it will take three of them to weigh down the

Illinois steer, and probably four. Take the best and the average, and it will be found, on careful examination, that the cattle on the noted grasses of Texas, whether from the soil, heat, or waters, or other cause, do not attain the weight and condition that the same cattle do if removed to the north, nor that northern or western cattle do on their own native prairies.

What are the active causes in operation which tend to influence prejudicially the stamina of southern herds? Traveling over the prairies, no one can fail to be struck by the large number of dead animals to be met with. The dissection of these, or the slaughter and dissection of the first animal met with, reveals three distinct and unfavorable manifestations. The spleen is enlarged; the animals have, without exception, the "ague cake" — the stamp of a malarious district; the liver is fatty, and this is a lesion that might be anticipated in so warm a county; the true stomach is reddened at its left end, the membrane is eroded, or appears scratched with a sharp nail on its folds, and although there may be only a single and small erosion, nevertheless the trace of gastric disorder is there. I have not failed in a single instance in Texas, to trace this, and I have opened as many as twenty-six animals per day, weighing the organs carefully, and watching closely for these signs. Sometimes the scars of old ulcers are more marked than the erosions on the mucous folds, and it is not uncommon to find these traces of ancient lesions about the pylorus, or intestinal opening. My observations extend further.

From the earliest age that the calf feeds on grass, to the oldest a bullock attains, the morbid lesions alluded to are found.

“It is difficult to get at the truth, but from personal observations, and very careful and numerous inquiries, I am in a position to state that almost, if not quite, universally in the states bordering on the Gulf of Mexico, and for a distance of at least two or three hundred miles inland, the cattle do not attain the full weight they can and do reach elsewhere; that they very commonly appear in blooming health, and are usually free from acute and marked symptoms of any disease; that nevertheless, these animals are usually more anæmic and less firm than northern cattle, and that, without exception, all of them that I have dissected have shown the spleen enlarged to twice or thrice its usual weight, the liver slightly or very fatty, and the true stomach reddened and eroded. The removal of these animals to a more northern state results, especially as winter approaches, in a diminished size of spleen, a great deposit of fat and development of blood and muscle, and the cicatrization of the gastric lesions.

“Conjecture is not always profitable, and as yet it is impossible to say more with certainty than that in a warm country, where a rich and retentive soil is ever charged with considerable moisture, and where artificial systems of culture are in their infancy, a general low tone of system prevails, which manifests itself in the shape of an imperfect development of blood, an enlargement of blood glands,

and very significant lesions of the stomach and liver.”

I have quoted quite extensively from the report of Dr. Gamgee, as this report is doubtless the most reliable of anything now published concerning the natural adaptation of the territory that it covers. Dr. Gamgee, in his researches and labors in the south, acted upon no principle that would tend to give any other but a true and reliable report of the natural condition of animal life, and the special adaptation of the country. This valuable information I am inclined to think will tend to correct in a measure the too prevalent opinion of greater natural advantages being possessed by the people of the “sunny south.” While this report only covers one class of animals, we find that by a parity of reasoning, the same condition of soil and climate that produces the semi-barbarous Texan cattle would show no better results in the development of other classes of animal life. The few specimens of half savage swine and semi-barbarous sheep, of very little value for any purpose, are the natural products of this region of country. As beasts of burden and labor, the mule and camel readily adapt themselves to this country and thus give promise of success in the special branches of agriculture adapted to this country. While live stock growing in the southern states is not a success, cotton and sugar afford a source of income that pays probably as well for money and labor invested as any other branch of industry in the country.

With the Mississippi river and its tributaries,

which afford cheap transportation for the exchange of commodities with all portions of the north, the sure development of the south to a higher position, financially, civilly, and morally, is only a matter of time. While wheat cannot be raised in the west, south of 39° north latitude, for less than \$2.50 per bushel, on the average, it can be raised in a more northerly climate and shipped to the south for a little more than half this money. And while the upper Mississippi country does not produce sugar and cotton, an increasing demand for these articles in the north will furnish, eventually, a market for all surplus that can be grown in the south.

Through the cheap means naturally afforded by water communication between the north and the south, for the exchange of commodities, the density of population, and corresponding wealth of the northern states is sure to bring a corresponding development of wealth in the south.

The Mississippi and its tributaries with the adjacent country will become to the New World what the Nile was to the Old World in the zenith of her glory. While an advanced civilization and powerful people was developed at an early day in the east, which had the Nile for its central artery of life, the New World is sure to produce the record of a nation on a more extensive scale, of tenfold greater magnitude in wealth and national development, as well as superior intelligence on a higher plane of life,—a nation with no parallel in the world's history, and for its central artery of life and vitality, the Mississippi and its tributaries, with the adjacent country,

which will become the great central life-giving principle of the nation. What the Nile and adjacent country was to the Old World the Mississippi will be to the New. The great centralizing seat of wealth and prosperity, the heart of the nation, from which will ramify the various veins and arteries of trade that will course through the body of the nation as the blood through the human system, and to return again to the seat of life for new vitality to continue the onward course of life.

CHAPTER XIII.

UNDER the second division for investigation as to the subject of stock growing, I will include the states of Illinois, Missouri, Kansas, Nebraska, Iowa, and the states of Wisconsin and Minnesota on the north. This may be considered as the grain-growing region of the west, and from the fact of its peculiar alluvial soil, which is almost inexhaustable, might be considered the bread and meat producing portion of the continent. Having that diversity of soil that is adapted to the various kinds of grain, as well as all the domestic grasses, it affords facilities for both grain growing and stock growing that are not possessed by any other portion of the American continent. With these natural advantages of soil we may also notice that no other equal portion of territory on the earth has greater advantages of pure, running streams of water, so diversified over the surface that no large portion of territory is deprived of running water. Coupled with this we might also mention that water is easily and cheaply obtained from wells that afford a plentiful supply, generally near the surface.

The climate of this portion of country, even with the transient cause of malaria arising from the decomposition of the newly turned sod, is found, on an

average, to be as healthy, naturally, and as exempt from local diseases as any portion of the American continent, and enjoying a much more healthy climate than states farther south. This whole region of country, or nearly so, having a porous soil that water quickly penetrates and filters through without leaving ponds, swamps, or marshes, to form a constant source of disease to the surrounding country, as in some of the older states.

The climate is one that is specially adapted to the healthy development of all classes of animal life; and from the naturally pure and salubrious atmosphere, which is not subject to any superabundance of moisture, lung diseases are scarcely known, except in some cases where the afflicted of other states come here for recuperation and restoration of health.

The invigorating and vitalizing atmosphere gives great power, strength, and activity to mankind as well as the laboring animals, and this fact, together with the fact of so few stormy days in a year, enables the farmer and out-door laborer to accomplish more work than can be performed in any other country. The whole equine race, horses and mules, are generally healthy, and suffer from no local diseases, except such as are induced from bad feeding and management. The highly electrical condition of the atmosphere gives superior nerve-power and activity to the horse as well as man. The high temperature of mid-summer's heat seems to be endured much better by the mule than by the horse; and for this reason the mule, as a laboring animal, is generally preferred, and will gradually take the place of

the horse for hard farm service. The mule is less liable to disease, endures hardships better, and on less food, and is of longer life for service.

Corn, the great staple crop of the prairie, so easily raised, so certain a crop, and so valuable for its meat producing qualities, and being a grain that does not bear transportation any long distance, necessarily limits in a great measure the business of the western farmer to that of growing beef, pork, and mutton, as well as wool, and butter, and cheese for the most reliable source of income. This being the fact, live stock that will, to the best advantage, and with the most profit, produce these commodities, becomes the important subject to the western farmer. What are the kinds of stock? What the most important conditions of success in growing and feeding? are the leading questions of the western farmer. For beef purposes the grade "Short Horn" steer, of one-half, three-fourths, or seven-eighths blood at two years old past, probably fills the demand for a beef animal with the most value for the cost, and with the most profit for the feed. This class of animals, fitted for the market at the age of two and a half to three years, with a gross weight of fourteen hundred to sixteen hundred pounds to the head, pays better for the keeping, sells for a larger price, and is more satisfactory to the feeder than any other animal that can be handled, for beef. This is no doubt admitted by all farmers, and consequently no grounds for controversy on this point. The mode of raising and feeding in the west, necessarily will vary, even with competent stock growers, as the circumstances

of different farmers are quite various. In raising stock on a small scale where but few cows are kept, and with sufficient help, the milking of cows and feeding the calves is the usual practice in the west. On a large scale it is better to let the calves suck the cows, but kept away or not allowed to run with the cows. Calves should be separated from the cows, and allowed to suck twice per day at least, and three times are better. The cow should be milked the first few days after calving so that no surplus milk should be left after the calf has taken all that it will. It will pay better to give the calf all the milk furnished by the cow, until it is five months old, at least, as a stunted calf never will make a thrifty animal, and no food is so well adapted to the health and growth of the calf as the new milk of the dam; and a calf that is allowed to suck the cow will do better on eight quarts of milk per day than one fed on twelve quarts per day; this seems to be the natural mode of receiving its food and the calf does not gorge itself as is the case on being fed. Some farmers are frequently so situated that it becomes necessary to let the calves run with the cows in the pasture, and while the calves will do full as well in this way it is bad on the cows, and where practiced the udders of the cows become contracted in size and the partial loss of the udder very frequently happens. In the weaning of calves and artificial feeding of skimmed milk with shorts, &c., I think there can be no profit in the long run, as what is gained in butter is more than lost in the value and growth of the calf.

Calves should be allowed good pasture in summer or extra feed in winter after three months old, as they will usually at about that age take all the milk of the cow and begin to eat extra food. Calves that are dropped in the fall or early winter will not make as large or thrifty animals as those dropped in spring. The open field and sun's heat are necessary for the growth of all young animals. This is their natural element, and all young animals should be dropped in the spring, especially in a cold or northern climate. Calves dropped in the fall or early winter will require careful feeding during a portion of the winter, and the feed best adapted to their growth is cooked corn with shorts, and a supply of good timothy hay. It will pay the farmer well to prepare some mode of cooking shelled corn for all calves, so that they may be kept growing through the first winter of their lives, after which there is little trouble in wintering on raw food.

It will pay the farmer well to cook corn for milk cows during the winter, also all calves and pigs; but beyond this I think in this western country with cheap grain there is no profit that is adequate to the cost of the extra labor and expense. Corn is generally fed too much to all young stock by western farmers, from the fact of its being cheaper, more plenty and more easily handled. Shorts are valuable as a feed to all young stock; pigs and calves will do much better where fed on one-half shorts and one-half corn mixed; the corn to be cooked. Where mills are convenient, corn and oats in about equal quantities can be ground together, and for all

stock that is fed in stable in winter this form of grain feeding is the most convenient, and doubtless the most economical.

All breeding animals should be fed largely on oats, either whole or ground with corn; and for work horses, especially in warm weather, oats should be the main food. For all young stock, oats should form a large portion of their feed in the absence of shorts.

In the process for feeding for beef and pork, the common practice in the west of feeding cattle and hogs together, and feeding mostly on shock-corn in winter, has an advantage over all other systems of feeding for economy and profit.

One important advantage, however, in feeding any stock for market, I think is generally overlooked by most feeders. This is the practice of summer feeding or feeding fattening animals while on grass. It is a notorious fact that two-thirds of all the cattle fed in the west, are put into the market only half fed, and consequently not more than half the profit is realized that should be from such feeding. We will take, for instance, a steer, such as are purchased usually at two years old past, during the summer at about thirty dollars, weighing say nine hundred pounds; he is kept on grass until cold weather in the fall, and changed to corn. It is found to be good feeding that puts on two hundred and fifty pounds during the winter, with one hundred bushels of corn, and in such a winter as 1872 and 1873, about one hundred and fifty pounds would be a liberal estimate for the amount of grain. A steer

costing say thirty dollars, and fed one hundred bushels of corn at a cost of twenty dollars more, making fifty dollars cost at three years old, with a weight of say eleven hundred pounds, allowing for good feeding and good stock (common stock understood), worth at home four dollars and fifty cents per hundred or forty-nine dollars and fifty cents for the steer marketed at this age; and allowing the gain accruing to hogs fed with cattle to pay for the summer pasture and labor of feeding in winter, we find, with good management and good luck, that at the above figures, which are about the proper estimate for the spring of 1873, and where cattle have had good protection from storms and fed and watered properly, the above figures of two hundred pounds gain for one hundred bushels of corn would be a fair estimate, so that where corn has been purchased at fifteen cents per bushel a small margin of profit is the result

Now we will take these half-fed three year old steers and put onto grass, say for six months, with liberal feed on tame pasture at a cost of eight dollars each for pasture and fifty bushels of corn fed during the summer at a cost of ten dollars more, making a cost up to the next winter of twenty dollars per head to cover all cost, and we have at this time a steer three and a half years old costing seventy dollars with one year's feeding. Now, any experienced feeder will agree with me that if a steer will put on two hundred pounds gain during the winter for one hundred bushels of corn he will put an additional gain for the six months of summer

with good pasture and fifty bushels of corn, three hundred pounds gain, and at this time will be ripe for the market, and bring say five and one-fourth cents per pound, or seventy-three dollars. The gain on hogs fed during the summer we find is about double that fed in the winter, and would be, say eight dollars more gain on the same feed, or eighty-one dollars and fifty cents, or eleven dollars and fifty cents profit over and above what would be realized the six months previous, and the feeding still on for six months more or until four years old, would give a correspondingly higher price per pound, and a corresponding profit.

For another illustration of feeding we will take, say a half blood or three-fourths blood "Short Horn," which, if kept on reasonable good feed until two years old, will, I find by experience, weigh about twelve hundred pounds on the average, and this steer at that weight is worth four cents per pound, or forty-eight dollars, and will during the next six months, with the same feed allowed the native steer, gain four hundred pounds and weigh sixteen hundred pounds at the same time the native weighs fourteen hundred, and while the native will bring, say five and one-fourth cents, the grade Short Horn will bring six cents, which is ninety-six dollars, and allowing the cost of the feeding, say twenty dollars, making cost in all at, say thirty to thirty-two months of age sixty-eight dollars, we find we have twenty-eight dollars profit where we had eleven dollars and fifty cents profit on the native; but here is another item still left out, as it will be noticed that the

native steer in this calculation is one year the oldest at the time it is put into the market at a weight of fourteen hundred pounds. This one year's difference in age we will estimate at eighteen dollars, which added to sixteen dollars and fifty cents as the difference in feeding capacity of the two steers, and we have thirty-four dollars and fifty cents in favor of the Short Horn steer. Now these figures are for a good native steer and a good grade Short Horn steer, and are as near the facts as my experience and observation can make them, and I think will be corroborated by all experienced breeders, or those that have had experience with Short Horn cattle.

But some one may reply that it takes more money to invest in Short Horns, and the cost of a Short Horn bull is quite a little sum. We will investigate this part of the subject a little, and say a good Short Horn bull costs three hundred dollars, and the interest on this would be thirty dollars for one year, and say a scrub is worth thirty dollars and the interest is three dollars per year, and the cost of keeping the same in both animals, leaving a difference in annual cost of twenty-seven dollars. Now we will refer back and note the fact that we set the price on the native steer at thirty dollars, and on the grade steer at forty-eight dollars, both the same age, past two years old, or say thirty months. Now we will presume the farmer raises his own steers for feeding, and the cost of keeping is the same at the age referred to, thirty months old. It will be readily noticed that the Short Horn is estimated worth eighteen dollars the most, and this is credited to the

cost of bull, and that twenty calves are raised in one year by the farmer, at an average value of eighteen dollars each above the value of native steers, or in all three hundred and sixty dollars profit for use of Short Horn bull in one year.

It is on this plan of having good animals and feeding well from the time the calf is dropped until it goes into market, that the western farmer may be enabled to keep the skeleton out of the corn crib.

About the first of January, 1872, I sent a barren Short Horn cow into the Chicago market for beef, which was sold for seven cents per pound, and came to ninety-seven dollars, but this was a small cow, below the average size, and a common size Short Horn cow should weigh at least sixteen hundred in condition for beef, which at seven cents per pound is one hundred and twelve dollars. At the same time good native steers were selling in the same market at five cents per pound on an average weight of twelve hundred pounds, or sixty dollars each. Now of these two animals the cost of raising would be about the same, and while one would give no profit in the raising, or only cover about cost, the other would give from forty to fifty dollars profit.

Now these are figures that show for themselves, and such facts should convince any farmer as to the advantage of keeping none but good stock, and feeding well and taking good care of all animals.

The business of raising any kind of stock is necessarily one of constant care and watchfulness, in order to meet with a full success, as in most other callings in life. Every animal on the farm should

be seen by the owner every day, or by some one competent and trusty to care for them.

In breeding any kind of stock all inferior animals should be rejected or put into the market for what they will bring, and only good animals of either sex used for breeding purposes. I notice a common habit with most farmers of the west is to breed animals too young. Bull calves one year old purchased for immediate use, and then crowded beyond their capacity; also boar pigs being used at six months, or just as soon as they are found capable of serving. This practice is injuring the stock of the country and gradual degeneracy is sure to result. No young bull should be used before eighteen or twenty months old, and but little before two years old. I never use swine for breeding of either sex until after eighteen months old, as I should not expect to make any great success at raising swine if used younger.

In growing cattle and horses, as well as mules, there seems very little obstacle to success on the western prairie, as these two classes seem both well adapted to the country, and with ordinary care and feeding, nothing hinders success; but when we come to swine we have a different subject to deal with, and one on which there is a greater diversity of opinion. The different breeds have each their special favorites, and the debilitated condition and disease of swine throughout the west cause much speculation, and many theories as to the true cause of the various diseases.

Under the chapter on diseases of animals, I have

treated on this subject to some extent, and will not here take up any more space on the subject. As a means of economy and success, swine should, as far as possible, be fed with cattle, and allowed salt at all times where they can get at it; and at such seasons as disease is prevalent, a mixture of salt, ashes, and slack coal, if convenient, with black antimony and sulphur, should be provided. Carbolic acid and coal oil are also good as a disinfectant and preventive. The proper way to furnish salt for swine or sheep is to use say sixteen foot plank twelve inches wide and one and one-half inches thick with two edges nailed together, in the shape of a V trough, and fastened to the ground stationary by nailing to end pieces driven into the ground. The end pieces should extend about eight inches above the top of the trough and a board sixteen to eighteen inches wide fastened about eight inches above the trough as a cover to keep out the rain, and keep sheep or hogs from getting into the trough. This permanently fixed in this way will last for a number of years, and not be required to be cleaned out, if properly constructed so that only the heads of animals can be got into it. For cattle, the same kind of a trough should be constructed about four feet above the ground so that no other stock can get into it, and every pasture field should have a trough constructed on this plan, and kept supplied at all times with salt and other ingredients demanded by stock.

For cattle and sheep one bushel of salt and about six or eight ounces of sulphur mixed, should be used. For swine a larger portion of sulphur should

be used in the summer months, in connection with the salt. In breeding of swine, pigs should generally come in April or May, and only one litter each year for profit and success. The sows should be kept in small lots, with dry shelter, and the pigs never changed from the place where they were dropped until after weaning time. Five or six sows can be kept in one lot and if the pigs are all dropped nearly at the same time, as they should be, they will suck the different sows, and any sow losing a portion of her pigs will readily adopt others, where they are crowded out, and a larger number of pigs raised in this way. Pigs will do much better to remain in the same yard through the season, and not be changed from where they first commenced feeding. Shade of some kind and plenty of drink must be provided. Slops from the house, soap-suds and all refuse can be turned into the swill barrel to good advantage. A swill barrel can be constructed by using a kerosene barrel, suspended between two wheels on the plan of a hand-cart, so that one hand can run it, even if filled, and by tipping over empty directly into the pig-trough. A stinking swill barrel is not agreeable or wholesome, near the dwelling of civilized people, and should be kept at proper distance. The swill barrel rolled off every day and emptied and rolled back empty, avoids any nuisance about the dwelling. No manure heaps of any kind should be allowed to remain through the summer within forty rods of a dwelling house. The sickness and ill-health so common to towns without police regulations is mostly originated by the accu-

mulation of filth; and the pig-pen, which is the next door neighbor to most out lot village residences, forms largely the source from which the doctors draw their living in towns, as well as in the country. The natural food for swine seems to be something of a succulent nature, and breeding sows, and pigs, especially, must have most of their food in the form of slops and swills. The milk from the dairy seems almost indispensable to grow fine pigs. Shorts with corn meal, and ground oats, in the form of swill, or cooked feed, is the best adapted to pigs, and sows giving milk, and is essential to grow good hogs; and this feed, with salt used daily, will keep away cholera, and most all diseases common to swine. Good clover pasture, in summer, is the cheapest food that can be furnished for swine, but the reeding of some grain, daily, with pasture, will pay much better, and the pig, as well as the steer, should have the fattening process performed during the warm months, on pasture; as about twice the value is received for a bushel of corn fed in this way, as compared with winter feeding.

As to the different breeds of swine, there is, probably, not as much difference as many would seem to think. Of the various breeds, I have selected the Berkshire and Poland China, which I breed distinct and pure, as well as crosses. For common stock purposes Berkshire boars crossed on Poland China sows seem to do as well as any. The Berkshire seems to be gaining ground over the other breeds in the west, but I think one reason of it arises from the fact that Berkshires are mostly bred in the east,

where swine are more healthy, and not so generally debilitated by disease, as some other breeds in the west, and are consequently more vigorous, and produce better success in breeding; although the Berkshire is the most thoroughly established breed, and produces its like more certainly than other kinds, and is probably better adapted to a northern climate than any other breed, yet there are other breeds that might have advantages over the Berkshire in a more southern climate.

It appears to be a fact that dark colored animals are generally more hardy, in the western climate, and perhaps constitutionally so in all climates. White hogs, with me, have usually suffered more from disease than black ones.

As I have had about one thousand acres of prairie broken on my farm in the past three years, I have had to combat disease among swine quite diligently; but all swine kept on solid ground on timber land, have escaped disease entirely, and hogs that I purchased from others, to run with feeding cattle, and that were affected by disease more or less, generally recovered, and after a time took on flesh reasonably well, when kept and fed on hard ground in timber, with a running stream of water, and gravelly banks and bottom to the stream. I have cured some cases that were very bad, and lost none except when my own personal attention was necessarily called away at the time when disease was prevalent in the neighborhood.

As to the subject of gain for a given amount of feed, there seems to be so many conditions that in-

fluence the feeding capacity of swine, as well as other animals, that it is very difficult to establish any rule or principle that can be relied upon for the amount of flesh that can be obtained for any given amount of feed.

The weather has much to do in the matter of success, as stock will put on more flesh, for the same amount of feed, in warm weather, than in cold weather; and in a climate where long, cold winters prevail, stock should be fed in the summer season, as much as possible, and be put into the market in early winter, or fall, while those more favorably situated, as to warm winters, can feed later to good advantage, and market at such season as will pay the best. A pig that would gain ten pounds weight for the bushel of corn fed in warm weather, would probably gain five pounds for the same feed in the coldest weather. Many experiments have been made, indicating that raw corn fed to swine has made ten pounds gain, and on the strength of these statements, people are very apt to take for granted, that such is the general result of feeding corn to swine.

Cooked corn has made a gain on hogs all the way from twelve to twenty pounds for the bushel of corn fed. The different ages of hogs, the breeds of hogs, the state of the weather they were fed in, the condition of health of the hogs, at time of feeding, and the time the feeding is continued, all have their effects in the results of feeding. Skillful men in feeding different breeds of hogs, have demonstrated the fact that good breeds of hogs, that have been

well fed, and kept in good, healthy condition, have proved much more profitable, and the stock from such animals is worth a great deal more, than the stock from animals that have been neglected, run down, and become debilitated with disease; but no man has ever yet proved that a Berkshire is a better feeder than a Poland China, or Chester White; neither has it ever been proved, that any one breed possesses a very great value over all others. While one person has, by a lucky purchase of one or more good animals of a certain breed, made a great and satisfactory success, and by the experiment, in his own mind, has established the fact that his special favorite has proved to be the best breed in the country; at the same time, another person, with another breed, has made as full, or greater, success, with the same kind of experiments, and so the controversy continues, and probably will continue, as long as man exists, and breeds domestic animals.

By the different breeders of swine, all the leading and established breeds have, in the hands of certain individuals, and under certain favorable conditions, each by itself, been proved equally as good as any other breed, and no standard of excellence or value has been attained in any one breed, but what an equally high standard of value has been attained by some other breed. And, while these are probably facts, each breed, by itself, has a special characteristic value for some special merit, that no other breed has manifested; and each seems to have a special value on account of a certain adaptation of the animal to a certain condition of life.

While the Berkshire will probably put on as much weight for twelve months, as the Poland China, at the same time the Poland China will put on the greatest weight for twenty months feeding; and while the Berkshire is probably better adapted to a more northern climate, and will be more profitable in such a climate,—on the other hand, the Poland China would probably be full as profitable for a warm climate; and, while the Chester White might be as good a feeding hog as the best, others might be found more hardy, and better breeders. I have made a good success with different breeds of hogs, under favorable conditions, and have also made a poor success with the same breeds, under circumstances that were unfavorable for success. As to the best age to market hogs, twelve to twenty months is found to be the most profitable age, according to breed, and circumstances of the breeder. Young hogs put on flesh faster, and give a greater return for their feed, than older hogs. It is found more profitable to feed pigs to their full capacity, until they are put into market. While good, thrifty, healthy hogs, in warm weather, will put on ten pounds gain for each bushel of corn fed raw, it is quite evident that the average gain for hogs throughout the west is only about five or six pounds for the bushel of corn fed.

And while three dollars per hundred for live hogs only gives fifteen cents to twenty cents per bushel for the corn fed, it should be made to give thirty cents for each bushel of corn fed. While many farmers haul off corn and sell it at fifteen to twenty

cents per bushel, they should manage to feed it out in such a way as to get at least thirty cents per bushel at home. Although the price of stock is low, there is no probability that it will reach a price so low that it will not pay thirty cents per bushel for corn that is judiciously fed to the right kind of animals. If the western farmer can realize thirty cents per bushel for his corn, fed on his own farm, with the certainty of a crop that hardly ever fails, it is much better, and more sure to reward his labor, than the raising of wheat at any price that can be expected in the west. While the first one or two crops off from land will probably pay as well in wheat as any other crop, nearly all of our prairie lands are found much better adapted to corn, oats, and grass; and after being cropped a few years, wheat is found to be a very uncertain crop.

SHEEP HUSBANDRY.

As a very essential part of the live stock interest of the west, we will include, in this chapter, a few remarks on sheep.

This subject of sheep husbandry, in the west, being somewhat peculiar in its nature, requires, perhaps, a more special investigation than any other branch of the live stock department; and, as in all other departments of live stock, we find a great diversity of opinion among different owners of sheep. To get at the foundation of this subject, we must necessarily look into the leading characteristics of each breed of sheep, prominent in the United States,

and understand their history, and natural adaptation to different conditions of life.

As the most prominent breed in the country, the American Merino, having a wider range of adaptation probably than any other sheep in the world, we will notice this breed first. The peculiar soil and climate of Spain that originated this breed, as well as the natural habit of this breed in its native country, must necessarily be investigated and understood, as well as the conditions of success that have been brought to bear in this country in improving their original condition.

Merino, in the Spanish language, means wandering; hence, a wandering sheep. These sheep, having their home and habitation in the congenial climate of Spain, in a comparatively dry and pure atmosphere, and being habituated to a scant but rich quality of herbage peculiar to all mountain regions, driven in large flocks from place to place in search of food, they necessarily took on that form of physical frame and habit that forms such a marked contrast with the more domestic animal of the same species in the British Isles. The Spanish Merino imported into the United States and given a more domestic treatment, has been greatly improved in different portions of the country, so that a sheep quite superior to the original has been developed and acclimated to different conditions of life. In noticing, however, the conditions of success in its development and improvement, we find that the peculiar stony or gravelly soils of the mountain regions and high lands of Vermont, Pennsylvania, and Virginia,

and a portion of Tennessee, are the localities where the greatest success has been made with this breed, and on such soils only have they ever remained a healthy race, and made a successful growth, for any great length of time.

In certain counties in northern Ohio, on a sandy soil and rough rolling land, many farmers kept good flocks of the Merino and had good success, often shearing eight to nine pounds per head of washed fleece for the whole flock.

In other counties on a more level and clay land, these sheep were often afflicted with foot-rot and other diseases, that made their keeping less profitable to their owners. Lands that are specially adapted to the growth of wheat are also well adapted to Merino sheep, and the two branches of business are necessarily connected with each other. Randall, in his work on "Sheep Husbandry," asserts that Merino sheep cannot be grown on the western prairie, and probably Mr. Randall was about half right, as disease has usually followed this class of sheep when brought into the west, and with few exceptions they have failed to make any increase on the prairie. The common complaint is the scab, foot-rot, and a failure generally to raise the lambs. This fact cannot be attributed to the climate, but must be attributed to the soil. The deep alluvial soil and level lands in the west does not give that rich quality of feed that is common to sandy or gravelly soils, which are common to all mountainous regions.

The abnormal growth of hoof peculiar to the Merino on rich alluvial soil, is a characteristic of their

natural habit of wandering over stony soils that demands a greater wear, and consequently a greater growth of hoof. On farms throughout the west that are characterized by a sandy soil and rolling or hilly surface, with a necessary amount of timber, the Merino can be made a success, with the proper care and management.

The value of the Merino in the west arises from a superior production that follows the crossing with coarse wool bucks, and for this purpose there is perhaps no other sheep so valuable. While the Leicester, Cotswold, and Southdown are sometimes subject to disease and sudden death by undergoing a change of climate from the older states, or Canada, to the west, they soon become acclimated and generally become healthy and seem to be much better adapted to the alluvial soil of the prairie than the Merino.

The coarse wool varieties here noticed are naturally adapted to a more severe climate, and enjoy our cold winters much better than the Merino. During the past severe winter I have had the different varieties of coarse wool sheep mixed in with the Merino, in the same flock, and when the coarse wool sheep would face the storms and go a half mile to a stack for feed, the Merino would stand all day under the shed and not come out. Good sheds should be constructed for sheep, so as to keep out the drifting snow from the north, east, and west, but should be open on the south, as a tight shed or barn is not healthy for sheep, if kept in large numbers.

Of the various breeds of sheep, the coarse wool

varieties imported from the British Isles have a better adaptation to the western prairie, and will eventually take the place of the Merino and all other sheep of a less vigorous constitution. All the coarse wool varieties have their natural habits and traits of character, that have been given them by high domestication and good feeding, and for keeping in large numbers may not succeed as well as the Merino, but so far as my experience goes there is less difficulty to be apprehended from this cause than is generally anticipated by breeders. The sheep demanded by the western farmer in the corn regions is one that will turn at an early age for mutton, as meat producing is essentially the leading business of the western farmer.

While the best mutton sheep is sought by the farmer, it should also be an object to get a good wool sheep, as both items are an object and about equal source of profit. My experience has tested the fact that a cross of coarse wool bucks on Merino ewes for general stock purposes proves an entire success, and a flock of sheep reared up from this cross, by still breeding on coarse wool bucks, will prove fully as profitable for both wool and mutton as the full blood of any coarse wool variety. In the fact of importing any stock from eastern states or from foreign countries, however well adapted they may be, the sudden change of climate seems to have a derogatory influence upon the health as well as the breeding qualities of the animal, and for that reason, the crossing on stock that is already acclimated to the country, although inferior in character,

produces a better success in the health of the offspring than breeding full bloods, not so acclimated. A full blood animal of any breed that has been bred in the west from sound and healthy stock, is much more valuable for the farmer in the same locality and conditions of climate, than one imported from a different country or climate. This rule, I think, will apply to all classes of stock, and generally be found correct by the western stock breeder. In the cross of a Southdown buck on a Merino or native ewe, the offspring, instead of being half-blood, is virtually three-fourths blood, the great predominance of character being in favor of the buck, and arising from the superior vigor and constitution of the animal. On the same principle, the breeding a Short Horn bull on a native cow shows that predominance of character in the offspring in favor of the sire that almost equals the full blood, and this principle is what constitutes the value of well bred animals.

Through this system of breeding, by the importation of the best types of the coarse wool varieties into the west, and breeding pure breeds of these several classes, also crossing and breeding grades for common stock purposes, is found the road to successful sheep husbandry in the west. The quality of wool produced by these several crosses and grades has an active demand, and quick sale to manufacturers, as will be noticed in the report included in the back part of this volume. On the 28th December, 1872, a lot of sheep were sold in the Chicago market for eight cents per pound, averaging one hundred and forty pounds per head. These were

mutton sheep, or as is usually understood, the coarse wool variety. At the same time that this lot of sheep sold for eight cents per pound, or \$11.20 per head, a good lot of Merino or native sheep would only bring about four and a half cents per pound, and at the average weight of ninety pounds per head would bring \$4.05.

Now I have a lot of lambs bred from Merino ewes crossed on Cotswold bucks, that at twelve months old weigh one hundred pounds per head on an average, and at twenty months old will safely weigh one hundred and forty pounds per head, which we will estimate worth in the Chicago market \$10.00 each when twenty months old.

This lot of lambs will shear one clip of wool at an average of ten pounds per head, that we will estimate at thirty-five cents (allowing for a decline in the market), making \$3.50 per head for wool and \$10.00 for carcass for twenty months growth, with only one wintering we have \$13.50 per head.

My full blood Merino lambs, dropped at the same time, all kept in the same flock of about five hundred lambs, with the same feed, will weigh at twenty months not over ninety pounds per head, which we will estimate at \$4.05 per head, as heretofore, and about six pounds of wool per head, which, at say forty cents per pound, or \$2.40 per head for wool, making \$6.45 for a merino lamb of good stock, well kept, at twenty months old, as against \$13.50 for a Cotswold grade, at the same age. Another fact comes in here, to still widen the difference in profit; viz: In raising the grade lambs I find ninety-five

per cent can be saved, while not more than fifty to seventy-five per cent of Merino lambs can be saved if dropped at the same time or in early spring. In a latitude where long winters prevail, it is necessary to turn bucks in with ewes about the 1st to the 15th of November, so as to have lambs dropped early in April, as it is frequently remarked by western sheep growers that one early lamb is worth two late ones. The Southdown cross is equally as hardy as the Cotswold cross, but not quite as valuable for size of sheep or weight of fleece.

In comparing profits of sheep husbandry with the raising of swine, say a large breed of swine like the Poland China, is raised to twenty months old, at an average weight of four hundred and fifty pounds per head, which is a liberal estimate in the west, and at three and a half cents per pound gross, or \$15.75 per head. Now on the closest estimate that I can make, a hog at twenty months old will consume more than double the grain, and require at least twice the labor in feeding, as well as be subject to loss by cholera or other disease, that adds at least twenty per cent to the cost of hogs in the cholera districts of the west. Again, the hog is rooting and destroying all pasture where turned out to pasture, and sheep do no damage to either pasture or fences, and require less cost in fencing than any other stock on the farm.

I find it difficult to give a close estimate in dollars and cents, on any one branch of farming, where a system of mixed husbandry is carried on, as with me, as all the branches necessarily co-operate in reducing expenses a little, where carried on together so as

to employ a certain number of men and teams during the year, and keep all employed at all seasons of the year. For a statement of profit in sheep husbandry, I will commence with one given by Eli Stillson, of Oshkosh, Wisconsin, to the National Live Stock Journal, of March, A. D. 1873, for one thousand sheep and three sheep to the acre, as follows:—

333 acres of land at \$50 per acre.....	\$16,650
1,000 sheep at \$2.50 per head.....	2,500
	<hr/>
Value of land and sheep.....	\$19,150
CR.	
By 4,500 pounds of wool at 50 cents	\$2,250
By increase of flock 200 at \$2 each.....	400
	<hr/>
Net receipts.....	\$2,650
DR.	
To interest on capital at 7 per cent.....	\$1,340.50
To cost of labor and board.....	1,000.00
To repairs and insurance.....	200.00
To feed purchased.....	50.00
Wool twine, and salt.....	25.00
	<hr/>
	\$2,615.50

Nothing added here for taxes. Apparent profit, \$34.60, to offset loss by dogs, and other casualties.

In contrast with his statement I will give one in accordance with my own experience, and in the first place say, that my Merino sheep shear six and one-fourth pounds of washed fleeces per head, instead of four and one-fourth pounds to the head, as given by Mr. Stillson, and while he sold his clip at fifty cents I sold mine at fifty-three cents per pound. Instead of putting on three sheep to the acre I would prefer to put on only two to the acre of improved land, and make the estimate as follows:

For 1,000 acres of land at \$40 per acre, or.....	\$40,000
2,000 sheep at \$5 per head.....	10,000
	<hr/>
Making capital invested.....	\$50,000

CR.

By 20,000 pounds wool, 10 pounds per head, unwashed at 35 cents.....	\$7,000
By 800 lambs at \$5 each.....	4,000
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Annual proceeds.....	\$11,000

DR.

To interest on capital at 7 per cent.....	\$3,500
To cutting and feeding 200 acres feed.....	1,600
To taxes on property.....	200
To repairs on farm.....	200
To salt, incidentals, and shearing.....	300
	<hr/>
Annual expenses apparent.....	\$5,800
Annual profits apparent.....	\$5,200

The advantage of manure to the farm in mixed farming, where grain is raised as well as grass, and this item, with \$200 more taken off from the item of profits, might offset the wear and decay on farm tools and machinery, as well as interest on this item of investment not included in this statement, and bearing \$5,000 as the item of profit to offset the time, care, and labor of managing the business, which is one of constant care and anxiety.

In devoting this one thousand acres to sheep, I would have eight hundred in pasture, a part blue grass if possible, but timothy, for both pasture and hay, is good for sheep, and a pasture or meadow of clover and timothy will be more reliable and produce more feed; but clover is poor pasture for sheep after the fall frosts, and if a field of blue grass or

fall rye can be provided to turn into as soon as the frosts appear in the fall, sheep will do much better. Clover pasture will make sheep scour badly after frost comes in the fall. In the two hundred acres to be devoted to grain and meadow, I would divide equally into meadow, oats, and corn, or about sixty-five acres in each. The hay should be cut early, and stacked in field, and the oats cut a little green, so as not to shell or waste in feeding. A heavy crop of oats can be cut and bound up into bundles cheaper than any other way of harvesting, and stack much better, and much more convenient in feeding in the bundle. Oats I consider the most valuable crop for sheep, as well as any other young stock or breeding stock on the farm. There is no substitute for oats on a prairie for sheep or young stock or breeding animals. The straw that is scattered on the ground and left by sheep can be taken up and used for bedding, as all sheep yards should be well bedded with straw during the winter. I always find it better to scatter oats on clean ground in feeding, and but little loss of grain will result from this plan, as sheep will pick up all grain on clean ground. In growing corn for sheep, I prefer to plant in drills three and a half feet between rows, and stalks eight to ten inches apart in the row, as a larger crop can be raised in this way, and if cut up and put into large shocks as soon as it begins to harden, the fodder is of great value for sheep, as they require a great deal of rough fodder. I prefer to feed corn, oats, and hay by changing, or feed hay so that they can get it from racks at any time, and sheep that are to be turned for mutton will do better

on shock corn alone. Breeding ewes should have oats and hay and very little corn. The new stock of lambs, after getting started on winter feed, will keep fat on shock corn and hay, but oats will add greatly to the growth of wool, and carry lambs through the winter with less loss than feeding corn. In commencing to feed corn to sheep, great caution must be used, as there will be some that will over eat, and death is generally the result. After sheep get to eating corn for five or six weeks there is no danger of over feeding after that. In the estimate of two sheep to the acre, I made allowance for ordinary pasture and common crops of grain, but a farm to produce as it should by good tillage, will feed two thousand five hundred sheep for each one thousand acres, but two sheep to the acre is a safe calculation. In this estimate of ten pounds of wool per head, I do not include Merino sheep, but full blood Cotswold and grades, and put the price for unwashed wool, which will make the estimate plain and reasonable to any wool grower. My full blood Cotswold sheep, which I consider as good as the average of that class, I find shear from ten to eighteen pounds of unwashed wool, and will scour out in tub washing about thirty-two per cent, while merino wool in the dirt will usually scour out sixty per cent of dirt and grease. A lot of grades Cotswold and Merino, such as I am raising, will average ten pounds per head safely in the dirt, and scour out not over forty per cent to produce clean wool. I have made my estimate quite low, so as to be safe in case of any emergency of bad luck or depreciation in prices.

I raise heavy crops on a new farm, and feed well, as I find no profit in keeping any kind of stock on the starving plan. In estimating eight hundred lambs, at five dollars each, I make the estimate on the basis of turning all surplus of stock, or the annual increase in the shape of mutton, and sell out all weathers, and a sufficient number of ewes to make this number.

As to the feed and labor allowed here in the estimate, eight dollars per acre, all round, for the corn, oats, and hay, will cover all cost of raising, harvesting, and feeding out, and will feed this number of sheep up to a condition of mutton sheep. As not more than one-fourth of the flock would, at any time, be weathers, there would necessarily be one thousand breeding ewes, and an increase of eight hundred, on this class of sheep, is quite low, according to my experience.

While I consider this estimate safe, on the class of sheep here referred to, I would not undertake to show up much margin of profit with a lot of Merino sheep. And, in the statement of Mr. Stillson, I fail to see any margin of profit. While my situation and fixtures are quite favorable for sheep growing, I could, probably, show a little profit on the same basis of Mr. Stillson, with this advantage, that I probably feed better, and have a better grade of Merino sheep.

My Merino sheep shear six and one-fourth pounds per head, washed fleece, and sold, last season, for fifty-three cents per pound, which would give me one dollar per head income more than re-

ceived by Mr. Stillson, and while his figures show no profit, I would, on two thousand sheep, realize two thousand dollars profit, compared with my present showing of five thousand dollars profit on the same number of Cotswolds, and grades.

While this is my showing of success, I would not pretend that every farm of one thousand acres, in the west would, with the same care and labor, produce an equally favorable result. In conclusion of this subject, I would say that I find no bad results from keeping eight hundred to one thousand head of mixed breeds together, on summer pasture, but in winter, three hundred to five hundred is a large flock to keep together, and feed to good advantage. I have found, by experience, that sheep will never suffer for water as long as there is snow on the ground; and, by experiments, in watering some flocks, by pumping water all winter for them, and giving no water at all to other flocks, that I have failed entirely to discover any advantage in favor of watering. But this was contrary to my expectations. For two winters experience in wintering without water, I find that sheep have come through the winter just as well, in every respect, without water, as those that were furnished with water, and this important fact, I am certain, is an exception in all classes of domestic animals, and for the trouble of watering stock in cold winter weather, gives the sheep an advantage over all other stock, in the care of wintering.

As to the practice of feeding turnips, so common in some countries, I find it is not practical with me.

The great swarms of insects that make their appearance on the approach of warm weather in spring, especially on new lands, prevent the growing of young plants to such an extent as to forbid entirely any success. And the severe winters generally, on the western prairie, makes it difficult to handle roots of any kind, in feeding stock, as they freeze so quick, when exposed to the cold of a real winter's day. The cheapness, and abundance of other kinds of food, in the west, makes it no object to raise roots, to any great extent, except for such animals as may be intended for fine stock, or show animals.

CHAPTER XIV.

FOR the third division of territory to bring to the notice of the stock grower, I will include the mountain regions of the western continent, lying between the Missouri river on the east, and Pacific ocean on the west. The geological formation of this region of country being almost wholly volcanic, is characterized by successive ranges of mountains that are almost barren, growing only a scant and stunted growth of bunch grass with a stunted growth of shrubbery as a common feature, and the valleys of alluvial deposits of soil between these several mountain ranges, being so limited in extent and narrow as a general feature, that no great number of population can ever be sustained from the agricultural resources of the country. The topography of this whole region being so nearly the same, that no one locality can be said to possess any great natural advantages of either soil or climate, the advantages of situation to available markets will naturally be governed by the main thoroughfares of railroads now built, and those in contemplation, for the future developement of portions that are now so secluded as to prohibit the idea of permanent settlement. The various mining interests throughout this whole mountain region, will in the future, as in the past, furnish employment for a large number of la-

borers, as well as the various classes of middle men, who furnish the supplies of food, clothing, and other appurtenances of the miner. The very limited extent of arable land in all this region will necessarily require the cultivation of all that is available for the production of vegetables and other necessaries for home consumption. Except the wheat and fruit lands of California, no other portion of all this region of country will produce any surplus of agricultural produce, except in the form of live stock. A certain portion of California will continue to produce wheat and the various kinds of fruit in the greatest abundance and of the most superior quality. The facilities of inland transportation will, in time, furnish the mining regions with these leading articles of food. The pastoral regions of southern California, as well as the gulches and ravines and river bottoms of the mountain regions, will support a limited number of cattle, horses, and sheep, on the scant but exceedingly rich quality of grass that abounds in greater or less quantity in different locations. The peculiar adaptation of the Merino sheep to this climate and soil, gives a source of wealth that is destined to form the leading article of export. The nomadic life of the mountaineer, and the peculiar migratory disposition of the Merino sheep, as well as the most perfect adaptation of soil and climate, makes this country essentially the natural home of the Merino sheep.

A more special attention will now be directed to that region of country that seems to attract the attention of stock growers and capitalists from all por-

tions of the country; from the natural advantages furnished in growing so cheaply and successfully, that great fortunes are being made from the natural pasturage of the country,—a very large extent of country extending along the base of the eastern slope of the Rocky Mountains, extending into the foothills and mountain gulches on the west, and a distance of three to five hundred miles out into the plains on the east, and included mostly in Colorado and Wyoming territories. This region of country has for its geological formation, a drift deposit of mostly fine sand, to a great depth, that so plainly indicates the fact of the beating of the ocean waves for many thousands of years against this former coast, and by the gradual receding of the waters, continued this vast sand deposit eastward for a distance of four to six hundred miles, where the change to a more sedimentary deposit that characterizes the alluvial soil of that garden of the world, the Mississippi valley, is generally found, indicating the locality of deep waters of the same ocean or inland sea. This extensive sand deposit along the base of the Rocky mountains, receiving the wash of mineral matter from the mountains in the form of various mineral salts impregnated with alkali, gives that peculiar character and adaptation of the soil that distinguishes it for its superior quality of natural produce in the form of native grass of the country. The peculiar adaptation of this superior quality of grass to the growth of domestic animals, together with the equable climate and healthy and vitalizing atmosphere, affords natural facilities for growing stock

that are not enjoyed by any other portion of the American continent.

In the year 1850, while our California Emigrant Company stopped a few days on a branch of the Laramie river, in the month of June, to fit our stock for the long siege ahead, it was generally remarked that this feed was fully equal to a cornfield in the older states for feed for cattle and horses. The superior mineral character of the soil gives to the spontaneous growth of vegetation that quality of nutriment that is specially adapted to animal life, and that necessity of constantly supplying salt to stock, as in the Mississippi valley, is not required here. In the breeding of young stock, no country in the world, probably, affords such natural advantages. But when we contemplate the fact that not more than one-fourth part of this entire country can be considered arable land, or will ever pay for plowing, and that not more than twelve inches of rain fall is received here annually, we are forced to the conclusion that no great number, comparatively, of population, can be supported here, and only along the banks of streams can any permanent settlement be made. That inevitable condition of things, in a civil point of view, that always pertains to a nomadic and migratory life, must necessarily exist here. The favorable sites along the streams of pure water that flow down from the mountains across the otherwise uninhabitable country, give favorable advantages for small towns and villages that will furnish the headquarters of the herdsman and shepherd, that will, as of old, watch their wandering flocks and herds by

night and by day. While the small portion of tillable land will furnish the necessary grains and vegetables as well as butter and cheese for a limited number of inhabitants, the larger portion of the country must ever be given up to a migratory life of herding cattle, sheep, and horses; and with this feature of the country and understanding of its natural adaptation, probably no other country on the face of the earth furnishes such natural advantages for growing stock, or promises such complete financial success. The business of stock growing in this country is necessarily confined to a specialty, and certain rules and principles will necessarily have to govern the *modus operandi* of the stock grower. Those special conditions to be observed in the management of stock growing in this country, as well as the results to be expected from it, we will notice somewhat in detail. First among the important branches of enterprise here, is the manufacture of cheese and butter. The pure atmosphere and equable climate which is ever free from extremes of heat and cold, the pure waters of the mountain streams, and the rich quality of the pasturage, all combined, furnish all the conditions of perfect success in this branch of business. The production of cheese here cannot be otherwise than the most perfect success, and while now that standard brand, "New York Factory," is so extensively counterfeited throughout the western country, this popular brand must eventually give way to the superior brand, Rocky Mountain Cheese. No other one article of diet furnishes the same amount of nutriment in the same space or density of

form that is furnished by the article of cheese; and at the same time, no article of food is better adapted to a mining region or a migratory people. No country probably, in the world, furnishes a better natural market for cheese, than is furnished throughout the whole mountain region of the west, or to the frontier settlements east of the Rocky mountains. The miner, necessarily confined to such articles of food as will bear transportation to the best advantage, and requiring a strong and hearty diet, finds in the article of cheese the most valuable article of food, as well as the one best adapted to the system in the fatigue and hardships of a miner's life. In this I speak from experience and observation while in the capacity of a California mine.

The article of butter, also, has been supplied to the mountain regions of the west from the older states, and sold in its inferior rancid condition, to the California trade at high prices. The Rocky mountain region can supply, at a great profit, this demand for butter, and, at the same time, produce a very superior article.

As the most extensive and important branch of stock growing in the Colorado region of country, the growing of sheep will doubtless take the preference in time. The extensive plains, without the advantages of water, that are a feature of this country, are better adapted to growing sheep than any other stock. No animal will herd so well, or travel so far, or go without water as long, as the sheep. But it would be as well to remark, that these facts are intended to apply to the Merino sheep, instead of the improved

mutton breeds of the older states and Canada. This dry and mountainous region of country, is the natural home of the Merino, and with the proper intelligence brought to bear upon this race of sheep, an improvement can here be made, I think, that never yet has been attained or never will be attained in any other country. As an outlet for the surplus produce in this country, the article of wool must eventually take the preference over all other branches of business. No other article will bear transportation as well, and probably no country in the world will so cheaply and successfully produce a good article of wool, as this country. But without the Merino sheep to meet this demand and supply this appropriate place, I would not dare to make this prediction. And while the Merino is fast losing favor in the whole corn-growing region of the west, and is being superseded by the mutton breeds, which are found more profitable, the demand for Merino wool will necessarily increase; and this vast extent of country in the mountain regions of the west, so peculiarly adapted to the Merino, will supply the demand for this variety of wool in the United States.

To cross the Merino on some coarse wool variety, such as is bred on the Highlands of Scotland, the Cheviot or Southdown, would probably result in success, and a sheep that would be more hardy and better adapted to the more northern and colder localities could be so produced. The increasing demand for wool in the United States, to keep pace with the increase of population, and demand for wool fabrics, together with the fact that any low price for wool

will necessarily drive all sheep from the high-priced lands of the older states, gives that guarantee of a permanency in western wool growing that renders it safe and reliable, and at the same time, free from any liability of overproduction or loss by sudden decline in prices. The business of wool growing on a basis where sheep are naturally healthy, in a country where no cost of land is required, and little or no winter feeding, or where the mere cost of herding forms the principal item of cost, cannot prove otherwise than profitable, even in any emergency of low prices for wool in the future. This basis or cost of growing wool, as compared with wool growing on lands worth fifty to one hundred dollars per acre, in a climate where stock is necessarily fed for six months of the year, forms a contrast so very remarkable as to hold out inducements to capitalists that are seemingly not afforded by any other branch of industry in the United States.

As to the permanency or durability of these natural pastures under close feeding that is a subject that might admit of some doubt; yet the range of country being so extensive that it seems to bid defiance to any idea of overstocking for many years to come. While the portions of country lying adjacent to streams might, in a few years, be overstocked by the dairy, or cattle and horses, the larger portion of the country distant from the advantages of water for stock, can only be made available in growing sheep. The Merino sheep, especially, seems adapted to that condition of climate and soil where water cannot be supplied, and will usually thrive well with

no more moisture than is supplied in the falling dew on the grass.

The next leading class of stock that will be found profitable in the Rocky mountain region, and one deserving important consideration from the fact of its being less liable to great depreciation in value, or sudden fluctuation in price, is a good quality of cattle; which can be raised probably cheaper here than in any other section of the country. The cattle business of this country, however, must necessarily be handled with a proper understanding of the surrounding conditions of market, as well as the class of cattle necessary to produce, to meet the demands with the most profit.

There seems to be two leading facts that must necessarily govern the mode of raising cattle in the Rocky mountain region. The first is the market or outlet for the surplus cattle of the country; and the second important object is the quality or kind of cattle to meet the demand, and prove the most profitable to the grower.

As to the market, the corn growing region of the Mississippi valley will doubtless furnish a ready market for all cattle that can be raised to a proper age for feeding.

The constant and growing demand for more good feeding cattle is a fact well understood throughout the corn growing region of the west. As the Rocky mountain region cannot grow cattle and fit them for the beef market with any great profit, these cattle must necessarily pass into the hands of the feeders in the corn growing regions to receive the finish-

ing touch for the beef market. The natural adaptation of this vast region of country, along the base of the Rocky mountains, is satisfactorily proved by the vast herds of the buffalo that have subsisted here in the past, with other wild animals, that have furnished the substantial food for the wild Indians. In no other portion of country on the earth's surface, has history furnished us a record of animal life in such numbers, in a normal condition, subsisting upon the spontaneous growth of vegetation of the country. The wild buffalo has never occupied any other portion of country on the American continent in such numbers, as upon these plains east of the Rocky mountains, and west of the Mississippi river. This being a fact, proves conclusively the special adaptation of this country to the bovine race. And by the intelligent management, with good breeds of cattle that can be made to take the place of this wild race, the buffalo, there would seem to be hardly a limit to what might be done in growing cattle in this section of country. We must, however, observe the fact that the buffalo has much the advantage over our domestic breeds of cattle in its traveling capacity, that gives it the advantage in going a long distance from water in pursuit of food. Such cattle as will pay best to raise here, must be kept near the streams, and not allowed to travel any great distance for food or water. The selection of good native cows, or grade Short Horn cows, that can be purchased in some of the older states to a good advantage, should form the basis of every herd; and by the use of thoroughbred Short Horn

bulls, grade up a superior class of cattle, that will sell at two years old for the corn feeding districts, to be fitted for the beef market, at the age of three years, or a little less. In this branch of stock growing, managed in this way, there can be no other result, financially, than complete success. The growth of young animals in this country will be very rapid, and of superior health and vigor of constitution, and young cattle raised here will be more valuable for feeding purposes than the same class of cattle raised in the corn growing region.

Texas cattle are found to be more healthy in this region than in their own native country, and the crossing on better stock, and gradually grading up, would in time produce an animal of some value; but it is a very poor policy in any country to take an inferior animal, or inferior race of animals, to improve upon to produce good stock. While the Texas stock might be used to some advantage, and produce a fair profit for the handling, a good native or grade Short Horn from the north would give at least one hundred per cent more profit; with another advantage, that consists in the fact that inferior stock is always slow sale, while good stock is always in demand at paying prices, even under a depressed condition of the market.

As a third class of stock to be noticed in connection with Colorado stock growing, the horse will demand our consideration. While each class of domestic animals has a special adaptation in the economy of civilized nations, each of these separate classes have also their own peculiar habits and char-

acteristics, that demand of the stock grower, that requisite knowledge for the health and complete development of those characteristics so desirable to obtain and perpetuate in the race. The leading object in growing cattle, is the most meat of the best quality for the amount of food consumed; on the other hand, the objects in breeding horses are the greatest nerve power, vitality, speed, endurance, muscular power, and long life. While the development of the meat capacity of an animal demands certain conditions of feed and management, and these conditions are in bountiful supply throughout the corn growing region of the west, at the same time the desirable objects sought in growing horses are dependent upon entirely different conditions of life. While corn is the principal basis of beef and pork raising on the western prairie, it has no special value in the growing of good horses; but on the contrary we find that oats, as a grain, have a special adaptation to the healthy and vigorous development of the horse; also that the drift formation of soil, or land specially adapted to the Merino sheep, is also the favorite of the horse. Where the Merino sheep will make a perfect success, there also the horse will be found equally successful in acquiring those valuable traits that give him a superiority over all other domestic animals. While the foot hills of the Rocky mountains, and adjacent plains on the east, are well adapted to the healthy growth of sheep and cattle, they are more especially adapted to the more perfect development of the horse; and in the surrounding conditions of market that are likely to exist for

many years to come, no country in the world affords superior advantages of a reliable market. While the corn growing regions of the west demand a number of horses, and this demand is constantly increasing, it is quite evident that the horses grown in this section will always be inferior in constitution and vigor to those grown in some other portions of the country. The growing of horses in the Rocky mountain regions, from good stock and proper management, will soon result in establishing a reliable market, at prices that will eventually take the preference over most other portions of the country.

The whole mountain region of the west is comparatively free from all malaria, or miasmatic condition of climate, possessing a dry, pure, and bracing atmosphere, that tends to give a higher development of nervous power, thought, and intelligence to man, as well as to the lower animals. The inspiring influence of these natural conditions of soil and climate tend to give to man a higher genius, a greater development of mind, and these influences are also extended to the equine race, which more nearly approaches mankind in intelligence and companionship than any other of the domestic animals.

The much abused Mustang, of northern Mexico, is an illustration of the climatic causes of the country, and the half-starved and stunted growth that is induced by hard usage and want of care and feed. These Mustang horses, Mexican mules, and Indian ponies occupy the same relative position to this country that the camel does to the deserts of Africa. Becoming adapted to the surrounding natural con-

ditions of climate and scant feed, often without water, on long voyages over the mountains, they seem to be capable of enduring most any amount of hardship and deprivation, while, at the same time, the corn fed horses from the corn districts of the west are of comparatively little value, when submitted to the hardships and exposure without feed and water that these animals undergo, and when taken to that country, generally fall away in flesh, and soon die, with the same treatment given the Mustang.

Gen. Fremont, in his cavalry expedition through Lower California and Northern Mexico, during the war with Mexico, in 1847, engaged these Mustang horses, which were rode from eighty to ninety miles per day on an average, as stated by himself, and far surpassing in endurance anything ever known of any other class of horses under the same condition of treatment.

The clean, rich, nutritious, but scant bunch grass of the mountain regions, together with the superior condition of climate, give to the horse great life and wind power, with superior vitality and longevity of life. These natural advantages brought to bear by the intelligence of man, will eventually develop a race of horses entirely superior to any yet known on the American continent.

CHAPTER XV.

DOES COLOR INDICATE QUALITY?

WHILE there seems to be a general prejudice against white in the Short Horn family, and this prejudice extends to white in other domestic animals, let us examine into the facts, and if there is merit or value in the quality of any animal that may be indicated by color, we should as far as possible avail ourselves of these advantages in breeding stock. A person goes into the market to purchase an apple for eating purposes, and without stopping to reflect or give any reason why, his intuitive perception directs him at once to the high colored or deep red apple. This he finds to be generally of a rich and high flavor, and by experimenting upon the different colors as indicating quality, it is found a fixed fact in nature that the principle holds good throughout the whole vegetable kingdom. Yellow indicates an organic quality superior to white, and a deep red superior to yellow, and all the varying shades of color are found to denote quality. An apple may be selected for eating that is of a very inferior quality, by reason of its agreeableness to the palate, while an apple of the highest quality may fail to suit the appetite. Another principle connect

ed with vegetable life, we find, also, is weight, or specific gravity. This principle can be illustrated in this way: let a person measure up a load of peach-blow potatoes and weigh them, and then measure up the same bulk of any large white variety, and he will easily detect the difference, and consequently learn the advantage of selling certain kinds of vegetables by weight instead of measure. Let us again follow this principle into the animal kingdom, and by way of illustration, take two boys of the same age, that both go into the water to learn to swim; one, after two or three trials, swims off readily, with no apparent effort, floating on the water like a board, and never in danger of being drowned, as his specific gravity is such that no effort is required to sustain himself on the water. On the contrary, the other boy, even of a more venturesome disposition, plunges in and makes many efforts, but learns that it is impossible for him to learn to swim, for at every effort to sustain himself on the water he sinks to the bottom like a stone, and with many years experimenting, ascertains the fact that it is not possible for him to swim. These, instead of being theories, are facts that I have personally demonstrated.

Again, we observe a man of only medium stature, that is capable of enduring almost any amount of physical or intellectual labor, while another of much greater stature is comparatively a bass-wood man, if I may be allowed the expression by way of contrast. This difference of physical organization we find applies to the whole animal kingdom, as well as the vegetable.

In choosing a horse we notice a vast difference in different animals, and any superior quality in the animal can be detected by the observing and experienced eye; high colors and bright colors in nearly every instance indicating a corresponding superior quality as to intelligence, physical strength, and durability. Among sheep we notice the Southdown with black face and legs and smoothly rounded physical form, always ready and active in picking its own way, and getting a living under neglect and adversity. Among swine we notice the smooth and black skin Berkshire, with fine physical form and intelligent countenance, always on the alert, ready for anything that will afford sustenance, while the coarser breeds cannot live and thrive under the same circumstances. Among the various families of the domestic animals, we notice certain highly organized types denoting superior organic structure, showing greater resistance to the various diseases that are common to the class, and at the same time proving themselves much more profitable for breeding purposes, by reason of reproducing with uniformity and greater certainty, as well as superior quality of their offspring. Among the bovine class of domestic animals, we notice a greater difference and wider range of types than in any other class. From the fact of their being the most common domestic animal given to the human family, their great diversity necessarily arising from the various conditions of climate and food, as well as habits and modes of different people in managing their domestic animals.

While the British Isles, with its rainfall of five to

six feet in a year, in a high latitude of even temperature, will produce the robust Englishman, as a contrast, the state of Iowa, with less than half the rainfall, in a changeable climate, but dry and bracing atmosphere, will only produce the improved type of the nervous, ambitious, and ingenious Yankee. All the various characteristics of different nationalities would in a few generations become assimilated and reduced to one characteristic type peculiar to the natural condition of their newly adopted country. The peculiar soil and climate of the British Isles, that gives the superior physical development to all their domestic animals, naturally produces the famous Short Horn, and the various types of large frame, long wool sheep, while the country of Spain, with a warmer, dryer climate and scant vegetation, produces the characteristic Merino. While the original color of the Short Horn family seems to have been mostly white—and such color does not seem to be an objection in England at the present time—on the contrary, the climate of Iowa and the western prairie interposes an objection at once. The characteristic coarseness and tenderness in organic structure of animals of a white or light color might not be so much of an objection in the southern states in a warmer latitude, with a climate that naturally induces that condition of animal life.

The dry and vitalizing atmosphere of our state naturally tends to a higher order of animal life, and different domestic animals of a larger frame will gradually undergo a change in our climate, and with

this change a corresponding change in color will naturally follow.

While white was the original color of the Short Horn, red is destined to be the color, especially in the western states. While the different shades of red indicate a difference in quality, the dark or mahogany red will take the preference and become the ideal of perfection.

The law that like begets like, only holds good under certain favorable conditions. Less bone and more flesh, with a more compact and solid condition of the physical structure, is the natural tendency of our western plan of feeding in our western climate, and with this change in organic structure, a corresponding change in color will naturally follow.

The farmer that acts upon these principles in choosing stock for breeding purposes in Iowa, will more surely get on the road that promises success.

CHAPTER XVI.

FEEDING FOR FAIRS---PEDIGREES OF SHORT-HORNS.

WHILE it cannot be denied that great advantages and benefits accrue to the agricultural interests of the country from an extended system of agricultural societies and annual fairs, there are many evil tendencies connected with them which escape the notice of the casual observer.

The live stock department of our shows is often of such great magnitude, that it would seem as if the labors of the societies to develop the interest which is of the highest importance to the farmer, had been crowned with complete success, and permitted no qualification. But nothing short of a good show animal will secure credit to the exhibition or the exhibitor, and our shows encourage all coming within the sphere of their influence to study and labor for the production of such animals. And yet the conditions which must be established on the farm as a prerequisite to the production of show animals, are a serious detriment to the progress of successful breeding, and inflict a damage upon the country of a character sufficiently serious to counteract in a large degree the benefits which accrue from our exhibitions. These conditions induce an impotent and barren condition of the animals them-

selves, and through their offspring sow far and wide the seeds of degeneracy, and a natural and hereditary tendency to weak constitutions.

Some of our theoretical editors sit behind their city counters, giving advice to farmers on the scientific principles of farming and stock growing, advocating the "forcing system," and declaring that the arguments advanced against it are "vague and unfounded," and that high feeding is the secret of success in the improvement of stock. Acting upon this plan, one of his readers visits the herd of some "famous" Short Horn breeder who feeds on the forcing system, and shows with great success, and purchases one or more show cows in their prime of life, which are recommended as being in calf by certain sires which are famous in the show-ring. With his purchase the farmer returns home, his mind filled with visions of fame in the future, and in due time wakes up to the fact that some of his high priced pets are hopelessly barren, and others very indifferent breeders, producing calves that fall far short of his anticipations. From one or two such lessons as these, the unsophisticated breeder begins to draw conclusions which are not quite so "vague" as they might be. Again: a farmer visits a herd of noted show animals, and discovers that certain famous cows have died of disease while yet in their prime; that others have lost their calves, prematurely dropped; that young stock, the produce of these famous animals, have staring coats of hair, and are afflicted with scours and colic, which defy the control of the breeder, and many of them so

physically debilitated as to render them forever comparatively worthless for breeding purposes. When he realizes these facts, and ascertains that the number of the representatives of famous females sought for by all the world can be counted upon his fingers, and that many popular tribes have absolutely passed away and "left no sign," his ideas of the "forcing system" are not quite so "vague" and indefinite as some people affect to believe.

As a close observer of the Short Horn interest in America for the past twenty-five years, and a breeder, not only of Short Horns, but of various descriptions of stock, I am very free to admit there is no other type of the bovine race that can compare with the Short Horn for beef purposes; and that where bred for milk they are without doubt as profitable for the dairy as any other breed of cattle. But I believe the treatment of this stock which the influence of our fairs tends in a large degree to encourage, is pernicious, and tends to restrict the usefulness of this matchless breed of cattle, and limit the benefits which it is capable of bestowing upon the country.

Liberal feeding is necessary to maintain any class of stock in its highest excellence; but a *judicious* system of feeding is more necessary and important. Stock, in order to make a vigorous and healthy growth, must have the advantage of good pasture, furnishing a variety of grasses, that its quality may be constantly maintained, and an abundance of wholesome water. The system of stall-feeding breeding animals and young growing stock for seven

to nine months in the year, which is the essential condition for the production of superior show animals, is not the natural way in which to maintain stock, and is detrimental to its health, vigor and fertility. And while breeding stock cannot be overfed on pasture in the summer, or in winter on hay with a proper proportion of oats, shorts, oil-meal, or corn, the practice of feeding corn in whatever quantities animals can be induced to take, which prevails so generally in the west, is highly injurious to all breeding stock, and extremely unfavorable to a healthy development of young growing animals, as every honest breeder of experience will admit.

As to the matter of pedigrees in connection with Short Horns, which was agitated so much at the recent National Convention of Breeders, there seems to be a variety of opinions; and these differences will naturally be governed by the respective interests of different breeders. A pedigree running in an unbroken chain to the English Herd Book, especially to the early volumes, adds largely to the value of the animal, other things being equal. This no one will deny. But a monopoly, founded upon the basis of a long pedigree, and regarding no other considerations, would, I think, be highly prejudicial to the stock interests of the country, encouraging us to place a higher estimate upon the shadow than upon the substance. The present American Herd Book system is, under the circumstances, perhaps as good as we can harmonize upon. The editor of any Herd Book is liable to be imposed upon by false pedigrees. And it must be an admitted fact, that

the value or merit of an animal does not depend wholly upon a long pedigree, but on the contrary, that it must have an inherent value, independent of pedigree, in order to be of any value for breeding purposes. It is a fact, which all experienced breeders will admit, that very inferior animals, possessing little or no value for breeding purposes, are frequently the produce of the most famous and fashionably-bred sires and dams; while, on the other hand, some of the most promising animals, those that prove true and reliable breeders, are the produce of animals with short pedigrees ending in high grade cows. While a good pedigree, if the animal corresponds, possesses much merit, it is only understood by experienced breeders; and I am inclined to think, that the more experience a person acquires in breeding, the less faith he will have in long pedigrees, and the more faith in the other established laws of reproduction, which are the essentials of success in stock breeding.

As none but breeders of experience are booked in pedigrees, the committees appointed as judges are, in nine cases out of ten, wholly unacquainted with them; and as a printed pedigree handed to them is about as intelligible as so much Latin, they ignore the whole system of pedigrees, and are governed in their distribution of awards entirely by the eye, or, to speak more accurately, by visible qualities. And, as nearly all of our committees are selected, as they should be, from among general farmers, trained through the influence of profit in common stock raising—the degree of profit with

them being always measured by size and fatness—this practice of awarding premiums on visible qualities is certain to prevail throughout the greater portion of the country, in opposition to any standard of fashionable breeding, improved quality, or fineness in organic structure. The conservative mind of the mass of the farmers of the country is yet to be educated to the advantages of improved stock, and this education will require time, and cannot be forced beyond the gradually improving condition of the country.

CHAPTER XVII.

ESSAY ON STOCK FARM.

HAVING recently located a stock farm of twelve hundred acres in Jasper county, Iowa, I will give my experience in connection with it, also involving ideas gained from stock raising the last twenty-five years in Iowa and northern Ohio. I have fenced into ten fields, with five board fences and white oak posts. I find that in mixed farming, cattle, horses, sheep, and hogs running on the farm, nothing less than five boards, each six inches wide, will make a reliable fence, live fences excepted. Whenever a crop of grain is taken from a field it is generally quite necessary that hogs and cattle or sheep should follow to consume what would otherwise go to waste. It often happens that a crop, especially in Iowa, is so blown down or destroyed by storms that harvesting is almost impossible, or attended with so much expense that no saving can be made by harvesting; and if so fenced that hogs, cattle, or sheep can be turned in, very little loss will be suffered by the farmer. And it often happens in Iowa, that a crop fed off by stock is disposed of to a better advantage than to be harvested and put into market. Hence I maintain that stock farming in Iowa implies mixed

farming; and good, reliable fences are quite requisite for any success.

The system of rotation in crops, as essential in Iowa, on her rich, alluvial soil, as in the older states with their worn out land (where it is necessary), requires fencing into convenient sized fields so that any piece of ground can be seeded down as soon as it becomes foul with weeds, which is the natural tendency with our black alluvial soil.

The next important consideration in a stock farm is plenty of living water in all the fields where stock is expected to be kept. No farmer should undertake to grow any kind of stock on a farm, beyond a work team, without providing water so that stock can have access to it of their own will. It is quite expensive to furnish water to stock from wells. Where ponds can be constructed so as to hold water it is more convenient for stock and less expensive; but pond water, during the summer, becomes very unwholesome, and unfit for stock to drink in a dry season.

I find that steers herded on the prairie, and furnished only pond water during the summer, do not feed well during the fall and winter. I think that steers running where they have good creek water during the summer, are worth at least one cent more per pound to feed in the fall, than those that have been shut up and confined to pond water. With the consideration that stock raising in Iowa must necessarily form the leading item, and is quite essential to the success of every farmer, a farm with running water so as to accommodate every field is worth

one hundred per cent more than one without running water.

The next important thing in connection with stock farming is timber. A grove of timber, in connection with running water, where cattle can resort in the heat of the day, is of great value and duly appreciated by all stock. Also in the winter season it moderates the cold day, and gives great protection to both man and beast. The great advantages of timber do not stop here, but are manifest in many ways in successful farming in all states.

As a wind-break, timber gives protection to the growing crops in summer; also gives off moisture to the atmosphere so as to prevent the sad effects of drouth in the vicinity. In a dry season better crops are grown in the vicinity of timber than on the open prairie distant from timber. Timber seems to absorb the miasmatic poison from the atmosphere and renders the atmosphere more healthy in the immediate vicinity. Fruit growing is much more successful in close proximity to timber than on the open prairie. I find that a garden started under the protection of timber is ten days to two weeks earlier than on the open prairie. The soil in the immediate vicinity of timber is more productive. The rain clouds in a dry season are attracted by streams of water and belts of timber.

The various kinds of domestic animals raised in the country we find well adapted to our climate and soil. In noting in detail some of the many requisites for the healthy and profitable growth of our leading domestic animals, I will first note the horse,

which from the fact of his special adaptation, being the great motive power for transforming the wilderness, and fitting it for the abode of civilization, the common beast of burden of the country, he demands more special care and regard for his health and longevity than any other of the domestic animals. The state of Iowa, by reason of a superior invigorating atmosphere, tends to give great vitality to the horse as well as man. Yet in no part of the country probably, is the horse so soon broken down and physically incapacitated for labor, as in Iowa. The common practice of feeding corn to horses, without regard to quantity, is sure to induce disease and debility that in a few years will unfit him for labor. At the time our horses would naturally be in their prime and ready for hard service, they are broken down and their usefulness destroyed. This does not, as is generally supposed, result from hard labor, but from bad feeding. Corn should not be fed to horses at any season of the year except in the coldest weather, and then only in small quantities mixed with other feed. A well-bred horse will usually keep in good health and do active service until he is twenty to twenty-five years old, if properly fed and not overworked. Clean timothy hay and oats as a feed will enable a horse to do more work and double his years of usefulness, as compared to the common practice of feeding corn and little or no hay. All work horses, as well as colts, should be allowed to run in pasture when not at work. Horses will keep in better health and be able to do more

hard service if they can be allowed to run at large on good pasture a part of the year.

A few words on neat cattle will suffice. The leading object of raising cattle in Iowa is their flesh. Beef and pork, the leading exports of the state in the past, will doubtless continue so in the future, from the natural conditions that control the destiny of our state. The principles in connection with this subject are the greatest gain for the least amount of food consumed, and in the shortest time. The investigation of the subject involves not only the plan of feeding, but a more important consideration, the capacity to take on flesh, or in other words, the different breeds.

Fifty years experience in this country has given the "Short Horn" the preference over all other breeds of cattle for beef purposes. So apparent is the difference that the most casual observer will at once detect the cross, even where but one-fourth or one-eighth blood is introduced.

In introducing the "Short Horn" among our herds, I notice a prevailing error in the minds of most farmers, who make size the leading object instead of quality. Among the "Short Horn" family there is as much difference in the tendency of different animals to take on flesh as among our native cattle. Great size usually indicates coarseness in structure, and the want of capacity to take on flesh rapidly.

Under the present condition of things no farmer in Iowa can afford to breed the common native cattle of the country; and the longer he persists in it

the worse will his condition be financially. Plenty of feed at all times, plenty of good living water, with salt accessible at all times, and good shelter in winter, are the leading requisites of raising cattle. In feeding hogs the same general principles apply as in feeding cattle.

Plenty of good clover pasture and water during summer, until the grain fields are cleared, then the hogs should have the benefit of what is left. After cleaning the grain fields, hogs should be turned into a corn field, where they cannot have too large field to run over at one time. This, by some, would be considered wasteful feeding. I consider it quite economical, at the present price of labor, and price of corn. For winter feeding, hogs do much better to be with cattle where they can be sheltered and have dry nests, and water convenient to get at. Hogs, to thrive well, and be healthy, where full fed on corn, should have plenty of salt, sulphur, and wood ashes, where they can run to it and help themselves. Stone coal will furnish the sulphur, and is quite valuable for hogs. As to breeds, Berkshire, Poland China, and Chester Whites, all have their admirers. Two years experience with the different breeds, being fed together and treated all alike, has convinced me that I do not want anything to do with white hogs of any breeds.

The black hog will, I think, eventually take the preference in Iowa. I breed the Poland China as a distinct breed, also the Berkshire. The best feeding hogs are produced by crossing Poland China sows with Berkshire boars. I do not pretend to say

what would be the result of breeding such a cross breed. By intelligent breeding in this way, a better hog for Iowa could be produced than we have now got for general stock purposes. As to feeding cooked food to hogs, at the present price of produce, and the cost of labor, I am satisfied that it will not pay except for such hogs as are necessarily kept up in pens. The farmer in Iowa must necessarily adopt a cheaper mode of raising and feeding hogs, and less corn should be fed, and good clover pasture furnished for feed in summer. In this mode of feeding, hogs will be more healthy and make a better growth.

As to the kind of stock that will best pay, my opinion is, that no farmer can afford to change from one kind of stock to another, with the idea of meeting a higher market; but all the different kinds of stock that the circumstances of the farmer will permit, should be bred with the idea of a permanent business without regard to price. Foretelling the price of any one article of produce in the future is what no one can pretend to do, and the constant fluctuation in prices of all the different kinds of produce should be a warning to the farmer to be careful about investing in any one thing too heavily, but rather in as great variety as his circumstances will permit; and continue in some established policy or plan of carrying on the different branches of farming. Instead of letting stock deteriorate, because the price is low, the farmer should make it a fixed principle to improve his stock of all kinds by breeding only the best and selling the poorest. On this plan I think success will be sure to reward his efforts.

No farmer can afford to raise stock of any kind, without proper protection in winter from stormy weather.

On the subject of applying manure, I am satisfied the most can be realized from it as a top dressing on grass land, and all manure that can be saved on the farm should be devoted to this purpose, and where convenient to do so, should be applied in the winter season.

As to the relative value of different kinds of food for stock, corn, the common staple of the country, will take the lead for fattening purposes. Corn at twenty cents per bushel is as cheap as good timothy hay at four dollars per ton. One acre of tame grass if properly seeded, I consider of more value than three acres of wild or prairie grass, for either meadow or pasture. Clover is very valuable for pasture, for most kinds of stock; but I would not sow clover for hay or use it for hay, unless mixed with timothy. Clover and timothy mixed is best for pasture. For seeding down for either meadow or pasture, my experience tells me not to sow timothy at any other time than the latter part of August or the first of September, and to sow on freshly plowed ground if possible, and roll down with a heavy roller. With the farmer, the roller is just as important as the plow, and it should follow the plow in every crop put into the ground. Clover should be sowed in the month of February, or on fresh plowing in April, and harrowed in lightly.

CHAPTER XVIII.

SHEEP HUSBANDRY.

WITH the present price of wool and other farm products in Iowa, sheep husbandry, if successfully engaged in, I am satisfied will pay a better profit than any other class of farm stock. With three years' experience in Iowa, on a farm of rolling prairie, well watered with running streams, and timber sufficient for protection against the cold winds of winter and the scorching sun of summer, I have experimented somewhat in raising hogs of different breeds, as well as cattle and horses, and also in feeding steers. I have, at the same time, kept from one thousand to fifteen hundred sheep, consisting of full-blood American Merino, Cotswold, and Southdown varieties; also a few large-frame, coarse-wool, native sheep; engaging in the business of sheep-raising in Iowa after the failure of so many different farmers by reason of disease among sheep, and the constant annoyance of dogs and wolves, which threatened to destroy what few sheep had escaped disease, seemed to forebode anything but success; especially in a part of the state so infested with dogs and wolves, that sheep-raising had been abandoned by nearly all the farmers previously engaged in the

enterprise. With all these obstacles, which seemed to threaten failure, I have met with success beyond my most sanguine expectations. By yarding my sheep at night inside high picket fences, for six or eight months, to secure them against the attacks of wolves and dogs, that came in great numbers, and made the nights hideous with their discordant music, I soon succeeded in clearing the surrounding country of all wolves and prowling dogs, so that my sheep now lie down in safety on any part of the farm, and rest in peace and quiet. By the use of strychnine, I find it an easy matter to capture all the dogs and wolves that come on my premises, and with comparatively little cost and trouble. This mode of dealing with the common enemy of the sheep, I find is quite practicable, and need not be attended with any danger to stock on the farm.

While farmers in all the states are clamoring for protection to sheep through the different legislatures, that source of protection has proved a failure; and especially is this the case in Iowa, where the dog owners are in the majority.

In making a wholesale slaughter of dogs, as I have done, I do not find it necessary to make any clandestine war on the enemy, or go outside of my own fences; on the contrary, I warn all my neighbors of the fact—that all dogs are in danger that come into my fields. I find that the best trained dogs as well as the prowling curs are occasionally night wanderers, and soon become victims of the fatal poison; but this I conceive to be the only prac-

licable mode of providing any security to the wool-growers of Iowa.

The climate of Iowa I consider quite favorable to sheep of any breed. Our rolling prairie, pure running water, and dry and bracing atmosphere, comparatively free from miasmatic influences, are all conducive to the health of sheep.

Shade of some kind, as a protection from the scorching sun of summer, is more essential to sheep than to any other stock.

I think it quite difficult to succeed in sheep-raising in Iowa, without the cultivated grasses. Sheep will not do as well on prairie hay or prairie pasture as on the cultivated grasses. The change of climate in the case of sheep from the eastern states disagrees with them at first; but after becoming acclimated, I think they require less care here than in any state east of us. With no other care than providing good pasture and water, with sheds for winter protection, with plenty of salt having a little sulphur mixed in it, I find sheep with me are more healthy, and thrive better than in Northern Ohio, where wool-growing affords the most reliable income to the farmer.

With the present prices of all kinds of stock and farm produce, I am satisfied that I can make a better income from sheep, with wool at thirty cents per pound, than on any other class of stock. Not every farmer in Iowa is so situated as to be able to handle sheep to advantage; yet every farmer, with proper fences and cultivated grass, can, to good advantage, keep at least one sheep to every two acres on his farm; and one sheep to each acre on a stock and

grain farm is about the number that can be kept to advantage.

The noxious weeds that infest the alluvial soil of the prairies, and overrun the country, by scattering their seeds broadcast, cannot be more effectually subdued than by keeping sheep. The coarse herbage that is left by all other stock on the farm, to become a nuisance, is usually devoured by sheep; and the cost of their keeping is thereby considerably reduced.

The great advantage of keeping sheep for the purpose of manuring and renovating worn-out farms, is well understood by the farmers of the older states, and is resorted to as a necessity as well as a source of profit. This great advantage, I think, will be duly appreciated by the Iowa farmer, who is constantly depleting his farm by grain raising.

I find it much more pleasant as well as more profitable to raise sheep than hogs. While hogs are constantly rooting and destroying pasture, and making their raids over the farm, breaking through fences, and destroying crops, sheep cause no such trouble. For gleaning the grain fields after harvest and through the winter, a greater saving can be effected with sheep than with hogs. Cholera, that seems to prevail among swine throughout the west, in defiance of the best medical skill, thus destroying annually a large portion of the crop, renders this class of stock less safe, and therefore less profitable than sheep.

The use of mutton for meat, in place of the hog diet so common in the west, would, I think, have a

tendency to insure better health among the people, and to impart greater energy and activity to the laborer; and this change should, in my opinion, be advocated by all agricultural papers.

As to the care and management of sheep, I will mention a few facts of importance.

Where large flocks are kept together, they should have plenty of range, and large yard room if yarded at night. Plenty of salt, with three to four ounces of sulphur to each half-bushel, placed so that they can have access to it at all times, is very essential. In wintering sheep, a great saving can be made by giving them plenty of range in pasture, or on green rye sown for their benefit in the fall. Very little hay or grain is required for sheep that have plenty of pasture range while the ground is bare in winter; and sheep wintered in this way are healthier, and do better.

As to the different breeds, each has its special advocates and admirers. While one man finds all his ideas of excellence concentrated in the Cotswold, another will prefer the Merino or Southdown. Of these three varieties, each has its peculiar characteristics and advantages. According to my experience, which is corroborated by that of many others, more success attends the crossing of the different breeds than in breeding distinct breeds. Although this principle is ignored by many writers, I am satisfied it is true.

One advantage that sheep possess over other varieties of stock is, that the carcass can be disposed of for mutton at any age, and costs very little if any

more to produce than other kinds of meat; while the fleece will usually pay all the cost of keeping. And as both items, the wool and the carcass, are sources of profit, both items demand the attention of the wool grower. A sheep that will combine in the same animal both these qualities in perfection, is the sheep demanded by the western farmer. While the American Merino, it is generally acknowledged, has the superior claim in respect to wool, the Cotswold and Southdown are far more profitable for mutton. The Leicesters are so similar to the Cotswolds, and they are so generally mixed together, that none but experienced breeders can recognize any difference between them, that I do not speak of them as a separate class, although I think they are inferior to the Cotswolds. I am satisfied that the wandering Merino, weighing one hundred pounds, will consume as much food as the lazy Cotswold weighing two hundred pounds. I am also confident that the most profitable sheep for the western farmer is a cross between the Cotswold and the Merino. The fleece of this cross is heavy, compact, and of good quality. It is also highly prized by the manufacturer. Lambs produced by breeding Cotswold bucks on good Merino ewes are strong and healthy, and will weigh at maturity about one hundred and fifty pounds; while the weight of a flock of Merinos will hardly average one hundred pounds. The fleece of this cross will usually average nine to ten pounds; while the average weight of the Merino fleece is five to six pounds. This cross produces a sheep that is more healthy, more profitable, and in my opinion better adapted

to the prairies of the west. In this cross breed the liability to foot-rot is also avoided, as the feet of the Cotswold and Southdown are always sound.

In breeding this cross, I would still use Cotswold bucks until the second or third cross; but a cross back on Merino bucks, in time, might, I think be advisable, in order to retain, to some extent, the leading characteristics of the Merino, as I am quite doubtful whether sheep raising can ever be made as profitable in the west with any other breed of sheep as a basis. While many of our theoretical writers advocate the principle of keeping the different breeds separate and distinct, which is all right enough for the purpose of preserving the distinct types or breeds in their purity, I am satisfied that, for ordinary stock purposes, the practice of crossing different breeds of either hogs or sheep, possesses many advantages over that of raising full-bloods. Change, the inevitable law of nature, is written upon the face of all material things. There are no fixed types in the animal kingdom. The nationalities of mankind grow up under fixed laws of the universe, and flourish so long as the surrounding conditions of life are favorable. By a change of these favorable conditions of life, nations degenerate. So with the domestic animals. The name of Bakewell is famous throughout England and America by reason of his success in producing new types and improvements in domestic animals. One of our noted authors on sheep husbandry charges Bakewell with extreme selfishness, in not imparting to the world the secret of his success. Now it is quite evident to my mind,

that Bakewell carried down to the grave no secret of his success, and never entertained any secrets. Being of a practical turn of mind, he possessed an intuitive perception of the physiological laws of animal life; and being surrounded by favorable conditions of life that he did not fully comprehend, he followed up the plans and principles of breeding which led to his great success. Those fixed conditions in nature of bringing together opposite characteristics of the same class or family of the animal kingdom, were understood by Bakewell as being the essential principles of successful reproduction. By this same law of nature, the crossing of different species meets with success; while breeding in on the same class of stock, tends to degeneracy, I find, by experience, that a cross between a Cotswold and a Southdown produces a vigorous and healthy offspring; also that a cross between a Southdown and Merino meets with like success. While the Merino may be as hardy as the Cotswold, for the western country, I have very indifferent success in raising full-blood Merino lambs; and I find that this is the complaint of most other breeders in the states. The same difficulty is also experienced in seeking to raise other breeds pure by themselves, to a greater or less extent; but by crossing the different breeds, the result is entirely different—the produce are much more hardy and vigorous, and the liability to loss is greatly diminished. In a flock of seven hundred pure bred and healthy Merino ewes, I bred two hundred on Cotswold bucks, four hundred on Merino bucks, and one hundred on Southdown bucks, all at

the same time, with about one hundred large-frame coarse-wool native ewes on Merino bucks. The lambs were mostly dropped about the first of April, in cold, stormy weather. I succeeded in raising about two hundred and fifty full-blood Merino lambs from the four hundred Merino ewes: while from the two hundred Merino ewes crossed on Cotswold bucks, I raised about two hundred lambs. I at the same time had pure-bred lambs dropped by Cotswold ewes and Southdown ewes. The lambs of the Cotswold cross being stout and vigorous, it was easy to raise by hand all that were deserted by their dams; while the full-blood Merino lambs so deserted, are difficult to raise by hand, and generally are all lost. Merino ewes are poor sucklers, and noted for deserting their lambs. The lambs from the Merino ewes crossed on Southdown bucks were strong and vigorous, and none were lost except where deserted by their dams. My full-blood Cotswold lambs were apparently more tender, and some of them died without any apparent cause, as they were well cared for. Some full-blood Southdown lambs were lost, in the same way. With my coarse native ewes crossed on Merino bucks, I had the best success; the larger share of them having two lambs each, and being great milkers, they raised their lambs with very little trouble.

This last cross makes a good class of sheep to grade up on Merino bucks for common stock purposes. As a basis for estimating the relative value of the two kinds, say at from eight to twelve months old, reckoning the value of the pure Merino lambs

at \$4, the Cotswold cross would be at least \$6, after making reasonable allowance for any prejudice that I might entertain in favor of the Cotswold cross.

Now as to the idea of retaining the original breeds in their purity, and breeding in that way, as advocated by many theoretical writers, we should bear in mind that these breeds, as such, do not occur in nature, but by the aid of man's intelligence, they have become established. On the same principle, if a superior type can be produced and maintained by intelligent crossing, why retain the originals?

With regard to the business of wool growing being overdone in the country by vast herds accumulating in California and the territories west, we should bear in mind, that the periodical seasons of drouth that are sure to visit that whole country, will continue to operate as a check against over-production, and thus guarantee to the farmer of the older states a safe investment if his business is carried on in a regular manner through a series of years. The keeping of sheep in as small flocks as possible, and guarding against over-stocking, are what the wool grower should never lose sight of.

As to preparing for market and marketing wool, there is not at present sufficient inducement to the wool grower to prepare his wool free from dirt. On the contrary, I am inclined to think that the dirty wool has the advantage in the market. And unless the farmers of a certain section of country can organize, and establish a wool depot, for assorting and grading their wool under the superintendence of competent and reliable men, appointed by them-

selves, the present condition of the market must continue to exist. These wool depots have proved a success generally, where resorted to in the eastern states, and there is no reason why they should not prove so in the west.

CONCLUSION.

OAK HILL STOCK FARM.

HAVING, at much expense, fitted up a farm of about twelve hundred acres, that is specially adapted to growing stock, I shall in the future, as in the past, endeavor to grow such classes of stock as are peculiarly adapted to the climate of Iowa, and other western states.

In the selection of stock for breeding purposes, I have spared no pains in trying to obtain the best specimens of the most popular families of Short Horns, and my special object in the future will be to improve upon the present stock, by judicious crossing and breeding, and a healthy and proper system of feeding.

While many of the leading stock breeders of the west have more or less sickness in the form of colic and other diseases arising from bad feeding, and bad water, I can say with truth, I have not had a single animal of the Short Horn family that has been in any way afflicted, or required any medical treatment whatever, in the last three years; and this fact of itself proves the healthy condition of all my herd of Short Horns. While I do not advocate the starving system of any kind of stock, but on the

contrary, find good liberal feeding necessary to produce good stock of any kind; at the same time, a complete success in growing stock is based upon the two leading principles of proper care and attention at all times, and the no less important principle of a proper knowledge of the adaptation of the various vegetable products of the soil, to the different conditions of animal life. What to feed, when to feed, and how to feed, are the leading questions with the stock grower, and for want of this knowledge, a partial or complete failure attends the efforts of many of our stock growers.

The Short Horn family, which is becoming more appreciated throughout all portions of the country, and the prejudices of the people fast giving way under a more intimate acquaintance with this class of stock, are facts that have been gaining ground for the last fifty years, and hence the continued demand, at increasing prices, for the "Improved Short Horn." The Short Horn enterprise of America is no South Sea bubble, no transient scheme of speculation, but on the contrary, is an enterprise that is sure to demand the leading and most important considerations of the western farmer.

In no country in the world, or to no people on earth, is the Short Horn of more value than to the farmer of the western prairie. Massive in size, with a physical development that no other class of the bovine race can hope to attain; its early development and quick growth, with a capacity for putting on flesh that is unequaled by any other class of stock, with the fact of great physical vigor, that is

so necessary to withstand the severe climate of our prairie winters, are some of the characteristics that tend to give the Short Horn its great advantage over all other breeds of cattle, in the corn growing region of the west.

In the breeding of swine, the black, or Berkshire breed is probably destined to supersede all other breeds, in the more northern portions of the United States, and for the more intermedite portion, or between thirty-eight and forty-two degrees north latitude, the Poland China is, I think, destined to hold the favorable opinion of the western farmer.

The crossing of these two breeds for stock hogs has many advantages in producing healthy, vigorous, and good feeding stock.

In the selection of Berkshires, I have many of the most noted families represented in my stock, and shall continue to import good breeding animals each year, from the best stock in the country, to cross on the several families now kept in breeding.

Of the celebrated Poland China, I have specimens from different breeders, such as Magee, Moore, and Sissons, and others, and a great diversity, I find, is created by different breeders, in this class of swine, in breeding for different objects, and under different conditions of climate, as well as food. The more common habit of growing swine in southern Ohio, in a favorable climate, and on clover pastures in summer, gives a larger bone and coarser frame, but a full development of body; while the western
m of corn feeding gradually reduces the size

of the bone, and gives more meat in proportion to gross weight.

The common practice of western breeders has been to breed out the white, and establish the more desirable black color, which has, within a few years, changed some of the leading characteristics of the Poland China, in the west.

In growing sheep on the western prairie, my experience, each year, more fully confirms the fact that the American Merino will necessarily have to be superseded by the coarse wool breeds, but a flock produced by a cross of the best coarse wool bucks on Merino ewes will produce a more valuable flock for the western farmer than any one pure breed. I shall continue to breed the Cotswold and Southdown breeds pure, and improve my stock by selections of the best breeding animals to be found in the country. A flock of cross breeds, quite valuable for starting a flock, will be kept on my farm, and for sale to farmers who desire to start a hardy flock of sheep.

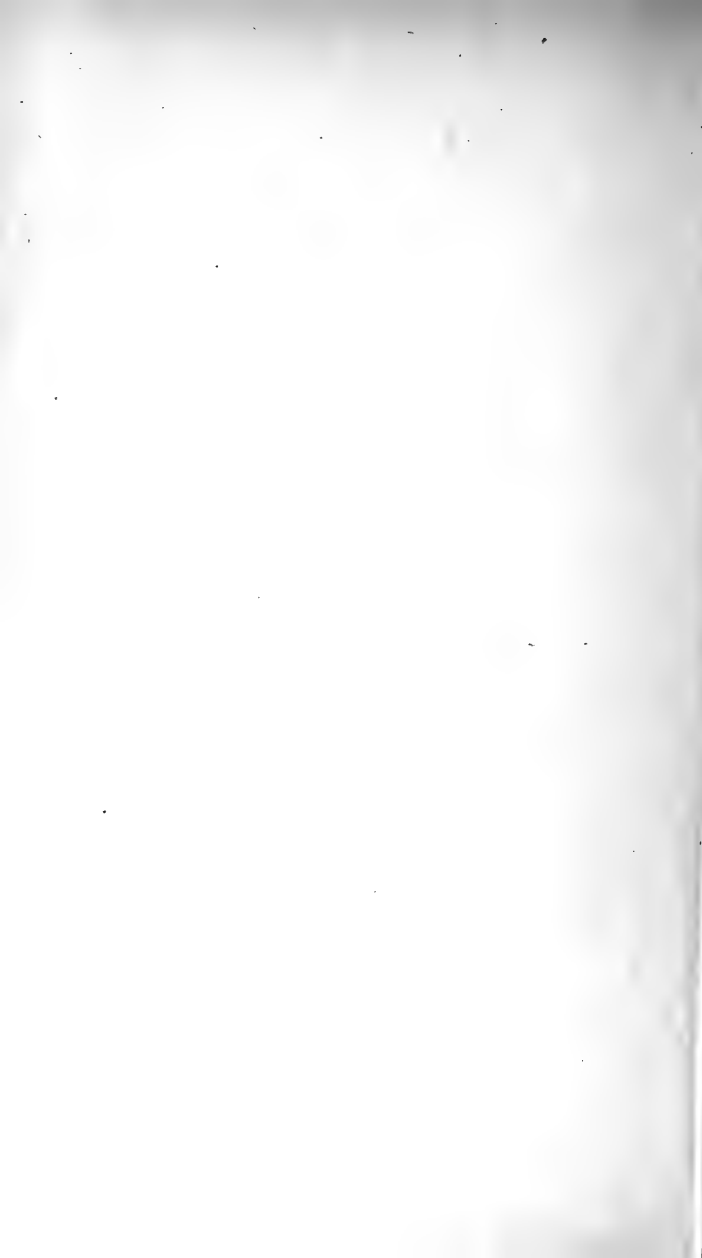


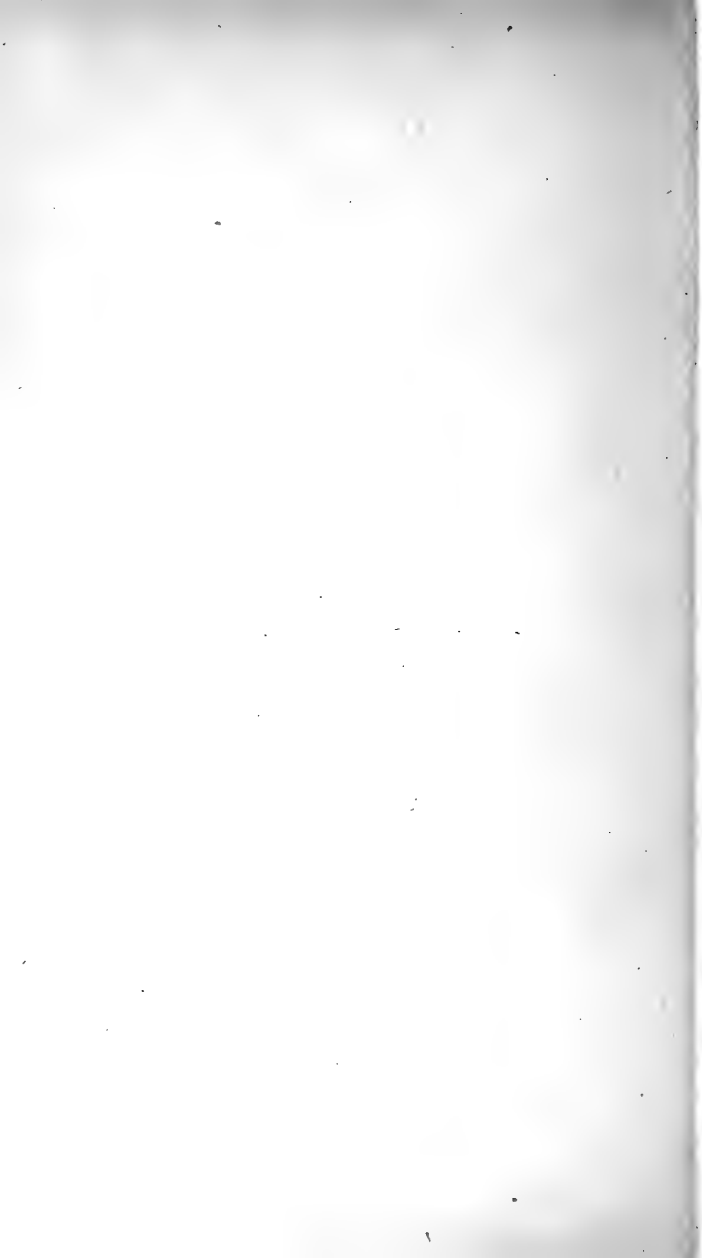
Table showing the quantity of seed required to
the acre.

NAME.	Quantity of seed.
Wheat.....	1 $\frac{1}{4}$ to 2 bu
Barley.....	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ bu
Oats.....	2 to 4 bu
Rye.....	1 to 2 bu
Buckwheat.....	$\frac{3}{4}$ to 1 $\frac{1}{8}$ bu
Millet.....	1 to 1 $\frac{1}{2}$ bu
Corn.....	$\frac{1}{4}$ to 1 bu
Beans.....	2 to 2 $\frac{1}{2}$ bu
Peas.....	2 $\frac{1}{3}$ to 3 $\frac{1}{2}$ bu
Hemp.....	1 to 1 $\frac{1}{2}$ bu
Flax.....	1 $\frac{1}{2}$ to 2 bu
Rice.....	2 to 2 $\frac{1}{2}$ bu
Broom-corn.....	1 to 1 $\frac{1}{2}$ bu
Potatoes.....	5 to 10 bu
Timothy.....	12 to 24 qts
Mustard.....	8 to 20 qts
Herd grass.....	12 to 16 qts
Flat turnip.....	2 to 3 lbs
Red clover.....	10 to 16 lbs
White clover.....	3 to 4 lbs
Blue grass.....	10 to 15 lbs
Orchard grass.....	20 to 30 lbs
Carrots.....	4 to 5 lbs
Parsnips.....	6 to 8 lbs

Table showing the number of seeds in one pound, and weight per bushel.

NAME.	Number of seeds per lb.	Number of lbs. per bu.
Wheat	10,500	58 to 64
Barley.....	15,403	48 to 56
Oats.....	20,000	38 to 42
Rye.....	23,000	56 to 60
Vetches.....	8,300	60 to 63
Lentils.....	8,200	58 to 60
Beans.....	600 to 1,300	60 to 65
Peas.....	1,800 to 2,000	60 to 65
Flax seed.....	108,000	50 to 60
Turnip seed.....	155,000	50 to 56
Rape seed.....	118,000	50 to 56
Mustard (white).....	75,000	75
Cabbage seed.....	128,000	52
Mangel Wurzel.....	24,600	20 to 24
Parsnip seed.....	97,000	14
Carrot seed.....	257,000	9
Lucern seed.....	205,000	58 to 60
Clover (red).....	249,600	60 to 63
Clover (white).....	686,400	59 to 62
Rye grass (perennial)...	334,000	20 to 28
Rye grass (Italian).....	272,000	13 to 18
Sweet Vernal grass.....	923,000	8

APPENDIX.

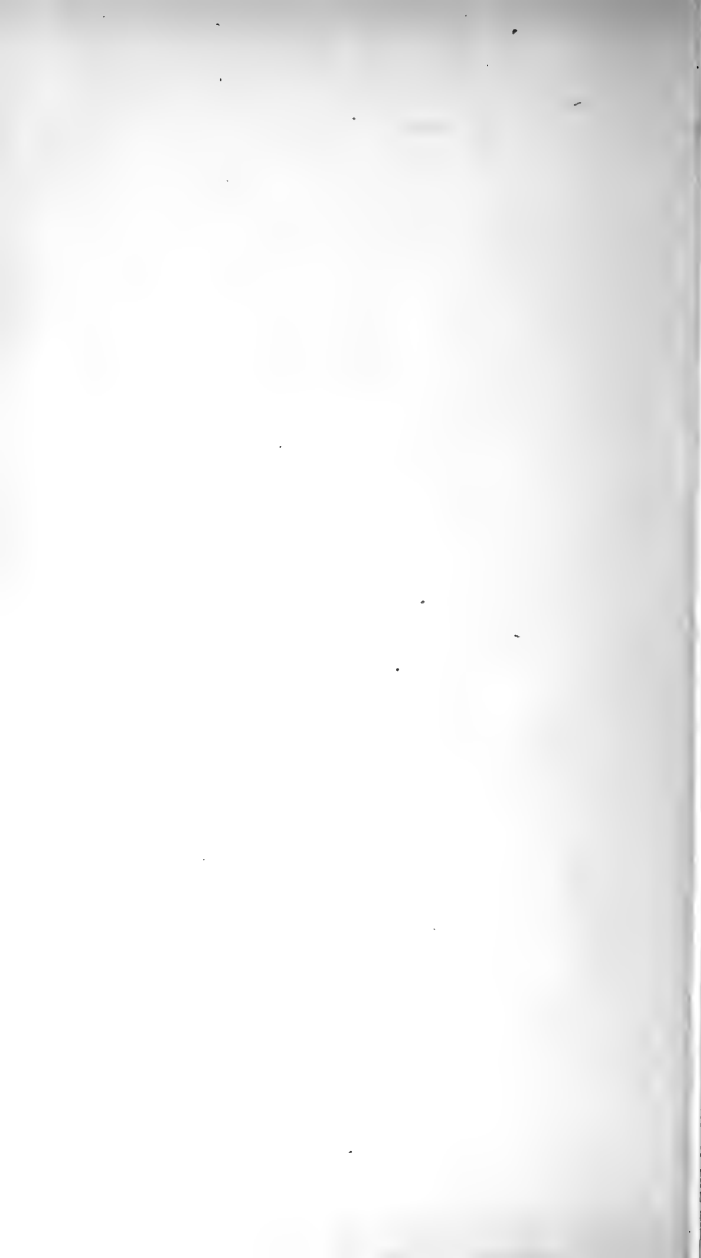


THE WOOLS
OF
THE UNITED STATES.

BY JOHN L. HAYES,

Secretary of the National Association of Wool Manufacturers.

From the Annual Report of the Department of Agriculture
for 1872.



THE WOOLS OF THE UNITED STATES.

F EW of our growers of wool are thoroughly informed as to the specific uses of the various wools of different breeds and their various grades. It is the purpose of this investigation to describe the wools of the United States from the stand-point of the manufacturer rather than from that of the grower. A precise knowledge of the peculiar requirements of each branch of the woollen manufacture for the kinds of wool needed for any particular fabric, is not only an interesting department of technical knowledge, but one inuring directly to the pecuniary advantage of the wool producer. It is also important to manufacturers that such knowledge should be possessed by those upon whom they are dependent for wool supplies. It is to this lack of intimate acquaintance with the peculiar wants of the various branches of the manufacturer, rather than to climatic or other impossibilities, that the wants of the mill owners are not more completely met.

DEPENDENCE OF MANUFACTURERS UPON
DOMESTIC WOOL.

Nine out of ten of the wool manufacturers of the United States, if asked the question, "What is the most pressing necessity of your manufacture?" would answer, "We want more domestic wool." The enlightened governments of all manufacturing nations have seen that the supply of domestic wool is the first and chief dependence of their manufacture. Seeing this, scarcely a hundred years ago the ruling sovereigns of western Europe, by introducing Merino sheep into their respective countries, did more to immortalize themselves than by any feats of arms. The King of Saxony introduced Merinos from Spain into his kingdom in 1776, and Frederic II., about the same time, introduced them into Prussia. Merinos were domesticated in Hungary by the great Maria Theresa, and in France by Louis XVI., in 1786, and with what results? The influence of the Saxony breed is seen in all fine German broadcloths. In Prussia eighteen per cent of her exports are Merino woollen goods. Hungary furnishes the supply of the raw material for the unequalled fabrics of Austria. The soft and fine Merino dress-goods of France are in use all over the civilized world.

In the United States domestic wool is the very foundation of the wool manufacture. Very careful statistics, collected in 1864, show that, of all the scoured wool used in the woollen mills of the United States, over seventy per cent was of home growth. Of four thousand and seventy-three sets, two thous-

and one hundred and seventy-one were employed wholly upon American wool. Of nine hundred and thirty-one mills, seven hundred and sixty-seven used domestic wool principally, while only forty-six mills in the whole country used foreign wool alone. No foreign wool was used in the western states. As the number of mills at the west has greatly increased, while the use of foreign wool in them is still unknown, the proportion of domestic over foreign wool used in all our mills has, without question, greatly increased. The new mills which have sprung up at the west and in the interior will obviously use domestic fleece, on account of the saving of transportation, the facility of selection and purchasing, and the opportunities for effecting saving to both manufacturer and wool grower, in the exchange of cloth for wool. But there are general reasons which lead all manufacturers who can use American wools to prefer them. Our machinery is adapted to the working of our own wools, and our best skill, founded on an experience of their distinctive characters is exercised in manipulating them. Although we may import limited supplies of foreign wool, an ample domestic supply would regulate the cost of imported raw material. As a result of the economic law, that no nation does nor can safely continue to import more than one-tenth of all it consumes, we cannot afford to import and pay for all the raw material which our machinery is capable of working up. If the domestic supply of wool be permanently curtailed we must inevitably curtail our manufacture, and the whole country will suffer from a less abun-

dant provision of comfortable clothing for the great mass of our people. The failure, therefore, of a domestic supply of wool would be as fatal to our mills as the drying up of the streams of water which move them. It is from a practical conviction of this fact that the most intelligent American wool manufacturers and their powerful representative body, the National Association of Wool Manufacturers, are the firmest advocates of adequate custom duties upon domestic wools, as well as upon manufactured goods. The manufacturers bear willingly the very heavy burden of the greatly increased capital required by the higher cost temporarily imposed by the increase of the wool duties, from two motives: first, from the conviction that wool production is just as much of an American industry as cloth production, and is entitled to equal defence against foreign competition; secondly, they appear to be profoundly impressed with the patriotic sentiment of Lord Bacon, among the wisest of our English fathers, "Let us advance the native commodities of our own kingdom, and employ our own countrymen before strangers." They would also adopt as a special injunction the other words of Lord Bacon, "Let us turn the wools of the land into cloths and stuffs of our own growth." There is reason to believe that, if the present scale of duties shall be maintained, there will be no limit to the manufacture of domestic wool, except that of its production. The president of the Manufacturers' Association thus presented his views at Syracuse in December last:—

“The theory of protection requires time to test it, especially as to its effects on production; and the results of the theory which we advocate and which we are putting into practice, will be fully manifested in its effects on the extension of wool culture. For myself, I have no doubt that, if another six years should elapse before the meeting of the next convention, when we come together we shall find that the consumption of American wool, now about one hundred and twenty-five million pounds, will aggregate more than three hundred millions annually. Of that I have no question under our present system. The demand will exhaust the supply, for there need be no check to the growth of wool in the United States, or to its extension over parts where no attention is now paid to sheep husbandry.”

The preference of our manufacturers for domestic wools is founded upon a recognition of their good qualities. When we speak of American wools, we refer to the predominant class, wool from grades of the Merino with the native or degenerated English breeds, characterized by a greater or less predominance of Merino blood. There are certain qualities, common to the varying breeds, which are due to the influence of our climate and soil, but especially to the system of keeping, consequent upon the thrifty habits of our people; and the most influential feature in their keeping is the fact that our sheep are uniformly and liberally fed, and hence produce a uniform, sound, and healthy fibre. Thus, the most characteristic qualities of American wools are due to the moral and economical habits of our people.

There are other special qualities due to the blood at present predominant, that of the so-called American Merino. As to the qualities of the full blood and grade merino wools of the country, the executive committee of the National Association of Wool Manufacturers, consisting of the most experienced and successful manufacturers of the United States, in a public report made in 1866, say:—

“In a class of fabrics entering more largely, perhaps, than any other into general consumption, that of flannels, the superiority—due principally to the adaptation of the common wools of this country, their strength and admirable qualities—is so marked as to almost exclude the foreign flannels. American fancy cassimeres compare favorably in finish, fineness, and strength with those imported. Our delaines, owing again in a great measure to the excellence of our merino combing-wool, surpass the fabrics of Bradford, at the same price. The excellence of American shawls was admitted at the Great Exhibition at London.”

And they subsequently add:—

“It has been the experience of all nations that domestic supply has been the first and always the chief dependence of its manufactures, and the peculiar character of the material has impressed itself upon the fabric which each country has produced. Thus, in the fine wools of Saxony and Silesia we have the source of German broadcloths; in the combing-wools of England, the worsteds of Bradford; and in the long merino wool of France, the

origin of the flannels and cassimeres. The peculiar excellencies of merino wools have given origin to our flannels, our cassimeres, our shawls, and delaines; and they give soundness and strength to all the fabrics into which they enter."

SPECIFIC WOOLS ENTERING INTO AMERICAN FABRICS.

Common flannels involve a very important consumption of wools, from the coarsest common or native to medium merino wools; opera flannels, from the very finest wools; blankets, from the most ordinary Mexican to noils (the shorter or refuse fibres obtained by the process of combing the best combing-wools), up to the medium merino wools; also the shorter wools of English blood, such as the Down and Cheviot wools. Shawls, the principal varieties, embrace all grades of Merino wool up to pick-lock, some special varieties being composed of worsted combing-wools; felts, generally the lowest grades of wool, but some varieties of felting, such as piano and table covers, medium merino wools. Knit goods, such as knit shirts, vests, skirts, drawers, cardigans, hose, involve a very important consumption of wool, from the lowest to high grades of merino, certain fancy varieties, composed of worsted yarns, requiring English combing-wools. Fancy cassimeres, occupying a prominent place in the list of fabrics, require all grades of merino wool, principally the medium; meltons, all grades of merino wool, without burr, principally medium; overcoat-

ings, such as beavers, moscows, Esquimaux, medium to finest grades of merino wool. For all mixtures of wool with shoddy, the best and longest merino wools are now regarded as most profitable, for the reason that they "carry" more of the short fibre of the wool substitute. Thin wool coatings require from medium to the finest merino wools; fancy ladies' cloakings, the finest long merino wools, and, in some varieties, mohair, or the wool of the Angora goat; gentlemen's worsted coatings, the finest long merino combing wools. For certain varieties of delaines, coburgs, and cashmeres, ladies' dress goods, with cotton warp, medium long merino wools are used; for Caledonian ladies' cloakings a limited use is made of mixtures of fine long combing-wools and English or Canada combing-wools; for serges, moreens, alpacas, Italian cloth for linings, mohair lustres, lastings, damask for furniture, for furniture covering, curtains and table-cloths, reps for furniture and curtains, webbing for reins and girths for horses and for suspenders, bunting for flags, military sashes, picture cords and tassels, clouds or nubias, Ristori shawls, braids and bindings, long English combing or Canada wools are required; for the warps of ingrain two and three ply carpets, the long carpet wools of Cordova and Chili, unsuited by their coarseness and unequal diameter for dress goods, are employed, the short wools for filling, and, for the cheaper carpets, the short and coarse Mexican and Texan wools; for Brussels and tapestry, and Brussels and velvet carpets, the long Cordova and Chili carpet wools are used, for the

colored yarns the warp being of linen; for the whites or very light shades, the best English or Canada combing-wools.

The above list would seem to answer the question proposed for the next topic of inquiry: What kinds of wool shall be grown in the United States?

1. *Merino wools*.—This question, which is more often addressed to the manufacturer than any other by the wool-grower, can be answered much less definitely than might at first appear. If a majority of the cloth manufacturers of the United States were asked this question *to-day*, they would answer, "Give us the wool produced by a cross of the full-blooded Merino with a full-blooded Southdown," which would be a typical medium wool. A larger supply of wools of that class is in demand than of any other just at this time; but the production of such wools would be impracticable as a system in our ordinary methods of sheep-husbandry. The manufacturers of classes of dress goods, into which delaine wools enter, have the same views. Mr. Walworth, the intelligent buyer of wools for the Pacific Mills, who is an authority, says:—

"The wool growers of this country have run too much into the same quality of wool, viz., about three-fourths blood. Now, there is a certain amount of this quality of wool needed, but the markets have been flooded with this one kind, while medium or one-half blood, and one-fourth blood wools are absolutely scarce. . . . There is a great demand for

medium or one-half blood wools, and I think it will be a permanent demand.”

Still, he adds the very sensible advice :—

“Let the farmers grow a greater variety of wools, and not all just about the same quality.”

On the other hand, the manufacturers of opera flannels and doeskins, complain that they cannot get in the country any stocks of the superfine wools of Saxon blood, the type of which was the old wool of Washington County, Pennsylvania. They cannot get them simply because they cannot afford to pay the high prices necessary to encourage the culture of these small-sized and comparatively unproductive sheep. It is absurd to say that the finest wools cannot be grown in this country, especially in Virginia and East Tennessee. Mr. William Chamberlain, in a letter, dated March 21, 1870, says, those who assert that superfine wools cannot be grown in the United States are mistaken. He further observes :—

“There are some grown fit for the manufacture of the very finest goods, and there would be much more if we had a market at remunerative prices. I have, within the last fifteen years, imported nearly five hundred Silesian sheep, of the best quality, and have bred them ever since, and they continue to do well, as well as any breed of sheep I am acquainted with. My shepherd, who has the care of them, is a Silesian, an experienced shepherd, and a man of perfect integrity. He had the care of one of the most celebrated flocks in Germany, and assures me

that wool does not deteriorate in this country, and he knows no better country for the growth of fine wool. My flock averages fully eight pounds of unwashed wool. I have sold it for the last two years to one manufacturer in Connecticut. He has made what are called doeskins, and good judges assure me that the cloth compares favorably with the best German doeskins. . . . The cross of the original Saxon and Silesian has resulted very satisfactorily, and has been used in Saxony extensively for a number of years; and it is found that the quantity of wool is increased without prejudice to quality. Fine wool can be grown in all parts of our country where the soil is dry, but in the south the fleeces become less dense, and of course lighter; on the sea-coast it gradually becomes coarser. You may be fully assured that our country is a good place to grow fine wool. All we want is a decent market, and manufacturers can be supplied without importing it from Australia and Germany.”

While cultivators, with means to encounter temporary depression of prices, through perseverance in the culture of a perfected race will ultimately be rewarded by winning appreciative customers, it is vain to expect American wool growers, except in rare cases, to pursue the culture of fine wool here when it is rapidly disappearing even in the countries which originated it. The observations of Mr. Moll, chairman of the jury on wools, at the Paris Exposition, are pertinent on this subject. He says:—

“The *superfine* wools, like the fine wools, are pro-

duced from animals of the Spanish race; but the race has been so completely transformed by art (selection, prolonged stibulation, and special feeding) that they can no longer acclimate themselves in the country where they originated, or, at least, accommodate themselves to the keep to which the original flocks were submitted. These wools measure from one-fourth to one-eighth centime of a millimeter in diameter. Their length rarely surpasses four centimeters. They serve for the fabrication of the most precious of the woolen fabrics, imitation cashmere shawls, merinos, and extra-fine cloths, mixed tissues of wool, silk, &c.

Commerce holds these wools in the highest estimation; but as the improved machines and processes enable us now to make from wools of lower quality stuffs having as handsome an appearance, those wools cannot secure a price proportionate to the expenses of their production, which are very great, in consequence of the care which the animals require, and the small weight of their fleeces. *This branch of industry is diminishing rather than augmenting.* Many of the superfine flocks of France have disappeared. Saxony, the cradle of this race, which has received the name of Electoral or Saxon, has now almost none. Silesia alone still possesses a certain number, which, with the flock of Naz, and some others, disseminated in Bohemia, Moravia, Hungary, Prussia, and Poland, furnishes the whole of the superfine wools used in Europe.

“As to the superfine Merinos, the Electoral type, or that of Naz, it is evident that they can be kept

only with a view to the production of wool alone, for of all the ovine races there is, perhaps, none which has less aptitude for fattening, and every time that the attempt has been made to increase their corpulence it has produced an alteration in the wool. It is true that this wool is of greater value than any other, but this advantage is more than counterbalanced by the small weight of the fleeces and the more minute care which these animals demand. Shall we ever succeed in making a race suitable for the butcher, and at the same time preserve the fineness of the wool? It is doubtful. It is desirable, however, that Europe should preserve a certain number of flocks of the fine type, if only for raising reproducing animals, to renovate the blood and preserve a certain fineness which threatens to disappear.”

Mr. Moll concludes his references to this race by briefly mentioning the requisites of soil and climate for their culture:—

“They must have other physical conditions than those which suit the mutton sheep; a climate dry and warm, a land with light permeable soil, and rather poor than rich, and a nourishment rather tonic than substantial.”

Mr. Sanson, the most eminent of recent French writers upon the zoötechny of sheep, observes that:—

“It is evident that in the greater number of the agricultural situations upon the European continent, the production of short wools cannot be economic-

ally pursued, as they are fitted only for the pastoral system, which is every day losing its importance in favor of the *intensive* culture."

Mr. William Latham, a very intelligent English flock-master of Buenos Ayres, in a work devoted to suggestions for the improvement of the wools of that country, rejects "the exquisite Prussian Silesian Merino" as unsuited to that country for general purposes. "Destroy its purity of blood, *mestize* it," he says, "and you have relatively nothing. Only under the highest degree of breeding, intelligence, and minute care could such a breed maintain its way." He regards with but little favor, too, the Saxon Electoral Negretti, "although beautifully true in shape, fine and soft wool, with a fair weight of wool in the higher strain of blood. Their habits and characteristics," he continues, "are the result of special treatment and selection; a high artificial temperature, treatment, and stimulation of the skin, increasing the skin-growth, and producing the numerous rolls or folds which cover the whole body, and creating the habit of excessive exudation of oleaginous matter, superinducing a diminution of the carcass, and loss of corporeal vigor, all of which render them and their progeny ill-adapted to harmonize with conditions essentially different from those which produced these specialties. Exposure of their progeny to inferior conditions of maintenance necessarily increases the tendency towards diminution, and causes an actual diminution of the carcass; the wool, though retaining the fineness, becomes short and weak in staple, and the fleeces open and light."

Before dismissing the subject of superfine wools, we would remind the readers of the Agricultural Reports of a remarkable article by Mr. C. L. Fleischmann, in the report of 1847, which attracted much deserved attention when it appeared. It will be remembered that this account contains a most minute description of the laborious and expensive system of the superfine sheep husbandry in Prussia, then at its highest prosperity, which quite disheartened the American growers of Saxony sheep. The very extensive collection of wools illustrative of this report was deposited by Mr. Fleischmann in the collections of the American Institute of New York. At the time of the exposition of woolens at the fair of the Institute in 1869, we had the pleasure of seeing this collection, and the gratification of observing that it was in excellent order. With our present ideas of wool staple, it appears almost inconceivable that these wools could have been a staple, agricultural product. The length in no case exceeded an inch, and was often considerably less. The fleeces were represented as weighing one and a half to two and a half pounds, and the fibre was marked by the distinctness and number of its curves or wrinkles, the curves being so sharply defined as to give the impression that they had been artificially crimped. It would be a graceful courtesy on the part of the American Institute to transfer this invaluable collection, which cannot be replaced, to the vigilant care of the curator of the National Museum in the Department of Agriculture.

While the demand for the medium wools for

some years to come is likely to be the most pressing, the remunerative demand for the very fine wools last spoken of will probably even diminish. There is likely to be an increased demand for a class of merino wools, which Mr. Sanson, the scientific writer on sheep before referred to, calls intermediary wools, quite different from our medium wools. He observes that "between the common and fine wools, or more exactly between the fine and superfine wools, a new quality has been introduced within a few years, which is of great interest in France." This new quality is that of the intermediary wools, differing from the fine in reality less in their diameter than in their length. This wool is not only very important for clothing purposes, as the improvements in power loom weaving necessitate the use of this long wool for warps, but for combing purposes, and especially for a class of goods known as *novelties*. Clothing manufacturers in this country have but recently appreciated the qualities of these intermediary wools, for to this class belong principally the Australian and New Zealand or Tasmanian wools, heretofore almost unknown, but which have been very largely imported by our manufacturers during the last year, notwithstanding the high duties. The fineness, length, soundness of staple, and remarkable freedom from grease, have brought them into deserved favor. Manufacturers have thus a new standard of excellence in wools, and American wools having the qualities of this standard cannot fail to be in demand.

The method of reaching by amelioration of our

present flocks this new standard is a question of much practical interest to our wool growers. That they may have a view of the means by which such a result has been attained elsewhere, we will refer to methods advised by Mr. Latham, before quoted, for ameliorating the flocks of Buenos Ayres. Mr. Latham regards the Australian type as the model for imitation in the present demands of the wool manufacture, and believes that the means to reach that standard is the persistent use of rams of such special type of the Merino family as will most effectually produce the desired improvement. The race for which Mr. Latham avows his unqualified preference for the purpose of amelioration is the pure French Merino, of which the best type proceeds from the Cabana Imperial, or the sheep-fold of Rambouillet. The view of Mr. Latham, that the flocks of Australia have been improved by the French Merino, is abundantly confirmed by other authorities. He says:—

“I believe that it is to this blood of Rambouillet French Merino, and George III. Merino, that we must look for the regeneration of our flocks. I am confirmed in this opinion by observation here, by the knowledge of the want of the great manufacturing interest in Europe, and by the practice of Australian breeders. . . . The beautiful little Negretti, with its fine, soft fleece, may be a more attractive object, but it cannot fulfil the requirements of our flocks so well as the solid Rambouillet and English Merino, from whose progeny, in a few crosses only, a size of carcass, a thinness of shape, a weight of

fleece, length, fineness, and texture of wool can be obtained (as I can testify from actual observation) equal, if not superior, under proper management, to nine-tenths of the sheep of the French Merino Cabanas.

“The distinctive characteristics of the Rambouillet variety of Merino are those of considerably larger carcass (two-year old rams, of the acclimated race of this breed in the author’s own flock, having attained weights of two hundred and two hundred and fifty pounds), longer wool, weightier fleece, fewer skin-folds, and better fattening qualities than the German varieties admit of. These are results obtained by a course of treatment conducive to corporeal vigor and healthfulness, which will render them better reproducers, and better calculated to meet, without prejudice, changed conditions, and better adapted to enter into harmony with them, and to receive the healthful modifications which local influences impose under a system consistent with them.

“In the treatment under which the French Merino types have been formed, there is less stimulation of the skin, less exudation of oleaginous matter; hence a large amount of the food taken is assimilated into the substance of the body and the wool, while the fullness of the carcass, brightness of look, vigor of carriage, greater length, brightness, strength, and the less greasy or heavy condition of the wool, may be contrasted with the shrunken habit of carcass, dull, anxious look, and wool overcharged with grease, which the German Merinos exhibit. It is

also noticeable that the Rambouillets, from their more vigorous and healthy habit and absence of excessive stimulation of the skin, are less subject to the "scab" and other cutaneous diseases, less liable to lung affections, the rams less exposed to constitutional "breakdown" in course of "service," and the wool, being longer, stronger, and less greasy, is not so likely to collect impurities, and suffer prejudice from burs, grass-seeds, &c."

We ought not to omit the testimony of the more intimate observers of this race of sheep in their own country. Mr. Moll, in his capacity of chairman of the jury on wool at the Paris Exposition, and with specimens of all the wools of the world before him, observes:—

"While Germany has had regard only to fineness, our skilful cultivators in the region of Paris have occupied themselves more with the quantity, and have not neglected the question of meats. They have modified the race, and have given it, by means of an intelligent selection, suitable nourishment and care, more size, forms better suited to fattening, and, above all, to a more abundant fleece; and to a wool, not so fine indeed as that of Germany, but one which, in consequence of improvements in machines and processes, responds much better to all requirements, and which, thanks to its length, strength, and elasticity, is suited equally to the card or the comb.

"The imperial sheep-fold of Rambouillet has mostly contributed to this happy movement, of which it has taken the initiative, and in some sort

the direction. We may say that the Rambouillet type is at present, in an economical point of view, and for the rich countries of the vine-bearing zone, the most perfect type in existence of fine-wooled sheep."

The qualification as to region, in the last paragraph, suggests that this race would be more likely to flourish in southern than in northern sections of this country.

In making these citations, and the suggestions founded upon them, which are addressed less to the mere wool-growers, whose main object is the rearing of sheep for the different purposes of wool-growing and meat-production, than to the class which combine with sheep growing the higher object of introducing to this country the best and most suitable blood that the world can produce, and who aim, with this blood, to create for their country a superior race,—it is very far from our purpose to suggest a general modification in the qualities of the characteristics of American fleece. The great mass of these American wools suits our machinery and prevailing fabrics. The demand for the intermediary wools is as yet comparatively limited, but will increase with the expansion of our fine merino combing-wool manufacture, which, for the production of all wool dress goods, did not exist four years ago, but is now successfully inaugurated, as the adaptation of these wools for both clothing and combing purposes is better appreciated. As these wools are in so high demand in Europe, the demand must become more extensive here.

With regard to the French Merinos as a source from which to infuse new blood into certain of our flocks, we are aware that the greater number of those introduced into the country a few years ago were regarded with but little favor, as they were selected solely with reference to their excessive size, without regard to other characteristics, their superior keeping and unusual care, while at that time there was no demand for their peculiar qualities of fibre. Dr. Randall observes that, "The stock imported in 1840 from the royal flock at Rambouillet was not overgrown. Their size, however, exceeding that of the American Merino, was an entire novelty, and a most captivating one to the public eye." With the new demand for long and fine intermediary fleeces, the introduction of these regenerators which have proved so efficient in Australia and Buenos Ayres, might well be again essayed; and if refinement is to be attempted with this blood, that stock might furnish a better foundation for refining than the vigorous and productive American Merinos, which, with all their excellencies, are still lacking in the fineness of fibre and exemption from excessive grease, which characterize the French and Australian standards.

The practical importance of the subject warrants a few words upon the much discussed subject of excessive yolk or grease in fleeces. It is well known that the tendency of American wool growers to produce heavy fleeces is a subject of much complaint with manufacturers. The first object with the manufacturer, provided he can have other requisite qualities, is to have clean, light wool. The yolk, which

causes the principal portion of shrinkage in scouring, is of hardly any value in the present methods of washing. Where unwashed wools are exported, the removal of the yolk by climatic influences sometimes adds very materially to the value to the manufacturer of the whole clip in certain seasons. Thus the prevalence of great rains over an extended region in Australia, where there is no provision for shelter, just before the annual shearing, has, sometimes, by washing out the yolk, made the whole wool-clip exceptionally valuable. It is argued by breeders of authority, that, to produce the greatest amount of clean wool, with the greatest economy to the wool grower, he must also produce a certain proportion of oil; that up to a given point the increase of wool may be measured by the increase of oil; that it is not just to charge upon the wool growing community that they produce uselessly heavy fleeces, while they can demonstrate that their growth of clean wool is increased by a proper attention to grease and yolk, and the quality of the wool may be increased by this attention; that if the wool grower has a flock of light shearing sheep, and desires to increase the clip of his future flock, he can accomplish his object by the use of a greasy ram; and that this is owing, not to the grease alone, but to the fact that with a proper secretion of oil and yolk, there are usually found those other points which make a ram valuable, such as firmness and thickness of fleece, uniformity of style over the whole surface, and that most attractive feature of a good sheep, a well-

wooled head, with a clean, strong, and expressive face.

On the other hand, writers of equal experience express the opinion that no species of Merino ram ever produced more than twenty pounds gross weight fleece without excessive feeding or unnecessary housing, and that it is advisable to raise such sheep as can be raised without such treatment. Certainly the freedom of the fleeces of the French Merino from excessive exudation of their yolk, with their magnificent development both of carcass and of wool—a fact noticed not only by Mr. Latham but by all the French writers—is an indication that the best development of flesh and fibre is not necessarily connected with undue production of yolk. An infusion of the blood of this race may perhaps tend to the improvement so much desired by manufacturers.

It should be noted that Dr. Randall, the highest authority on American sheep-husbandry, denounces with great severity the breeding for yolk, although maintaining that the American Merinos, when bred and treated judiciously, do not produce more yolk than is necessary for the economical production of wool, and declaring that there is no other national family of Merino, and no other breed of sheep whatever, that can vie with the American family in the very great improvement in weight of washed or scoured fleeces within the last few years. In the exhaustive monograph on the American Merinos, published as an appendix of the report on wool and

woolens in the report of the Paris Exposition, he speaks as follows:—

“This remarkable era in Merino breeding, commencing in sound measures of improvement, but culminating during the war in the excess which I have described, developed several fashions in breeding and management, which were altogether new in the business. Quality of wool was little talked about. Weight of fleece was the primary consideration, and it became the custom of many breeders to weigh their fleeces in the yolk, because, I suppose, it gave them an advantage over others. A rigid system of housing their sheep from contact with rain or snow the year round would preserve all the yolk in the fleece, and thus would add to its weight several pounds. The holders of the larger flocks could not do this without great inconvenience and expense. The former, therefore, were enabled to go into newspapers with far higher statements of weights of fleeces. Inasmuch as the system of housing and preserving all the yolk in the wool gave the fleece externally a very dark color, the color soon became a prime necessity of fashion, and, as the weight increased, and the color became darker with the yolk, the latter was as carefully bred for as the wool. I have seen it literally dropping from the fleece under a hot sun. As a high fed sheep produces considerably more wool and yolk than an ordinarily kept one, a system of pampering was also extensively resorted to. Many of the summer and winter housed flocks were fed grain to the utmost verge of immediate safety, and far beyond the bonds of ultimate

safety; for such continued forcing is destructive to the constitution and longevity of Merino sheep, as all will bear witness who have tried or observed its effects.

“Under the above system of breeding and treatment, and sometimes without any special pampering, Merino rams’ fleeces in the yolk are frequently reported as weighing upward of twenty-five pounds, and some have risen to thirty pounds. Ewes’ fleeces range from ten $\frac{1}{2}$ to fifteen pounds, and sometimes individual or small lots have gone higher. Unfortunately these weights afforded scarcely an approximate criterion of the actual weight of the wool, the proportion of yolk to the wool possessing no uniformity.

“The practice of housing sheep from rain and snow for the preceding objects is not a fraud, if distinctly avowed to all buyers. But I think it is productive of no benefit, and of considerable injury. It is a useless waste of a great deal of time, and occasionally produces loss in other respects. The new-mown hay or grain must be left to get wet on the ground, to the serious deterioration of its quality, rather than have the precious weight-giving and color-giving yolk washed out of the fleece. And there can, it appears to me, be no reasonable doubt that this habitual non-exposure to the ordinary changes of weather must, in the course of time, to a greater or less degree, beget an incapacity to endure such exposures with entire impunity. Besides, this housing, if ever so frankly proclaimed, tends to warp the judgment of all buyers, and especially in-

experienced buyers. If it did not give a fictitious value to the animal—rendering it more salable than sheep of equal value not thus treated—where would be the use of it? It is perfectly notorious that it, with early shearing, does so alter the appearance of the sheep, that a pair of twins of the closest resemblance, one thus treated and the other not, scarcely look as if they belonged to the same variety, and the “petted” one will far outsell the other. It is considered the breeder’s right, in all kinds of domestic stock, “to put the best foot forward,” and it is equally done with other breeds of sheep; but it is a pity that a higher standard of action cannot be permitted to prevail. Such fashions beget inducements to direct fraud. Thousands of *painted* sheep (painted to the true color by a preparation of oil, burnt umber, and a little lampblack) are annually hawked about the country with pedigrees as artificial as their color, and sold as genuine Simon Pures.

“Fitting sheep for sale by pampering is fraudulent, for it is never avowed or admitted, and if it were, there can be no honest or decent excuse for a practice which is directly and undeniably fatal to the well-being of the animal. We have no right to poison what we sell, because we know there will be fools to buy it, and to buy it more readily because it is poisoned. Another result has followed this indiscriminate scramble for large fleeces. Those who have carried it farthest have usually considerably depreciated the quality of the wool. The finest fleeces are not generally the heaviest. The greatest combination of wool and yolk—however coarse,

uneven, and even hairy, the former—is what these extremists have looked for in their breeding rams; and the progeny of such rams must, of course, partake of the same characteristics.”

2. *Combing-wools*.—The distinction between these wools and the card or cloth wools, before treated of, may be thus stated. Combing-wools are those specially fitted for the process of combing by hand or machinery, which process consists in drawing out the fibres so that they may be straight and parallel; the shorter portions, called “noils,” being removed by this operation. The fibres having been rendered straight and parallel are twisted or spun, and the yarn is called worsted. The ends of the fibre being covered by the process of spinning, the yarns are smooth and lustrous.

Card or cloth wool is wool fitted for being carded. By this process the fibres are placed in every possible direction in relation to each other, adhering by the serratures of the fibre, which are more numerous in the wool adapted to carding. They are thus fitted for felting, and the ends of the fibre are free to be drawn out into the nap. While card-wools are required to be fine, or comparatively so, short in staple, and for the highest fabrics full of spiral curls and serratures—qualities possessed by the wool of which the Merino and Saxony fleeces are types—the combing-wools, on the contrary, must be long in staple, from four to seven inches, comparatively coarse, having few spiral curls and serratures, and possessing a distinct lustre. These qualities are possessed in perfection by the English sheep of the

Lincolnshire, Leicester, and Cotswold races; and in a less degree by the Cordova wools of the Argentine Republic and the Donskoi wool of Russia. Comparatively long, fine wools of the Merino race, from two and a half to three inches in length, are combed for making coburgs, merinos, and similar fabrics, but they are not classed in the trade as combing or worsted wools.

An unprecedented demand for these wools has arisen in all manufacturing nations within the last ten or fifteen years, and the prices have more than doubled within that period. This is due, first, to the vast improvements in machinery for combing made within that period; and, secondly, to the late scarcity of cotton, and to the discovery that by the use of these wools with cotton warps, an admirable substitute is found for fabrics formerly made from the fibre of the alpaca.

Some of the fabrics made from combing-wool have been already mentioned. The list could be greatly extended as these wools compose the principal portion of the wool or part wool fabrics for female wear, the consumption of which is constantly increasing. The contexture and patterns of the fabrics, or their combinations with silk, cotton, mohair, Merino wool, and China grass, are perpetually and almost indefinitely changed to suit the caprices of fashion. Not only new tissues but new names appear each year, to conform to the fickleness of female fancy. A hundred different tissues, not styles, are made by a single house in Bradford.

But the basis of all the fabrics remains the same—English combing-wool.

The magnitude of this manufacture, and our present dependence upon foreign nations, are shown by the following statistics: Great Britain had, in 1871, six hundred and thirty worsted-mills, with thirty-five thousand seven hundred and forty-six power-looms, employing directly one hundred and nine thousand five hundred and fifty-seven operatives; while she had one thousand eight hundred and twenty-nine woolen-mills running thirty-four thousand one hundred and forty-six power-looms, employing one hundred and twenty-five thousand one hundred and thirty operatives, the worsted manufacture employing only fourteen thousand five hundred and seventy-three less persons than the woolen manufacture. Our importations of dress goods—composed principally of combing-wool—were, for

1869—63,278,264 yards, of declared value of . . .	\$15,463,942
1870—67,490,126 yards, of declared value of . . .	16,552,393

Our importations for cloths, for a corresponding period, were, for

1869—Of a declared value of	\$7,688,343
1870—Of a declared value of	9,543,911

Worsted yarns of the finer grades were made in this country only to a very limited extent prior to 1860 or 1861, except those made of shorter wool delaines, the yarns manufactured prior to that date being principally designed for carpets. The introduction of the finer worsted yarns was due to our

command of the Canada wools of English blood, which were admitted free under the reciprocity treaty. In 1866 an estimate submitted to the revenue commission placed the capital employed in the manufacture of yarns and the varied kinds of worsted goods—exclusive of the manufacture of delaines, in which American Merino wools are used with shorter Canada wools—at \$8,000,000, and the yearly value of the product of worsted goods at not less than \$10,000,000.

It was remarked in 1869 by Mr. Mudge, the commissioner for wool and woolens at the Paris Exposition in 1867, that—

“At the time of that exposition we had not then perfected any one single article of all-wool worsted fabrics in this country (not referring to mixed fabrics) which was worthy of being represented there, or, in fact, in any exposition. It is a source of pride and pleasure to all Americans to consider that, in so short a space of time, so much has been done. If you look at the exhibition of worsted fabrics at the Fair of the American Institute in New York you will see there a variety of worsted fabrics of which you need not be ashamed.”

Mr. Mudge spoke modestly, for he was the pioneer in a field in which he has achieved brilliant success. And we add that all the money expended by the Government of the United States, on account of the Paris Exposition, will be a hundred-fold repaid by the new arts (not fabrics), which that patriotic commissioner imported into his own country from Europe.

Some comments upon the exposition of woolen goods at the fair of the American Institute in 1869, made by Mr. John L. Hayes, Secretary of the Manufacturer's Association, express more fully the progress made in the worsted industry:—

“During the gloomiest days of the war an association was formed in Washington of patriotic ladies, who pledged themselves to wear nothing except of American fabrication, and we were witnesses to the chagrin with which they discovered the extremely limited variety of worsted goods manufactured here. How much would they have been relieved if they could have seen such a display of worsted goods as was exhibited at our exposition! Besides the beautiful delaines and coburgs of the older manufacture—the fabrics originated since the war—the worsted plaid poplins, the Caledonian cloakings, serges, printed cashmeres, alpaca and mohair lustres, mohair poplins of all shades, tissues not simply noticeable for being new, but for intrinsic excellencies, enable us to supplant foreign productions. * * Five years ago all our furniture and curtain stuffs, under the general term damasks, were imported. * * Two alcoves displaying draperies of all wool and common damasks, silk cotelines, reps, and terrys of various, though chaste, designs and colors, illustrate the advantages which the American consumer has in depending upon home manufacturers who will not insult their taste by the glaring designs usually produced for our market.”

To the above enumeration might have been added

the important fabrics, buntings and lastings, achieved since the war.

This enumeration should convince wool-growers how earnestly the worsted manufacturers are looking to them to supply the combing-wools, whose deficiency is the only impediment, under a stable system of protection, to an indefinite expansion of the worsted industry. In 1865 the worsted manufacturers were most solicitous for a renewal of the reciprocity treaty, under which they obtained the Canada combing-wool free of duty. In 1866 they entered into arrangements with the wool-growers which led to the tariff of 1867, and imposed a duty upon Canada combing-wools, practically amounting to twelve cents per pound and 10 per cent, *ad valorem*, and placed corresponding duties on worsted goods. In 1868 active efforts were made by the Boston Board of Trade and other commercial bodies for a renewal of the reciprocity treaty, while the inducement of free Canada combing-wools was urged upon the manufacturers as a motive for joining the movement. The manufacturers refused the bait so temptingly offered, and in October, 1868, the Manufacturers' Association, at its annual meeting, all the principal representatives of the worsted industry being present, unanimously passed the resolution—

“That any advantage which might accrue to worsted manufacture from the free introduction of combing-wools under the proposed reciprocity treaty with Canada would be more than counterbalanced by checking the impulse which has already been given to the growth of combing-wools here; while the ad-

vocacy of the reciprocity treaty for the purpose of obtaining Canada wools free would be a violation of the spirit of the agreement with the wool-growers, upon which the present tariff on wool and woollens was founded.”

Here was a practical exhibition of faith in the protective policy, and of confidence in the enterprise and intelligence of the farmers, which it was believed would lead them to cultivate with vigor this new field for production which the national legislature had opened.

It will be interesting to agricultural readers to know the individual views of some of the leaders in this department of the woolen industry, and we append some extracts from remarks made at one of the social reunions of the Manufacturers' Association, not only to show the importance attributed by these practical men to the growth of combing-wools, but to show how prudently, while dwelling upon this point, they deprecate the abandonment of other branches of wool production.

Mr. E. B. Bigelow, the first president of the Manufacturers' Association, and who, more than any other, is entitled to the honor of the conception of the policy which has so happily united the wool-growers and wool-manufacturers, remarked as follows:—

“The combing-wool industry, and the coarse and fine grades of the card-wool industry, have been alluded to, and a question arises as to their relative importance at the present time. It is well known that the card-wool industry constitutes by far the

larger part, probably four-fifths of the whole; and of that the extreme fine grade forms only a small percentage. The combing-wool industry, as has been stated, has recently assumed considerable importance. The principal hinderance to the further rapid extension of this branch of manufacture is the limited supply of raw material. Clothing-wools, or card-wools, as they are sometimes called, are produced in superabundance the world over, while there is a deficiency of long combing-wools. There is nothing that would give such an impetus to the manufacture of worsted fabrics in this country as a full supply of home-grown long combing-wool. Could our farmers—especially on the Atlantic slope, near large towns, where their mutton would find ready sale—be induced to engage more extensively in the productions of such wools, I am sure they would find it a source of immediate and permanent profit. It would also be a national benefit, not only by furnishing the raw material for an important branch of manufacture, but by supplying a much-needed article of food. It is the growing of the long combing-wool and its manufacture which have contributed so largely to the prosperity of England. The thirty millions of sheep which she supports are mainly such as produce this description of wool.

“The value of the worsted manufacture in England, in 1857, was £18,000,000 (or \$90,000,000). Since that time it has largely increased. In 1864, besides supplying the wants of the people, she exported fabrics to the value of £16,000,000 (or \$80,000,000). In the town of Bradford alone, the worsted manufac-

ture increased in value from £8,000,000 in 1863, to £13,000,000 in 1866. To France, as well as England, the worsted manufacture is an important source of wealth. During my recent visit to Roubaix, I saw evidences of material prosperity, such as I had rarely seen before. Its population, then seventy-six thousand, had doubled during the preceding ten years—forty-three thousand of them being employed directly or indirectly in the manufacture of worsted stuffs.

“I have stated that the clothing-wools are produced in superabundance. I ought to have excepted the very fine wools, the production of which is rather decreasing than increasing in all wool-growing countries. One reason for this decrease is that it is less profitable to raise than the coarser grades; another is that the fashions and the times have changed. Instead of fine-wool fabrics many people now wear coarse-wool fabrics. Improvements in the processes of manufacture have enabled manufacturers to make from the coarser fibre certain fabrics which are as satisfactory to the consumer as the finer wool fabrics of former days. It is desirable that we should have a home supply of all the varieties and grades of wool required by our manufacturers, and I hope that our association will strive to bring about that result, and that in view of the growing demand and deficient supply of long combing-wool, it will make special efforts to extend that branch of our sheep-husbandry.”

Mr. Mudge, late commissioner, &c., said:—

“I can only say to the wool-growers and agricul-

turists of this country that there is a field more vast than their imagination can take in, in the expansion of the worsted industry. It is the great branch which has engaged the attention of the two greatest nations of Europe, France, and England, during the last ten years. The great extension of their manufacturing industry has been in this branch of manufacture. * * * I believe the agriculturists of our country should pay, not entire attention, but more attention to the growth of long and lustre wools. There is a large amount of these wools now required for the use of the worsted machinery of this country, and we shall extend our manufactures in this branch, provided both wools and worsteds continue under the fostering care of the Government.”

Mr. J. Wiley Edmands, the present president of the Manufacturers' Association, said:—

“The interests of wool growers being intimately connected with ours, they are subject to all that befalls us as manufacturers. One difficulty we meet with is from the fickleness of the demand for goods from changes of fashion, and the different requirements of our customers as to the styles and characters of goods to be furnished to them. We have to meet the demand, and the changes required of us we must require of the wool growers.

“It is true that it is but a few years since we called on the wool grower to furnish us the finest wools, because then the products from fine wools were in demand by our customers; but now all this has changed from the changes of fashion, and the present demand is largely for the coarser wool — for the

staple that makes the Scotch tweed and other cloths that predominate in the fashions of the day. The fickleness of the demand is illustrated in my experience as a manufacturer of dress goods. It has been, until very recently, our aim to bring out our delaine fabrics so that they should be soft to handle, and in finish to imitate the all-wool French merinos. Now, as the fashion is, many styles of these goods must be made as stiff and hard as possible. We have to accommodate our fabrics to the changeable taste of the ladies, and the consequence is we now require a large supply of the long, hard, combing-wools. At the present time it is the long combing-wools that we want, and shall continue to want, for our worsted goods. Coarse wools are in demand, too, for cloths for men's wear, but I doubt not that we shall very soon find the clothing wool manufacturers calling for fine wool. Then the farmer will find encouragement to produce the best wools, but at present there is a surplus of fine wools grown in the world, and they command a low price compared with the coarser staple. I venture to say that it will not be three years before we shall find the fine wools of the country in demand again. At present, long combing-wools are in request, because the worsted goods have been lately introduced, and they are now the most remunerative of our fabrics. The combing-wools of this country are on the increase, and we are now beginning to receive them from Kentucky, and from Missouri and Oregon; and I doubt not that, with the present *stimulus*, their production will be abundant in a very few years."

This extract shows that it is not for the interest of American manufacturers, as a whole, to favor the production of any special class of wools.

There are some general considerations resulting from the history of prices, and condition of wool production in the world, which we cannot pass by.

The first of these considerations is the relative prices which combing-wools have attained in the markets of the world. In 1855 the price of English combing-wool was 1s. 12*d.* In 1864 the price of the same wools was 2s. 4. Cordova wools in 1855, 8 $\frac{3}{4}$ *d.*; in 1864, 11 $\frac{1}{2}$ *d.* Australian fleeces averaged in 1855, 1s. 8*d.*; in 1864, 1s. 10*d.* Cape fleeces in 1855, 1s. 5*d.*; in 1864, 1s. 4*d.* Buenos Ayres, fair mestizo, in 1855, 7*d.*; in 1864, 8*d.* Thus, while in nine years the combing fleeces had doubled in price, the fine wools had about held their own. The reason for this increased price of combing-wool is very plainly shown by the report of the Chamber of Commerce of Bradford, of 1869, which states that, while in 1861, one million two hundred and eighty-nine thousand one hundred and seventy-two spindles and forty-three thousand and forty-eight power-looms were employed in England in the production of worsted yarns and goods, two million one hundred and ninety-three thousand two hundred and ten spindles and seventy-one thousand six hundred and sixty-six power looms were in active employment in 1868; and since then the ratio of increase in England, and in many places on the continent, is believed to have been still greater.

The successful production of combing wools is

limited to populous districts where there is a demand for mutton, and to countries where there is an improved agriculture. Thus England and Ireland grow the most and best combing-wools, while a little is grown in France, Transylvania, Hungary, and Holland. England and France need all the combing wool produced in Europe, and are already competing with us for the combing wools of Canada, that country being the most important source of production on this continent. Thus, while the production of fine Merino wools in this country is liable to be affected by the competition of the vast pastoral regions of the southern hemisphere, Australia, the Cape of Good Hope, and the boundless pampas of South America, and without protective duties would be certainly overwhelmed, there is no probability of overproduction in the growth of combing-wool, and protective duties on these wools are desirable, rather to stimulate production than to resist foreign competition.

The next practical question arising is, "Where in this country shall combing-wools be grown?" The president of the National Wool Growers' Association asserts that the Cotswolds and Leicesters are well adapted to profitable breeding for mutton and wool combined, in situations where the lands are rich, not subject to drought, and are adapted to root culture, and where good city markets are easily accessible. "They are great favorites," he says, "with dairy farmers and with grain growing farmers who wish to keep but a few sheep."

Mr. Walworth, the practical wool buyer, before

referred to, after urging the superior profits of long wool production, says:—

“Now, although it may be most profitable to keep combing-wooled sheep, it will not do for every one to go into it indiscriminately. Men who wish to have large flocks of sheep, say several thousand, or even a thousand in a flock, ought not to keep these sheep, but will do better with the Merino. Men living on the prairies ought not to keep them, for the prairies will not grow combing-wool, but I think they should in many parts of Kentucky, Ohio, the hills of Pennsylvania, and New York, and in the best parts of Michigan; and in particular I would suggest to those farmers who have now in many of these states coarse native sheep, whose wool is common, and does not yield much combing or delaine, that if they would cross those sheep with a Leicester or Cotswold ram—I like the Leicester best—in one year they would receive more than fifty per cent for their outlay, for their sheep would be larger and would yield, probably, twenty per cent more delaine or combing-wool, which sells for more and sells quicker. Let them follow this cross up for a few years, and they might, with a very little expense, improve the breed of all such sheep. I do not recommend them to buy very costly rams for common purposes. Let men who make breeding a business buy the fancy bucks.

“I would not recommend the farmers in the far west, or in very new countries, to keep these sheep, for in such places the breed is apt to run out, and the wool becomes brushy and hairy, and of very

little value. I think Michigan well adapted for delaine wools of the medium grades. In that branch I have always classed her next to Ohio."

Another question is, "What breeds of combing-wooled sheep shall be kept?" The editor of this report, in an address before the New York Agricultural Society, thus states the prevailing opinion among growers, and the *desiderata* as to further knowledge upon this subject:—

"The Cotswolds appear to have the preference of by far the larger portion of the mutton producers, on account of size, hardiness, weight of fleece, and weight of fibre. For the production of early lambs upon native or grade stock, the Southdown is the preference of three-fourths of the breeders, although the Cotswold is liked by many. The Leicester—the basis of English improvement, to which nearly all her improved breeds owe an infusion of their best blood—is too highly bred to escape deterioration under our careless practices. The Lincoln, as modified by the breeding of the last few years, is a magnificent animal, producing a lustrous combing-wool of great length; and it is hoped the breed may gain a firm foothold upon certain districts characterized by succulent and abundant pasturage and large yields of roots and grains. Much of the mutton stock of the country is so mixed and degenerate that an expert would be puzzled to tell what breed is predominant, and the opinions of the sheep-farmers as to the comparative merits of different breeds are consequently confused and erroneous. It is greatly to be desired that the efforts of honest

and reliable importers and breeders of really fine animals should receive encouragement ; that a better acquaintance with the best types of the breeds may become general, and a more complete test of their comparative merits for different locations may be generally enjoyed."

For the purposes of the worsted manufacture, the wool of all the English races above mentioned is desirable, even the fleece of the shorter woolled Down sheep is well adapted for delaine tissues of the coarser texture at present in demand. The value of the Leicester race for the production of a higher quality of long combing-wool, appears not to have been duly estimated in this country. Leicester wools, pronounced by experts to be equal to the best English, are produced in Ohio, on the borders of Lake Erie. The report of the Chamber of Commerce of Bradford on wool supply, issued for the purpose of instructing the British colonies and foreign dependencies in the production of worsted wools, is the most authoritative statement as to the most desirable race for the production of combing-wools. Speaking of the Canada wools, the report says: "The bulk of this wool appears to be neglected Leicester, but is capable of improvement. There is a tendency in some parts to cross the native sheep with United States Merinos, but for the English market we recommend new Leicester rams, so as to impart length, lustre, and soundness to staple." Speaking of the Turkish wools, it says: "Crossing with Leicester rams would much improve these wools for this market;" and, of the Wallach-

ian, "Very suitable for the carpet trade; could be considerably improved if crossed with Leicester rams." Of the New Zealand wool: "Large supplies of this wool now come to the English market, and are very much in favor, especially the long stapled wools, usually termed the Leicester breed, which, at the colonial sales in London, realize higher prices than much finer wools." These extracts leave no doubt as to the blood which is in the highest esteem for wool production simply, in the principal market for worsted wools in the world. To this may be added that the recent experiments of Mr. Lawes, of Rothamsted, established the fact that Leicesters rank first in the production of the highest amount of wool per hundred pounds, live weight; after them, in order, are Cotswolds, cross-breeds of the two former, and Sussex, Downs, and Hampshires, and full-blooded Sussex, Downs, and Hampshires.*

The remarks preceding apply when the first object in view is the production of wool. But it must be borne in mind that for the abundant supply of combing wool, as a great national production, the raising of wool must be altogether secondary to the production of meat or mutton and lambs, and almost secondary to the production of manure. Mr. Dodge observes, in the address before referred to:—

* An English correspondent of the "Country Gentleman," under date of July 8th, writes:—The demand for Lincolns is very great, one breeder alone having sold upwards of eighty rams already this season, though the trade seldom commences until August. They are mostly purchased for exportation to Australia, Buenos Ayres, River Platte, &c., and are used to cross upon the native and Merino grades. It is said they answer the purpose better than any long-wool variety that has been tried, and a large trade has sprung up in consequence.—ED.

“Few owners of long woolled flocks in this country appear to understand practically the difference between fine wool and long wool husbandry, forgetting that it is the destiny of the Merino to be kept for wool, of the Leicester to be killed for mutton, and holding the mutton sheep upon barely thriving rations, for the purpose of shearing once in each year. The folly of such a course is like that of a beef producer, who should let his animals run in the stock range, and expect the results of stall-feeding. The mutton breeds, like short horn cattle, are simply machines for converting farm products into meats and fertilizers, the production depending upon the regularity and freedom from friction with which the machinery runs — irregular feeding, an occasional scanty supply, undue exposure to cold, or temperature uncomfortably high, reducing inevitably the amount of flesh produced by neutralizing the amount of nutritive power of a certain quantity of food. To make mutton with the greatest profit, every pound of hay, roots, or grain fed must yield a fair result in flesh gained. Thus, while wool growing may be successful in the midst of primitive, almost barbaric, practices in culture, mutton production involves arts of husbandry the most advanced, and a knowledge of animal physiology the most enlightened.”

In England the production of combing-wool, the kind in greatest demand, was secured by breeding sheep which would attain the utmost possible weight of mutton, which could be fed to their utmost capacity, and would produce the largest amount of manure.

The mutton sheep is at this moment not only the chief animal product of England, but it is what it was declared to be long ago, "the sheet anchor of English agriculture." It is the chief animal product of Great Britain. The statistics published by the Royal Agricultural Society show that Great Britain had, in 1868, thirty million seven hundred and eleven thousand three hundred and ninety-six sheep, five million four hundred and twenty-three thousand nine hundred and eighty-one cattle, and two million three hundred and eight thousand five hundred and thirty-nine pigs. The sheep is literally the basis of English husbandry. The agriculture of England, as a whole, is very simple. Four crops, in regular rotation, and mainly in the same order, constitute her great staples. Turnips, barley, grass, and wheat are said to be the four magical words at which the earth unlocks her treasures to the British farmer. The four-field or four-shift system, which pervades the greater part of the kingdom, consists of this succession. The cash receipts are for the barley and wheat alone; turnips and grass serve mainly to feed the sheep, which furnish mutton and wool to support them in their most important function, that of manuring the turnip-fields upon which they are folded for the four years' rotation. Recent agricultural writers in England affirm this to be the main object of English sheep-husbandry. Professor Coleman, of the agricultural college of Cirencester, in a paper recently read before the Royal Agricultural Society, on the breeding and feeding of sheep, says:—

“It is not difficult to show that sheep alone, apart

from their influence on the corn crops, will not pay a living profit, after all the expenses of growing the crops are considered."

Other practical writers for the same journal declare that there is no profit in growing sheep in England simply for their mutton and wool, but that culture of sheep is still an indisputable necessity, as there is no other means of keeping up the land. It is somewhat surprising to observe, in view of the importance of the combing-wool manufacture of England, how little consideration appears to be given to the qualities or the quantities of the wool produced, the attention of agriculturists being principally directed to the fattening qualities of the animals. The reason is that the best quality of fibre is a necessary consequence of the highest culture of the animal. The early maturity and slaughtering give soundness to the staple, the wool from old sheep being brashy and rough, and the regular supply of artificial food, when pasturage is deficient, prevents that most objectionable feature in poorly-bred wools — a long, spiry, coarse top, with a fine downy bottom. The length of the fibre is also the result of a suitable alimentary regimen, recent physiological observations having established the fact that the form and diameter of the filament depend upon the organization of the animal, while its length is determined by abundant nourishment. The quality of the wool being secured by good husbandry, where there is an extensive worsted manufacture, agriculture need not concern itself about the variety or special character of the fibre. With the infinite variety of fibres every

wool which can be combed has its special use, and commerce and the wool-sorters' skill will secure for each its appropriate place.

3. *Cheviot Wools*.— There is another class of wools occupying a position between combing and clothing wools, or adapted to special fabrics, both of worsted and cloth, which, in view of the new developments of sheep husbandry and wool manufacture in this country, deserves more attention than it has yet received. These are the wools of the Cheviot sheep, so extensively bred in Scotland in place of the old Highland breed, and which supply the chief revenue of the vast estates of the noble families of Breadalbane, Argyle, Athol, and Sutherland.

The name of this race is derived from the mountains of Cheviot, in the county of Northumberland, England, extending into the county of Roxburg, in Scotland. The geological basis of this range is porphyritic, the beautiful conical mountains, mostly covered with grasses, ferns, wild thyme, and other plants, distinctive of trappian soil, rising to a height of two thousand to two thousand five hundred feet; beyond and in contact with them is the rugged country of the heath, the true habitat of the black-faced or Highland sheep.

Before the middle of the eighteenth century the Cheviot sheep were confined to this district. A little less than a hundred years ago attention was given to their amelioration, and the new Leicester blood was introduced. The infusion of this blood was the more efficacious, as there is much reason for regarding the Leicesters and Cheviots as belonging to the same

type, the Leicester type, as it existed before the amelioration by Bakewell, prevailing in all the countries washed by the North Sea. These sheep moreover resemble the Leicesters in general appearance, being without horns and having white faces and legs.

The race is now diffused in all parts of Scotland, except the rugged heath-covered districts, where the Highland race alone can find sustenance. The number in 1856 was estimated by Mr. Stewart, in a monogram of the race published in the French language, at three million seven hundred thousand. In the more southerly counties the sheep farms are commonly about two thousand acres in extent. In general only a small part of the farm is cultivated, rarely more than fifty to one hundred acres, and that only for winter food for sheep. About one and three-fourths acres suffice for one sheep, a farm of one thousand eight hundred acres sustaining about one thousand sheep. The artificial food is altogether subsidiary to the natural herbage of the farm. It is supplied during falls of snow, and consists of cultivated grasses or the produce of the swamps, and the natural perennial grasses. These sheep have the facility of obtaining their food, even when the ground is covered with snow, by scraping away the snow with their feet, and they prefer the natural food, thus obtained, to dry provender. Protected by their close fleece, which prevents the penetration of rain and snow, they bear with comparative impunity the storms of the Scottish hills. They need shelter only from the driving snow-storms, which are often of terrible severity, the most common shelter being a

circular wall, without covering, of six feet in height, with a simple aperture for admission of the animals. Their limbs are of a length to fit them for traveling and enable them to pass over bogs and snows which a shorter legged animal could not penetrate. Mr. Lowe says that the entire management of these sheep in the northern part of Britain has no parallel in the same latitudes in Europe. In no other country similarly situated are sheep so entirely exposed to the inclemency of the weather without shelter of pens or houses. "Were these sheep," he says, "managed as in other parts of the continent of Europe, penned and fed in houses, and prevented from taking natural food, the mountains of the country could not maintain one-fourth part of the present numbers."

The Cheviots, although bred in purely pastoral regions, are grown primarily for mutton. The breeder in the mountains, however, rarely fattens his sheep or lambs for market. They are turned over, at different ages in different districts, to be fattened by the farmer of the arable lands and lower and richer pastures. When fattened, their mutton is held in the highest estimation. In the more southerly countries the increase of a flock of a thousand sheep is sold as lambs. The selling of the lambs takes place in August, and reaches from four hundred and fifty to five hundred and fifty, of which three-quarters are male lambs, and the rest young ewes; with one hundred and thirty to one hundred and fifty old ewes. These sales, with the washed fleece, make the whole return of the flock. In the north of Scot-

land these lambs are kept till three years old, and are then sold to be fattened.

The Cheviot sheep blood amalgamates readily with that of the Leicesters, and a system of breeding has been extensively introduced for producing the first cross of the descent. The rams employed are the pure Leicester breed, and the progeny is superior in size, weight of wool, and tendency to fatten to the native Cheviot. The lambs of this descent are sometimes disposed of to the butcher, and sometimes fed until they are shearlings, when they can be rendered as fat as the parent Leicesters, and not much inferior in weight; and they can also be raised to maturity under less favorable conditions of soil and herbage. The benefit, however, is said to end with the first cross. Mr. Lowe says that there cannot be a question that for general cultivation, in the high and tempestuous countries to which the Cheviot breed is adapted, the race should be preserved in its native purity. Every mixture of strange blood has been found to lessen the character of hardiness, which is the distinguishing character of the race. The beautiful breed of the Southdowns would seem to be of all others that which is best adapted to improve the Cheviot; and yet the experiments which have been hitherto made have shown that the mixed progeny is inferior to the native Cheviot in its adaptation to a country of cold and humid mountains.

We have yet to speak of the new claims of this race to the attention of sheep breeders, resulting from the new demands of manufacture, and the fields recently opened to sheep husbandry.

The washed wool of the Cheviot sheep averages about three and a half pounds to each animal. It was formerly used wholly as a clothing-wool. Since the attention of breeders has been devoted to the fattening properties of the race, the wool has increased in length and diminished in fineness. More lately, and until quite recently, it has been principally used for combing purposes. It is finer than the Cotswold wool, and can be advantageously mixed with English combing-wool. The recent application of the Cheviot wool, or a mixture of it, with fine Merino wools to certain cloths by the Scotch woolen manufacturers has led to the modern fashion of wearing coarse clothes for business and morning costumes.

The basis of the Scotch cassimeres, tweeds, and cheviots is the coarse Cheviot wool spun with a mixture of fine Buenos Ayres wool. The fabrics from this material are liked for hot climates, and have become a demand upon the continent. Even the manufacturers of Elbeuf, in France, so celebrated for their production of fine cloths, have been compelled to import the Cheviot wools, although they complain bitterly of the scarcity and high price. In view of these facts, it can scarcely be doubted that the demand for coarse wools for clothing purposes will be likely to continue, and for the production of such wools no race appears so well fitted as the Cheviot.

The new fields for sheep husbandry to which public attention has been recently called, comprising the vast natural pastures between the Missouri river

and the Pacific coast, the valleys and plains bordering upon the great Sierra Nevada, where the dried grasses, becoming perfectly cured uncut hay, furnish perpetual resources for winter grazing, and offer inducements for the trial of the Cheviot race. If mutton production is to be attempted in this region, the Cheviot race is worthy of the first attention on account of its hardiness and working qualities. If the cost of transporting live sheep by railroad from the base of the mountains to the Chicago market—as given by Latham, seventy cents per animal—is not underestimated, the Scotch system of breeding upon the mountains for fattening upon the richer lands of the prairies, might be profitably pursued.

4. *Carpet Wools.*—The questions connected with the production of carpet wools are of less interest to the American wool producer, because the culture of the animals producing these wools is not likely to be pursued as a final object where any purpose is entertained of improved sheep husbandry. Where stocks of these animals are kept, as the Mexican sheep of Texas, New Mexico, and Colorado, they are regarded valuable principally as a basis of improvement by means of higher types, and their wools as points of departure to be hastened away from as rapidly as possible. Still, the economical question as to the propriety of encouraging the growth of these wools by legislative measures is so important that we cannot omit the facts and considerations which may throw light upon a subject of practical interest. In starting upon this inquiry it is necessary

to refer to the terms of the existing tariff on wools, establishing the basis of the classification, which is:—

“Third-class, carpet, and other similar wools, such as Donskoi, native South American, Cordova, Valparaiso, native Smyrna, and including all such wools of like character as have been heretofore usually imported into the United States from Turkey, Greece, Egypt, Syria, and elsewhere.”

It will be first observed that the name of the class —“carpet-wools”—designates only the most characteristic use. Combing-wools are largely used for carpets, all the whites in Brussels carpets being made of Canada or combing-wools of English blood, generally constituting not less than one-fifth part of the fabric, but this use does not entitle them to the designation of “carpet-wools.” This designation really includes all those wools which are not strictly classed as clothing or combing-wools. It is an interesting feature of the present classification that it corresponds with that adopted, upon independent grounds, by the scientific writers upon wool in Europe. Mr. Moll, the chairman of the jury upon wools at the Paris Exposition, concludes that all the wools of the world are naturally and philosophically classified into three great groups: 1. “Heavy wools,” corresponding to our third-class, or carpet and other similar wools; 2. “Glossy wools,” corresponding to our second-class or combing-wools; 3. “Crimped or undulated wools,” corresponding to our clothing-wools of Merino blood, or first-class, with the single exception of Down clothing-wools. He thus char-

acterizes the first class corresponding to our third class:—

“The hairy wools (*laine apoils*), *Zachelwolle* of the Germans, kempy wools of the English, are produced by the ovine races which approach the savage type. These wools vary much among themselves, as well in the proportion of hair as in its fineness, and in the length and value of this as of the wool. There are some—for instance, the summer Donskoi—of which the down or wool has a fineness almost equal to that of Merino wool, which nevertheless does not give it the value of the last, because of the abundant hair with which it is mixed, and from which it is impossible to separate it after it has been shorn.”

Mr. Moll omits a characteristic feature which is observed in the wools, particularly those of long fibre, in our third class; namely, an inequality in the diameter of the fibre, which often presents a long, spiry, coarse top with a fine, downy bottom, a peculiarity noticed by the Bradford wool-supply committee in the Iceland long wools. At the time of the official examination of the wool samples collected for the use of the custom house officers, this characteristic of long carpet-wools was clearly pointed out by wool experts consulted by the examiners.

At first glance it would seem easy to permanently classify wools simply by the races which produce them, as it would be naturally presumed that certain races would invariably produce wool characteristic of their origin. For any determinate period this basis of classification would be correct enough,

and the present classification has clearly in view the present products of certain races. But for a truly scientific and permanent method, such a principle of classification is out of the question. Mr. Sanson, the most eminent of the modern writers of zoötechny, has clearly shown that the specific characters of the species of sheep are established by the forms of the skeleton, and of the head in particular, which are absolutely fixed, and transmit themselves infallibly by generations between individuals of the same species. But he insists upon the absence of any value in the character of the fleece or muscular parts which surround the skeleton, as a means of determining the characteristics of the types or races of sheep. He regards the fleeces and muscular forms of sheep as but secondary characters. These secondary qualities, although they may be of the highest importance in view of utility, and are the only ones capable of being developed by the art of culture, such as modes of habitation and alimentation. He shows, contrary to what is commonly believed, that the form and quality of wool cannot be of any avail for the determination of the types of sheep, and for the natural classification of their races; but that the form and quality of the wool are dependent upon alimentation and shelter. Although, according to principles laid down by Mr. Sanson, the races now producing inferior carpet wools may be capable of being so improved by culture in their secondary qualities as to produce combing, or even clothing wools, it is equally true that unimproved, degenerate, and neglected races tend to deteriorate in the sec-

ondary qualities, such as those of flesh and fibre. The countries designated in the wool classification as producing the characteristic carpet-wools are those where no improvement has taken place, except by a partial introduction of the Merino blood, and no general term appears more appropriate to characterize the animals producing these wools than that employed by Mr. Moll, the "half-savage ovine races."

The well-known expert, Mr. George W. Bond, in his paper on the "Custom-house Wool Samples," published in the first volume of the Bulletin of the National Association of Wool Manufacturers, has shown that the sheep of the countries designated as producing carpet-wools have descended from races quite distinct from those producing clothing or combing-wools. The native South American, Cordova, and Valparaiso wool is shown to be produced by descendants of "Chourros," or coarse-wooled sheep of Spain. The Chourros, as compared with the Merinos, are thus described: "They are larger, longer, and higher upon their legs; they have a head smaller and more tapering; the legs and head are without wool; they are of a robust habit; they are more easy to nourish; they bear hunger and the inclemency of the season better; the wool is straight and longer, much less fine, and much inferior in value." The native wools of Asia, including the East Indies, the north of Africa, and the most southern parts of Europe, are shown to have a common origin—the broad-tailed sheep, the most ancient race known, and which has remained almost without improvement, with the exception, perhaps, of the

Karamanian sheep referred to hereafter. The semi-savage character of this race is shown by the name applied to it by Mr. Sanson, "the barbarous type."

That all these wools are justly characterized as carpet wools is demonstrated beyond question by the uses to which they are applied. The first volume of the Bulletin of the National Association of Wool Manufacturers contains a statement of nearly two hundred importations of wools of the third class, into the port of Boston during the year 1869, and with scarcely an exception the origin of these wools was in countries designated, in the wool tariff, as those from which "carpet and other similar wools" are "usually imported."

The article introducing this statement was called forth by the assertion made by a wool-growers' association, "that considerable quantities of wool, suitable for clothing purposes, are admitted under third class duties, paying only three cents per pound." The Bulletin says: "Before introducing the statement of importations (third class wools) we would call attention to some other important facts tending to sustain our position, that 'carpet and similar wools,' imported into this country, are used exclusively for the purposes intended by the law. We are informed by the appraiser in Boston, Mr. Rice, and the agent of the mills hereafter referred to, that two of the carpet mills which are the largest consumers of the wools of the third class—one of them, the Lowell manufacturing company, consuming nearly one-fifth of the whole importation—at the request of the appraiser, Mr. Rice, had an inspection made by

experienced sorters, of the stocks of imported wools in the wool houses, to determine the amount of clothing wools they contained; and that this inspection established the fact that these stocks did not contain more than one per cent of clothing wools—not enough to pay for sorting. In fact, all the wools bought by these two establishments are used exclusively for carpets, not a pound of the wools bought or imported as carpet wool having been used or sold for any other purposes. This fact is more remarkable and conclusive, since the Lowell manufacturing company alone imports and uses not less than six million pounds of wool per year, and the purchases are made often by full cargoes, and usually in large lots. The second fact is that the largest importers of South American wools—Hemmenway & Company, of Boston—have given orders to their agents in South America to allow no mixture of clothing wools with the wools of the third class bought on their account. Finally, the increase of the carpet manufacture in this country fully accounts for the increase of the importations of these wools. The great increase is in the manufacture of ingrain carpets, used principally by consumers of moderate means, for no feature of American domestic life is more noticeable than the universal use of carpets, even in the humblest homes.”

Mr. Myers, in his effective speech in the House of Representatives, asserts that seven thousand persons are now employed in the city of Philadelphia in the manufacture of these carpets upon handlooms, and that they use only imported wool. The

“Industrial Protector,” published in Philadelphia, gives, from facts furnished by a former secretary of the Carpet Weavers’ Association of Great Britain, the statement that there are in Philadelphia between four thousand and five thousand hand-looms engaged on ingrain, Dutch, and Venetian carpets, about nine-tenths of which are working on ingrains; and that the productive power in the United States is five thousand two hundred looms and eight hundred power-looms, equal to two thousand hand-looms, making a total production of seven thousand two hundred hand-looms; while the total productive power of England is only two thousand one hundred hand-looms. With the vast consumption of wools of the third class, implied in these figures, there is no necessity of resorting to the theory of the consumption of these wools for clothing purposes, to account for their large importation.

It is evident from the above statement that no loophole exists in the tariff on carpet wools for the admission of the clothing and combing wools at lower duty than the law intends. We are now prepared to meet the inquiry why equally high protective duties are not due for these wools as for combing and clothing wools. The answer is: 1st. That the encouragement of the production of these semi-savage wools is neither desirable nor practicable, because it is more profitable to grow clothing or combing wools. The animals producing these wools will not be grown in populous districts, because they are not producers of mutton; nor in pastoral regions, because they produce less than half the

weight of wool of the Merino, owing to the less number of coarse-wool fibres on the same extent of surface. 2d. A high duty, not compensated by an increase of production, would check an important national industry, or, if a neutralizing duty were placed upon carpets, would tax the consumer to the full amount of the added duty, which is not the case when the production of wool is increased by the duty. Dr. Randall speaks authoritatively upon the question of the profitable production of carpet-wools in this country. Referring to a provision which had been suggested, that all kinds or classes of wool which furnish any clothing or combing wool, should pay the same duties as those two kinds, he says:—

“What would be the consequence of such a tariff? From the large amount of wool per yard necessarily used in carpets, the imposing of classes 1 and 2 duties would raise the prices of these fabrics to an oppressive pitch on consumers of small means. They now have to pay for them all they care to. We do not believe in encouraging popular extravagance; but we do believe in placing no unnecessary obstacles in the way of the widest popular enjoyment of those comforts and adornments which both indicate and produce taste, culture, and all that goes to make up civilization. Legislators have no right to render such enjoyments less attainable by enhancing their cost without the most stringent reasons. If protecting duties on carpet wools were necessary to foster an existing and important national husbandry, which is essential to the public subsistence, to the general

agriculture of the country, and to the utilization of the vast portions of the public domain, as is the case with clothing and combing-wool husbandry, then those duties would be as justifiable in one instance as in the other; and the same ultimate compensation would be made to the consumer by the reduction of prices caused by domestic competition. But duties equal to those on clothing and combing-wools will not now, nor probably for generations to come, lead to any extensive production of carpet wools in our country, because it would cost as much or more per pound to grow them as to grow the former, and the aggregate value of wool and mutton would be less. For our growers, then, to insist that carpet-wools should perpetually pay the same duties as the seriously competing wools, because a comparatively small amount can be and is used in clothing and combing fabrics, when, too, as already said, this use finds an equivalent in the use of the latter in carpets, would betray a selfishness so inordinate that it could not fail to disgust the great mass of our people."

The statement that it is not desirable to introduce into this country the races producing carpet-wools demands some slight qualification. In sections of the country, like Texas and New Mexico, where the Mexican ewes, descended from the smaller and short-wooled Spanish Chourros, can be cheaply procured, it may be desirable to import them for crossing with Merino bucks, as the cheapest and most rapid means of obtaining abundant stock; but in that, the ultimate intent is not to obtain a carpet but a clothing wool. Special qualities, besides the fleece, in races

producing carpet-wools and special adaptation to peculiar districts, may recommend their introduction. Such an exception appears to be the Karamanian sheep of Asia Minor. The broad-tailed or barbarous type of sheep found in the north of Africa, Syria, and Asia Minor, although producing in Asia Minor admirable carpet-wools, from which the Turkish rugs and carpets are fabricated, has always been regarded with contempt by European cultivators. A recent work, by the Rev. Dr. Van Leness, entitled "Travels in little-known parts of Asia Minor," shows that the broad-tailed sheep is carefully cultivated in some parts of Asia Minor, the best breed being raised in Karamania, a high and cold district in the southern portion of the peninsula. Speaking of a district in that region, he says:—

"A good many flocks of the broad-tailed sheep are pastured here, and the breed raised in the district, as well as further south, is highly esteemed. It has been a matter of surprise to me that, while so much attention has been paid in Europe to every natural production of Asia Minor, the broad-tailed sheep has not only been neglected, but travellers have always spoken of it with disdain and ridicule. The poor, meek animal's burden—his ponderous tail—which, in the eyes of the natives, constitutes a most valuable prize, is spoken of as an unnatural excrescence. * * * I believe, however, that this creature constitutes one of the most valuable possessions of the people of this land, and should greatly regret to see the breed exchanged for any other, not excepting Merinos. True, the wool is not fine, and can-

not be employed for the most delicate textures. It supplies, however, what is most needed by the common people—a staple for manufacturing cheap, coarse, and warm garments, and excellent carpets. But the flesh of the animal is superior to any breed on the face of the earth. * * * The natives fully appreciate the economical value of the broad-tailed sheep, and it has nearly supplanted every other breed on the peninsula. Fine rams fetch a high price, and you see them kept in all parts of the country solely for breeding purposes. Nor is the broad and heavy tail the least valuable portion of the animal; it is wholly composed of fat, which differs essentially from tallow or any other fat, except lard. Its delicacy enables it to take the place of butter for culinary purposes; and it is, in many respects, so far superior, while also decidedly cheaper, that, in most parts of the country, butter is not manufactured, because it is not needed; milk is thus made into cheese only. Moreover, ‘tail’s fat,’ as it is called, is as much an article of merchandise here as any other necessary or comfort of life; and a market unsupplied with it would be poor indeed. It fetches a medium price between tallow and butter, and is almost entirely used by the natives instead of the latter. There can hardly be a doubt that this animal would succeed in Europe, for it is hardy, and the best breed is raised in Karamania, a high and cold district in the southern part of the peninsula.”

No suggestion bearing upon the production of raw material for our industry or means for sustenance is to be slighted, and the feasibility and advan-

tage of introducing, by the same agencies which have effected the importation of the Angora goat from Asia Minor, the Karamanian sheep for culture in the high and arid regions of the far interior, where they would unquestionably flourish, may possibly be found worthy, in the new demand for coarse wools, of the attention of our breeders.

The space allotted to this article will not permit the discussion of the important practical questions of the preparation and putting up of wool for market; but one question connected with that preparation is too important to be passed by in silence; this is the feasibility of dispensing with the washing of sheep prior to shearing. The testimony presented in the discussions at the Syracuse convention shows that the requirement of this preliminary washing, made indispensable by the present demands of the majority of manufacturers, is regarded as a heavy burden upon the wool-grower. In many districts, as in Texas, this washing is impossible on account of the want of convenient streams of water. In others the process is unhealthful, both to animals and men, from the coldness of the streams; and everywhere, as ordinarily practiced, it is injurious to the sheep, from exposure to wet and cold, and the rough handling to which they are subjected. Mr. Montgomery, the late president of the Ohio Wool Manufacturers' Association, expresses the objections of wool-growers to washing sheep as follows:—

“It has been asked why we wish to sell our wool in an unwashed condition. One reason is, that we don't want to subject our sheep to the labor of car-

rying ten or twenty pounds of wool, soaked with water, and to consequent discomfort and illness, for a week, more or less, until it gets dry. We don't choose to dress them in wet clothes for that length of time. Another reason is, we want to shear our sheep early; and if we undertake to wash them we cannot do it, for the water is too cold, both for the sheep and the men, early in the season. A great many men in our western country cannot go into the water; one is subject to rheumatism, another to ague. A great proportion of our men are foreigners, raw men, not capable of handling sheep skilfully; and then the cost of getting it done is more than the increased cost of getting it to market with the dirt still in the fleeces."

Notwithstanding these sensible objections, the majority of manufacturers, at present, prefer to purchase wools in the washed state. The principal reasons for this preference is, that it having been the custom of the country to put the wools in market in a washed state, the manufacturers have been accustomed to form their judgment as to quality and value upon wools in this condition. It is understood that the subject has been brought before the National Association of Wool Manufacturers, but that no disposition has been manifested to recommend a change in the usage of the country. Besides, it is manifest that no change, like that demanded by the wool-growers, could be brought about by resolutions of associations or conventions. It may, however, be effected by other influences now in operation. The value of solutions of the yolk of fleeces as a source

of potash, as a manure for the land, or for use in the arts, has been demonstrated in France, and is being better appreciated in this country. Methods are being introduced in many establishments for preserving and converting into manure the solutions of yolk obtained by washing the raw fleeces in cold water. Thus the unwashed fleeces have a new value to manufacturers which may gradually lead them to prefer purchasing the fleeces in the raw state. On the other hand, the intelligent wool-grower, seeing the value of those solutions, may be induced to wash his sheep at home, in such a manner that the wash-water, so rich in potash, may be distributed upon the land as liquid manure. This question, upon which wool-growers are so sensitive, will be settled by natural causes, which will tend to bring about the result that is the most economical on the whole. In this, as in all cases, the interest is mutual between the manufacturers and the wool-growers. It is for the interest of the manufacturers that that course shall be pursued by the wool-growers which in the end will enable them, with a fair profit, to give to the manufacturers the greatest quantity and the greatest value of wool at the lowest cost. The distinction between these two bodies of producers is but nominal, for each is engaged upon different parts of a series of processes by which the raw products of the soil are converted into the clothing of man. They have a controlling interest in common—the permanent establishment of the woolen industry in all its branches, agricultural and manufacturing, upon American soil.

ERRATA.

Page 25, seventeenth line from top of page, read *conditional* for "unconditional."

Page 78, first line, read \$300, instead of "\$30."

Page 164, tenth line from bottom, read *leaving*, instead of "bearing."

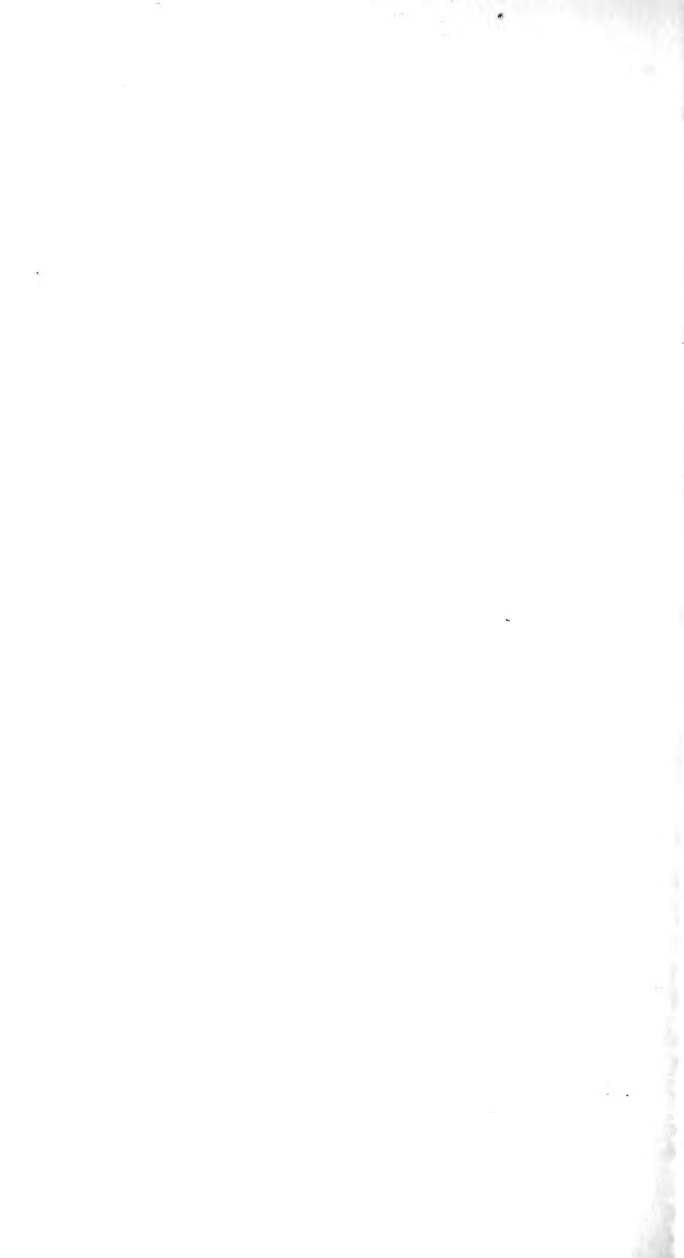
Page 170, fourth line from bottom, in place of *Missouri River*, read "Rocky Mountains."

Page 173, second line from bottom, read *who*, instead of "that will," after the word "shepherd."

Page 175, fifteenth line from bottom, read *miner*, instead of "mine."

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