THE SHEEP-SCAB.

A

HAND-BOOK FOR AMERICAN SHEPHERDS.

THE SHEEP-SCAB;

Its Nature, Prevention and Cure.

A

HANDBOOK FOR AMERICAN SHEPHERDS.

BY

HENRY TEMPLE BROWN.

TO WHICH IS ADDED, BY REQUEST,

THE CLASSIFICATION OF WOOLS, AND THEIR MARKETABLE VALUES.

AN ADDRESS DELIVERED BEFORE THE MISSOURI STATE WOOL GROWERS' ASSOCIATION, AT SEDALIA, MO., APRIL 5, 1882.

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THE SHEEP-SCAB.

BETWEEN the Mississippi River on the east, the Pacific Ocean on the west, and extending south to the farthest extremity of Texas, lies a vast area of country peculiarly favorable to the raising of live stock. It possesses advantages in the way of grazing, climate and adaptability to the handling of large flocks or herds, equalled by few, and perhaps surpassed by no other countries of the globe. During the past thirty years the great resources of this region have become fully appreciated, and the progress made in the propagation of stock, within the last decade, has been something enormous; and not the least important feature, in this remarkable development, is the great increase in sheep. So rapid a growth in any industry, where the management is on a large scale and without due regard to details, is almost always accompanied by an increase of the

evils which attend that industry; and so has it been with sheep and their diseases, particularly those of a contagious nature.

The natural or normal condition of all organic structures is that of healthfulness; the unnatural or abnormal condition or state, is disease. To prevent the latter should be the earnest desire of all who are engaged in sheep husbandry; but if any one is so unfortunate as to have disease of whatever nature in his flock, the question presents itself at once to the thrifty owner, how shall it be cured?

Among all the ills that sheep are subject to, by far the most prominent is the "Scab," which is placed at the head of the black list, as having done more damage and caused greater losses to the owners of sheep ranches, than all other diseases known in the United States.

A deep interest in the welfare of the sheep culture throughout the west and south has prompted us, after a thorough investigation of the various authorities on the subject, and a careful analysis of information obtained from prom-

inent sheep men throughout the country, to issue this little HANDBOOK on the Scab, with the hope that it may be of some use in the sanitary work of removing this pestilence from our flocks.

ITS HISTORY AND NATURE.

The sheep-scab, or a disease analogous to it, has existed in some part of the world from time immemorial. We do not learn of its being mentioned in the Bible, but it was certainly well known to ancient shepherds. Ovid, in writing of a pestilence that prevailed in the Island of Ægina, thirteen hundred years before the Christian Era, describes the falling off of the wool of the sheep and their wasting away. Livy, the historian speaks of a disease, *scabius*, as being very virulent among sheep, in the neighborhood of Rome, in the year 424 before Christ. A most graphic and exact description of the scab in sheep is given by the poet Virgil in his Georgics. All the early English writers on sheep husbandry speak of it, and there is not a French, German or Italian writer on the subject, who does not men-

tion the scab as a prevalent, infectious and mortal disease among sheep.

Until a comparatively recent date, however, the cause of the disease was not known. Youatt in his work on the sheep, published in 1840, and re-issued in a new edition in 1878, mentions that the scab may be produced by a variety of causes, such as bad keep, starvation, hasty driving, dogging and exposure afterwards to cold and wet; thus producing suppression of the perspiration. At the same time he admits the presence of the parasitic mite known to all who have been troubled with this disease in their flocks. W. C. Spooner, veterinary surgeon of Southampton, England, when treating of sheep-scab, pertinently stated that the scab is similar to the *itch* in man and the *mange* in dogs and horses, being in fact, like these diseases, usually propagated by contagion; but he adds that "*poverty and filth will produce it!*"

That the scab may or can be produced spontaneously, by poor keep or insufficient nourishment, has never been established as a fact in the

United States; it is contradicted by Professor Pasteur, an eminent French chemist, whose views are endorsed by Professor Tyndall, the distinguished and enthusiastic student of science. The latter states that Professor Pasteur has carried out his experiments with a thoroughness quite apparent to the instructed scientific reader, and accompanied by a logic as complete, and has thus established the conviction that even in the lower reaches of the scale of being, "life does not appear without the operation of antecedent life." The position of M. Pasteur, although often assailed, has never been shaken; on the contrary, it has been strengthened by practical researches of the most momentous kind.

It is granted, that the mismanagement of sheep, lack of nourishment, exposure to cold and wet, etc., *favor* the increase and spread of the disease, owing to their general debilitating influences; but that such conditions are the originating cause is stoutly denied by the latest scientific authorities on the subject. Such being the case, the question arises—

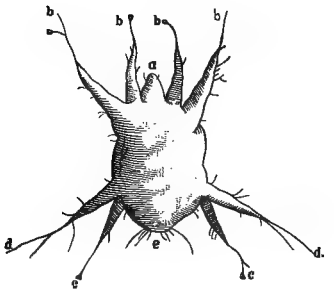
What is the Scab?

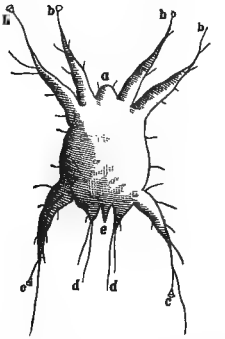
The scab is a contagious skin disease of sheep, due to the presence of animal parasites belonging to the class *arachnida* (spiders); order *acarida* (mites); sub-order crawling mites; family *sarcoptes*, of which there are three genera: — the sarcoptes, that burrow in the skin; the dermatodectes, that simply bite and hold on to the skin; and the symbiotes, that live together and pierce no farther than the epidermis, in search of food.

The variety of *acarus* we have to consider is the *sarcoptes ovis* (that which burrows in the skin of the sheep). It is a spider-like mite from one one-hundredth to one-sixtieth of an inch in length. They have no tracheæ or other respiratory organs, as yet discovered by investigating naturalists, hence respiration is supposed to be cutaneous.

There are different species of the *genus acarus*, of which the one under consideration is peculiar to the sheep, for although the disease of

THE ACARUS WHICH CAUSES SCAB.





The figure at the left represents the female of 360 times the natural size, provided with eight legs; four before, and four behind.

a,—The sucker.

b, b, b, b,—The four anterior feet, with their trumpet-like appendages.

c, c,— The two interior hind feet.

d, d,— The two outward feet, the extremeties of which are provided with long hairs, and on the other parts of the legs are shorter hairs. To these hairs the young acari adhere when they first appear from the pustule.

e,— The tail, containing the anus and vulva.

The figure at the right, is the male on its back, seen by the same magnifying power.

a,— The sucker.

b, b, b, b,— The fore legs.

c, c,— The outer hind legs.

d, d,— The rudimentary abdominal legs.

e,— The tail.

scab corresponds with the itch in man, and mange in dogs, the parasite is in each case a different one, and the acarus which causes scab in sheep will not cause either of the other diseases, neither will the acari which produce those diseases cause "Scab."

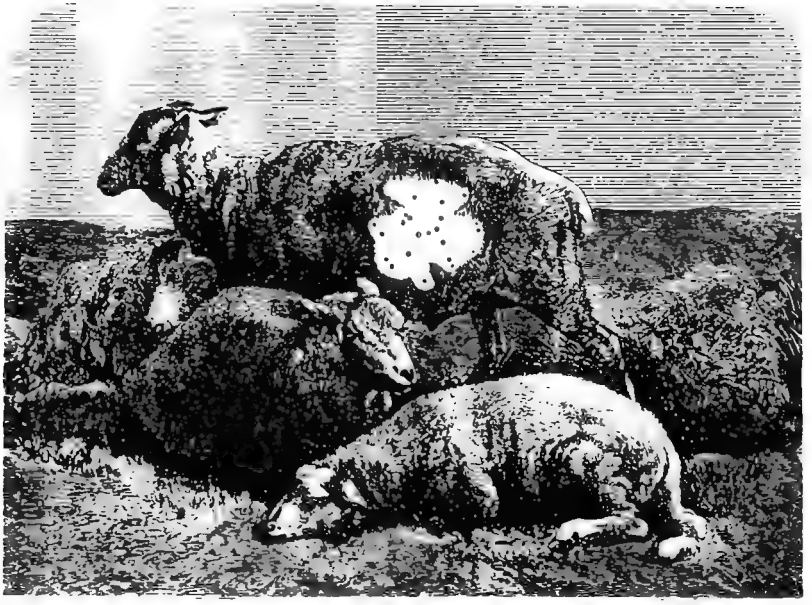
The male acarus is smaller than the female, and is migratory in his habits. One male suffices for many females, and is longer lived than the female. The latter is of a sedentary nature and may be more easily discovered than the male. The adult acarus has eight legs, four before and four behind, although of the latter, in the male, the inner two are rudimentary.

M. Walz, a German veterinarian, who has given much investigation to the subject, has graphically described the mode of operations by these parasites.

If a female acarus be placed on the wool of a sound sheep, it quickly travels to the root of it, and buries itself in the skin, the place at which it penetrated being scarcely visible, or only distinguished by a minute red point. On the tenth or

twelfth day a swelling may be detected with the finger, the skin changes its color and has a greenish blue tint. During this period the eggs are deposited and are undergoing the process of incubation. The pustule is now rapidly formed, and about the sixteenth day breaks, and the insect again appears with its young attached to its legs and covered by a portion of the shell of the eggs from which they have just escaped. Every litter of these parasites comprises according to the best authorities, from eight to fifteen young ones, who set to work to penetrate the neighboring skin, and bury themselves beneath it, where they find their nourishment and grow and propagate, until the poor animal has myriads of them preying upon him, and it is not surprising that he speedily succumbs under the infliction.

One female acarus, through the reproduction of its young will give an increase of one million five hundred thousand of progeny in three months, as shown by the following table: —



In the above cut, upon the denuded spot of the sheep, made bare by removing the wool, is shown the *actual* size of the acari as they appear to the naked eye.

Generation.	Days.	Females born.	Males born.
1st	15	10	5
2d	30	100	50
3d	45	1,000	500
4th	60	10,000	5,000
5th	75	100,000	50,000
6th	90	1,000,000	500,000

This wonderful propagation explains the serious nature of the disease, and shows the necessity for immediate action with energetic remedies or effective preventives.

The male acarus placed on the body of a sound sheep, will burrow its way into the skin; in due time the pustule is noticeable, but the itching and the scab will soon disappear without the employment of any specific remedy.

The deductions arrived at from the foregoing description of the acarus and its habits, which are well authenticated by practical experience and scientific research, establish the fact that the existence of the disease is not to be attributed to any accessorial circumstances pertaining to the general condition of the sheep; but is directly accounted for by the introduction of the acarus through the medium of—

Contagion.

There is an old British adage that, "One scabby sheep will infect a whole flock," which is a truism that cannot be gainsaid, provided the proper means are not taken for the eradication of the parasites. If a single scabby sheep be herded with the flock, it is a question of but a short time when the *whole* flock will become infected. If a neighbor's sheep be scabby, running in a contiguous pasture, there is danger of contagion. So is there in putting sheep onto a range from which a scabby flock has lately been removed; the posts, stones, fences, etc. against which the diseased animals have rubbed themselves, in the endeavor to find some relief from their torture, being a fruitful source of infection; for on such objects the acari have been deposited with the bunches of loose wool, and are communicated to the next comer.

One noticeable feature in connection with the contagious nature of this disease, is the fact that the old and unhealthy sheep are the first at-

tacked, and the long, coarse-woolled sheep of open fibre in preference to those of shorter fibre. The close-grown fine-woolled Merino sheep will long withstand the inroads of this parasite, but not even they are exempt from the contagion. The power of the healthy merino sheep to resist for a time this insinuating insect is probably due to an abundance of yolk and the density of the fibre acting as an obstacle to its penetrating to the skin.

Symptoms of Scab.

It is seldom the case that the first attack of the acari is observed, even by the careful superintendent, for the mites are barely visible to the naked eye, and their presence causes no particular irritation to the sheep, until they have been located in the skin for several days. The earliest evidence that sheep are infected with this plague, is a certain restlessness and uneasiness, and unless the shepherd is on the alert, this symptom is passed by unnoticed; consequently the disease is rarely discovered until it is fully

established. As it progresses, about twelve days after the sheep are attacked, they are seen rubbing themselves against trees, fences and other hard objects, manifestly to gain relief from an irritating itching sensation. An examination at this time will show the following result: pimples have formed and are filled with pus, which by rubbing, become broken and in the course of a few days, the acrid matter escaping from the pustules dries and forms a scab; hence the name of this disease so much dreaded by sheep breeders.

The parts chiefly affected are the neck, back, and flanks; the belly and legs being comparatively free from these parasites during the early stages of the disease. With the formation of the scabs, the sheep obtains no deliverance from its misery, but the itching continues with redoubled force, and in the vain endeavor to find some relief, the animal is noticed scratching itself with its feet, biting at the parts affected, tearing off the wool both in this way and by rubbing, until it becomes a most wo-begone creature, denuded

of its natural covering, — a mass of nauseating, festering sores.

In such a condition externally, it is no wonder that the general health of the sheep should deteriorate, no matter how well fed it may be; the frequent result being diarrhœa and the formation of tumors in various portions of the body, until the animal finally succumbs under the disease.

It is often remarked that the scabby sheep are the poorest animals of the flock, the observer seeming to forget that the sheep are in a poor condition because they are infested with myriads of parasites that draw nourishment from their bodies; that their condition is the *result* and not the *cause*. It has already been shown that "there is no life without antecedent life;" hence poor keep, uncleanliness, and low diet, do not produce spontaneous life. Let this be kept in mind when considering the origin of the *mity* diseases, to wit, that there are no mites without antecedent mites, and these must have come in the case of sheep-scab from scabby sheep.

The locks of wool that fall to the ground from

biting at the sores, or that adhere to the rubbing places, are the frequent means of conveying the parasites from sheep to sheep, and from the old flock to the new; for these insects have a wonderful vitality, enabling them to live for weeks or even months, away from the source of their nourishment and the field of their propagation. So insinuating is this disease, and when once established, so rapid is its diffusion, that, of the sheep breeder owing an infected flock, one is led to exclaim, with the poet Dryden, —

> "He sees the diré contagion spread so fast,
> That where it seizes, all relief is vain."

TREATMENT AND CURE OF SCAB.

HAVING presented a sketch of the systematic history of the acarus, which individually might seem so insignificant, but which, collectively, forms an army capable of working incalculable destruction to the interest of sheep husbandry; and having also given a diagnosis of this parasitic skin-disease, with the fatal results likely to arise from its introduction onto the sheep-range; the question next to be considered is, how can we most effectually and economically eradicate it from our flocks. In answer I would say, that the most effectual and perhaps the most economical way, is to carry out the old proverb that

PREVENTION IS BETTER THAN CURE.

Let the legislature of each state where sheep-husbandry is a prominent industry, enact laws making it a penal offence for any one to have in his possession a sheep affected by the scab, and let the penalty be sufficient to ensure that the disease shall be extirpated "root and branch."

As with the cattle disease, pleuro-pneumonia, both in Great Britain and in the United States, the pithy, pertinent, and most significant motto is, "*Stamp it out*" by the isolation and slaughter of the animals, if need be, rather than to permit this terrible malady to spread: so of the scab; if it be in a flock of sheep stamp it out, at whatever sacrifice. There is this difference, however, between these two plagues; the former is deemed incurable, while the latter, as will be shown, *is curable.*

It may be argued by the ignorant or malicious, or by the novice, that the scab cannot be cured. To those I would mention an instance that comes within my personal knowledge, and of recent date; the party interested being an enterprising Scotchman residing in one of the Western States. Said he, "I coom here, a few years ago, with only eight sheep and vary leetle mooney, and now I have twa thousand sheep and mooney in the bank." He had earned his money and his flock by purchasing and *curing scabby* sheep!

As a matter of interest to the reader, I will give the principal points of the statutes in England which affect the Sheep-Scab.

"Every person having in his possession or under his charge a sheep affected with scab shall observe the following rules: —

He shall, as far as practicable, keep that animal separate from animals not so affected.

He shall, with all practicable speed, give notice of the fact of the animal being so affected to a constable of the police establishment for the place where the animal is.

The constable shall forthwith give notice thereof to the inspector of the local authority.

The inspector shall forthwith report the same to the local authority, and to the Privy Council; and shall continue so to report it once each month until the disease has ceased.

Sheep affected with scab shall not be exposed in any market, or fair, or other public place where animals are exposed for sale, nor caused to travel by railway or other means.

They shall not be placed or kept on any

common or unenclosed land, or in any field or other place insufficiently fenced, or on the side of any highway.

Every person having in his possession or under his charge a sheep affected with sheep-scab, shall treat such sheep, or cause it to be treated, with some proper dressing, or dipping, or other remedy for sheep-scab.

Animals affected with sheep-scab, or having been in contact with, or in the same field, shed, or other premises, with a sheep so affected, shall not be removed from such field, shed, or other premises, except by license of removal for that purpose, granted by the District Inspector.

The penalty for every offence against the foregoing rules is £20, or £5 for each animal, besides costs."

In some of our own States there are laws covering the question quite essentially, as the following from the statutes of the State of Illinois will exemplify.

"Any person who shall knowingly or wilfully bring or cause to be brought into this State, any

sheep or other domesticated animal, infected with contagious disease, or who shall knowingly suffer or permit sheep or other domesticated animals, infected with contagious disease, to run at large, shall be fined in any sum not exceeding one hundred dollars, and shall be liable to civil action for all damage occasioned thereby."

But in the States farther west and south, where such legislation is most needed, the laws are crude and comparatively of little effect.

That the disease can be cured is not to be doubted, there being sufficient evidence to that effect; but what security has the thrifty farmer in getting rid of this pest in his own flock, if that flock is continually exposed to further contagion from the infected sheep of his neighbor, who, either from laziness or ignorance, will not apply the proper remedies to eradicate the nomadic parasites; what security, I repeat, has he, if the laws will not protect him? Hence I say to all sheep breeders having the mutual interests of this industry at heart: let each man of you use your best endeavors to force from the law makers

of your state the proper legislation to ensure immunity from the inroads of this destructive malady.

"But however wise and praiseworthy prevention may be deemed," says the sheep owner of the west, "I find that my flock is infested with the scab, and I am anxious to cure it. How to do this in the most sure and economical way is what I most desire to know."

If the flock be small the first thing to do is to separate the diseased sheep from the rest of the herd; if they have become enfeebled from exposure or the ravages of the disease, the treatment should begin with a liberal diet and attention to their general health. A low physical condition is a great obstacle to the cure of scab, and measures should at once be taken to remove this difficulty. If the malady is in its incipient stages and the animal, in other respects, is sound and strong, means should be adopted to prevent any general falling off in the condition.

The next point is to strike at the root of the evil; namely, to annihilate the *acari*, which have

been shown to be the first and only cause of this quickly spreading disease. No more safe and certain cure can be prescribed than a decoction of —

TOBACCO AND SULPHUR

with soap or concentrated lye. Tobacco, however, should always constitute the chief ingredient of the dip prepared to destroy the parasitical mites causing the scab.

There are a number of *patented* prepared dips which are more or less effectual; most, if not all of them, having tobacco as the base of their composition; there are also certain arsenical preparations, mercurial ointments and other compounds of mineral poisons, that are sometimes used; but to handle the latter with safety, a greater knowledge of chemistry is required than usually falls to the lot of the average shepherd.

Much has been said and written on the various prescriptions and modes of treatment, and a more definite statement concerning the poisonous and non-poisonous remedies or dips, may not be deemed out of place. A large sheep owner in

Australia and a man of much experience in chemistry, writes: —

"I should like to say a word to those who are ready to praise the so-called non-poisonous prescriptions. I say *so-called*, because there is really no such thing. How can a non-poisonous decoction destroy one of the most tenacious forms of parasitic life? Taking the advantages and disadvantages of poisonous and the *so-called* non-poisonous dips, I am strongly in favor of the poisonous compounds. I speak the words of experience. I have dipped and had dipped under my direction or supervision, thousands of sheep with both kinds, and at all seasons of the year. I dip with a preparation of arsenic when I am left to be guided by my own knowledge and experience, and can truly say that I have not had a complaint of any description; but I use the so-called non-poisonous prescription for dip, when requested to do so, and I find that sheep so dipped require the operation *twice* to once of the former."

On the other hand, experience has taught the

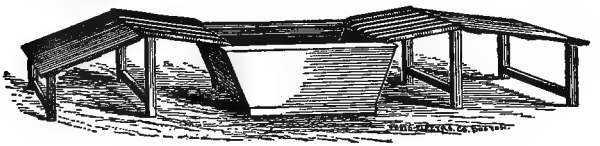
danger of using arsenical or mercurial solutions, particularly if strong, or applied in cold weather, for it has served to remove the sheep from a world of parasitical affliction. Hence the reason for cautioning flock-masters in regard to recipes compounded with mineral poisons. Non-professional men are not so likely to destroy sheep with the non-poisonous dips, *so-called*, as they are, when they undertake to use such powerful agents as the mineral poisons mentioned above.

Tobacco is a very poisonous plant, as everybody knows, and the wrangle between the two contending parties, is not really between poisonous and non-poisonous sheep dips, but between the *more and the less* poisonous decoctions.

Assuming the shepherd to have selected, from his knowledge and experience, the proper decoction to serve as a cure, the next point in order is the mode of application. The method of preparing the different dips is so fully explained in the various recipes given in the Appendix, that it is not necessary to allude to them here.

If the number of sheep to be treated is small,

the preparation for dipping need not be elaborate. A tub with its appendages similar to the cut below and made large enough to allow the immersion of the sheep, will answer every purpose.



Two men should take the animal by the feet, plunge it into the bath, where it is held for one or two minutes, until the wool is thoroughly saturated; then place it on the slatted drainage table, fixed on an incline, so as to allow the drippings from the sheep to flow back into the tub. While there, the wool should be well pressed to remove all the surplus wash before releasing the sheep.

The cut represents a dipping tub with two draining tables. One table would answer the purpose; but, as it takes longer to press the surplus liquor from the wool than to dip the sheep,

the arrangement recommended admits of a considerable saving in time.

Dipping on a Large Scale.

Where the flocks are large, as in the West and in Texas, comprising not unfrequently many thousand sheep, it is altogether preposterous to think of dipping by hand. To a prominent wool grower in Kansas, we are indebted for the following description and the annexed diagram of a dipping tank, as generally used in Australia.

The dip should be sunk level with the ground, and made either of timber, or brick and cement, so as to be water-tight, and so situated that water can be led into it, with also a discharge pipe. The draining yards are usually made with battens and corrugated iron sheeting underneath, so as to lead all the drainage back into the dip. The bottom of the tank should be three feet wide and spreading to the top, so as to have as little liquor left over as possible; and by its side should be placed large boilers to keep the dip-

decoction at a tepid temperature, renewing the infusion from time to time.

From a succession of yards, the sheep are brought rapidly through the "race," too narrow to admit of their turning around for a retreat; thence they plunge into the tank, steaming with the preparation for the destruction of the parasites, and emerge therefrom upon the battens of the draining yards, there to stand until the drippings have run off, after which they pass out.

A man should be stationed on each side of the vat, with a crutch to dip each sheep over the head; one at the end of the double race, also with a crutch, to compel every sheep that hesitates, to jump into the dip; three men yarding and one attending to the boilers and draining yards. With such an apparatus and seven men, there is a capacity for dipping ten thousand sheep a day.

Either of the above mentioned processes will kill all the parasites that exist at the time of the operation; but it will not destroy the eggs that

lie in a state of incubation beneath the surface of the skin; the shells being impervious to the effects of the decoction. There is no preparation strong enough to destroy the eggs, which does not, at the same time, endanger the life of the sheep. In the course of from one week to fourteen days, these eggs will hatch and become living parasites, that in their turn will follow the natural instincts of their being, and continue the process, already explained, of preserving their species. It is possible that enough of this solution may be retained in the wool, to annihilate a portion of the young acari as they hatch, but experience proves that this cannot be depended upon, for the wool continues its growth and forms a layer next to the skin, which is entirely free from the dip and protects the incipient breeders of the disease as they come from the shell.

Therefore if the shepherd thinks that his labor has ceased with the first dipping and the apparent checking of the disease, he will be sadly disappointed, as well as surprised, to find it break-

ing out again within a few weeks, and that he is as far as before from effecting a cure.

When the young are hatched, they can be destroyed, but not before, and until each and every acarus is exterminated, the sheep owner cannot feel confident that a positive cure has been established. The period of incubation does not exceed sixteen or eighteen days; the first dipping will destroy all living parasites and those that acquire life during the ensuing seven days; at the end of that time the operation must be repeated, in order to kill all those insects that are hatched during the following week; while a fortnight from the time of the first immersion, the sheep should be submitted to a third and last plunge into the decoction. This final treatment will effectually dispose of all the acari that may come after, leaving the animal free from this noxious disease, and giving to it a new lease of life and enjoyment, as well as remuneration to the owner for the time and labor expended.

The best time to dip the sheep is when the wool has attained a moderate growth, say about

one inch in length, rather than immediately after shearing, as the wool then retains more of the solution, giving a better chance for the destruction of the young brood as it appears.

An impression prevails among some sheep men, that the dipping of sheep improves the character of the wool. That it does have indirectly an advantageous effect, in relieving the skin of the animal from a contagious pest, and in enabling him to restore a debilitated physical condition, there is not a doubt; but that there is any *direct* action upon the wool, of a beneficial nature, is an erroneous supposition.

There are yet further precautions necessary to avoid a recurrence of the disease; after dipping, the sheep should be placed on a new range or in a fresh yard, well removed from the one inhabited before the treatment began, and on no account should they be allowed on the old ground, until at least two months have elapsed. The cautious shepherd will carefully collect all detached locks of wool remaining in the infected pasture and have them burned. Every care

should be taken to destroy the germ-mites which lie in a dormant state in the yards, fences, rubbing places, sheds, etc., all of which, including the feeding-troughs, ought to be washed with a strong solution of chloride of lime or with some of the dip, before the cured sheep, or any others, be brought in contact with them.

Enough has been said to impress all who are engaged in sheep husbandry with the fact that the disease known as "Scab" is the most formidable foe that farmers, enlisted in wool-growing in the United States, have to contend with, and that the prosperity of this industry consists in expelling it from their flocks.

In Australia tens of thousands of pounds sterling have been spent in the eradication of this ruinous disease, which deteriorates the quality and quantity of the wool and ultimately causes the death of the parasitically infested animals. A history of the rise, decline and almost complete extermination of the scab in Australia would be exceedingly instructive and interesting to the owners of sheep ranches in our western States,

territories, and in Texas. The sum of such a history is briefly expressed as follows: many a ruined man has traced his downfall to the scab in his flock of sheep; many a sheep owner now looks back upon years of labor and anxiety, when nothing but the most indomitable pluck and perseverance were equal to the emergency; and now they can entertain a sincere feeling of thankfulness that the scab is a thing of the past. May this historic fact from a far-off land, infuse new courage and zeal into the efforts now being made, in our own country, by those whose flocks are infested with the scab, to eradicate it from their sheep; for either the acari or the sheep must go, as they cannot live and thrive together. If sheep proprietors of Australia can say that "they have deep feelings of thankfulness that scab (where formerly so prevalent) is a thing of the past," then may owners of sheep in the United States feel stimulated to persevere until they, too, may exclaim with profound gratitude, that the scab, here as there, is a thing of the past.

THE CLASSIFICATION OF WOOLS, AND THEIR MARKETABLE VALUES.

Mr. President and Gentlemen: In considering the classification, or *grading*, of wool, as it is termed in the Eastern markets, let us first look into the causes that led to such classification.

Fifty years ago, when wool growing and manufacturing in the United States, as compared with to-day, may be said to have been in their infancy, it was the custom, among a majority of the large manufacturers, to go into the country about shearing time, and to purchase from the farmer, either directly or through their agents, enough wool to supply their mills for the entire year. In so doing, they accumulated a great variety of wools; among them some grades not adapted to their wants, and which they were obliged to sell.

At that time, before the railroads had formed so complete a network over the Western States, and before every village had its newspaper with daily or weekly market reports from the Eastern

cities — and, I may say, before the now irrepressible wool circular reached the hands of almost every grower throughout the country — the wool buyer was able to take advantage of the ignorance of the farmer, and to buy his wool at prices frequently 15 to 20 cents per pound below the values ruling in the East. In fact, there were instances where washed wools, bought in Ohio at 40 cents per pound, were sold in the East at 65 cents, and that was done during a period when there was no material change in the market.

Such a state of affairs, however, could not go on without an end. The growth of the country brought increased facilities for distributing information and commercial reports; the wool circulars spread over the land like a cloud of locusts, and from their periodical quotations of prices, the farmers were apprised of the values of their staple. We will admit that the farmer is as liberal as any other citizen of the country; at the same time, he is quite as determined to get value received for his product, if he knows it; and this fact was quickly demonstrated by a decreased

margin in the price of wool between the West and the East; the difference, in a great measure, being to the advantage of the grower.

Manufacturers, finding that the success of their mills no longer depended upon the profits to be made out of their wools, but that competition necessitated a closer application to special styles of goods, were compelled to buy only such grades as were adapted to the production of their particular fabrics; hence arose the importance and advantage of commission houses, to receive and assort the wools to that end.

The classification of wools consists in assorting the fleeces, as they come from the sacks, into different grades (each fleece being left intact), in order to offer to the manufacturer, as nearly as possible, the particular quality of wool he may require. By obtaining just the wool he wants, and no more, the consumer can afford to pay its full intrinsic value, while each grade goes into the place to which it is adapted, and thus nets a better result to the owner than by any other method.

In handling the wools of Missouri and adjoining States, the following classification is usually made: First, as to *quality*, of which there are four grades — Fine, No. 1 Medium, No. 2, or Low Medium, Coarse and Common. Second, as to *staple*, or length of fibre, namely, Fine Delaine, No. 1 Combing, Medium Combing, Coarse or Low Combing.

Fine wools, or X and above, as they are classed in the washed fleeces of Michigan, etc., are from such sheep as will grade three-quarters blood Merino and above; the second cross of thoroughbred Merino ram with a pure Southdown ewe will yield this quality. The fleeces are usually graded into two classes according to condition of grease and dirt, namely, Light Fine, being such as will lose in cleansing 63 to 66 per cent; and Heavy Fine, which includes bucks, heavy wethers, and ewes that will shrink 70 to 78 per cent. These wools are used in the manufacture of flannels, overcoatings, cassimeres, and a variety of the finer qualities of smooth finished goods.

No 1 Medium, the next in order of quality, is the half-blood Merino fleece, arrived at most directly by the first cross of a pure Merino ram with a pure Southdown ewe. The wool is soft, and works freely, with little waste; it is adapted to the same class of goods as those just mentioned, but of a more medium quality, and is particularly suitable for hosiery and knit goods. This wool is also frequently used in the manufacture of fine heavy cloths, as a warp wool, with the higher grade as woof or filling, the latter being brought on to the surface of the fabric, and a fine finish thus obtained.

No. 2, or Low Medium, is a more difficult grade to classify as to blood. It is generally the result of mixed breeding, with more or less want of purity in both sire and dam, being $\frac{1}{4}$ to $\frac{3}{8}$-blood Merino. It is not uncommon that sheep of a higher grade, where they have been neglected in food and care, will yield fleeces that have to be thrown with this class. The wool is used in the production of rough-faced goods, such as Cheviots, etc., and is sometimes worked in connection with cotton, to make satinets and jeans.

Coarse and common. The mongrel sheep, the Cotswold, Leicester, or whatever breed it may be of coarse-woolled sheep, that has been neglected by its owner, poorly fed, ill-cared for, or fleece grown, finds but little use for its wool outside of blankets and carpets. The fibre is wiry and hairy, being deficient in the beard, which constitutes the most important feature in the spinning qualities of all wools.

The other grades in our classification are the staple wools, delaine and combing, which, in quality, coincide with the so-called clothing grades just enumerated. Let it be the result of carefully breeding the Merino, or a series of crosses of the Merino with the long-woolled sheep, the fleece must have a uniformity of length to the staple, the latter must be elastic and sound throughout its entire growth, and particularly in these wools should the fleece be free from all extraneous matter, such as dung, heavy sweat locks, burrs, straw, etc.

The peculiar method of working consists in passing the wool through a machine called a

comb; hence the term *combing*, as applied to these grades. This process, in result, is similar to the manipulation of a handful of cleansed wool with an ordinary comb; the fibres are all brought out, so that they lie parallel, and, when twisted, form a strong, hard, and brilliant yarn. On the comb will be found an accumulation of the short fibres, from half an inch to one inch in length, which are called *noils*. These noils the manufacturer is obliged to sell, as they are not adapted to his particular class of goods. It is evident, therefore, that fleeces which are not of sufficient length, or that are at all weak in fibre, or that, while long enough on the shoulder and back, yet run short and fribby on the belly, are not suitable to the classification of delaine and combing wools.

There is still another impediment that applies particularly to fine, unwashed wools, and which, to a certain extent, stands in the way of their being sold as fine delaine, even should they have the other necessary qualifications. The bellies and skirts of the blooded Merino sheep are so

impregnated with the natural oil, sweat, etc., that it is impossible to scour them white. The importance of this drawback lies in the fact that many of the mills using this class of wool, manufacture it into yarn, which is sold to other mills that cannot afford the additional expensive machinery; therefore, the yarn must be white and perfect, ready for any use to which it may be applied.

Having given the leading characteristics of combing wools, there remain to be mentioned the requisite length of staple, and some of their uses. Fine delaine wool should be, on the shoulder $3\frac{1}{4}$ to $3\frac{1}{2}$ inches in length, and not less than three inches on the belly. These wools go principally into the fine, black worsted suitings for men's wear, particularly into spring and summer fabrics. In this connection I would mention, that, for light weight summer goods, a finer wool is required than is necessary for the heavy winter cloths. No. 1 combing requires a uniform length of 4 inches or more, which, combined with the other qualifications, produces a

wool well adapted to shawls, heavy worsted suitings, and ladies' fine dress goods. Medium combing, in quality, corresponds with No. 2 clothing; its length averages $4\frac{1}{2}$ inches or over; its use, the better classes of alpacas and worsted braids. The yarn is sometimes used sparingly in cassimeres, to give a worsted effect to the pattern of the goods. Coarse or low combing is mostly obtained from the pure or nearly pure Cotswold, Leicester, and other long-woolled sheep. It has entered but to a limited extent into the wants of manufacturers during the past two years, and for its consumption has been almost entirely confined to cheap alpacas, ladies' dress goods, and braids.

The second question assigned to me by your executive committee is, "The Marketable Value of Wools," by which, I take it, is implied, the comparative value of the different grades of Missouri wools, as resulting in the returns per sheep to the grower. First, let us notice the method pursued by the manufacturer in making his purchases. Given a pile of wool of the

required quality, length, and strength, the all-important question to consider is, what will it lose in cleansing? The consumer can afford to pay a certain price for his scoured wool; and, starting from that basis, he calculates the probable shrinkage, in order to arrive at its value in the grease — that is, in its natural unwashed state. In such estimates of shrinkage, the experienced manufacturer will approximate very closely to the actual result; but he is not infallible, and serious mistakes in judgment are sometimes made; hence it is often the case that before buying a large pile of wool, he will wish to test sample bags.

Taking an average of the last six months of 1881 as a basis for the comparative values, in the order of scoured value, shrinkage, and grease value, the following result is obtained: Light Fine, scoured, 77c; shrinkage, 65 per cent; grease value, 27c. No. 1 Medium, scoured, 66c; shrinkage, 55 per cent; grease, 30c. No. 2 Medium, scoured, 54c; shrinkage, 50 per cent; grease, 27c. Coarse, scoured, 41c; shrinkage, 45

per cent; grease, 22½c. Heavy Fine, scoured, 75c, shrinkage, 74 per cent; grease value, 19½c. It will be noticed that the cleansed value of Heavy Fine is 2c below that of Light Fine, while the wools are of the same quality. This discrepancy is accounted for by the fact that bucks' and heavy ewes' fleeces require a greater expense in sorting and cleansing; also the heavy sweat locks and fribs cannot be scoured white, which depreciates the average value of the fleece.

The next point to consider is the comparative gross returns obtained per fleece of the different grades of wool. Taking an estimate of the average weights of the fleeces, as nearly as they can be approximated, we find the result to be as follows: Light Fine — say 10 lbs. *a* 27c, = $2.70 to the fleece; No. 1 Medium, 8 lbs., *a* 30c, = $2.40; No. 2 Medium, 7 lbs., *a* 27c, = $1.89; Coarse, 7 lbs., *a* 22½c, = $1.57.

In regard to the marketable value of Delaine and Combing wools, referring to Fine Delaine, the defects already mentioned are a serious drawback. To induce the manufacturer to buy

such wools for delaine, the grower must remove those objectionable features before doing up the fleeces, and let them be sold with his heavy. By so doing, the Delaine fleeces would probably bring 2 to 4c per pound more. From 1 to 1½ lbs. would usually cover the weight of such skirting, which, if sold *a* 19½c, and the remainder of the fleece *a* 30c, the result would be $2.84 per fleece, against $2.70 if sold as clothing, or about 1½c per pound gain. Before taking this step, however, the owner should be well assured that the fleece has the other necessary qualifications of Delaine wool. The other grades of Combing are more free from these fribby locks, and have usually commanded for Medium, 2 to 3c, and for Coarse, 2 to 4c more than for the corresponding clothing grades; although during the past year the limited call for Medium and Low wools has restricted the sale of Combing grades, and the margin above clothing prices has hardly been sufficient to cover the expense of grading them out.

In considering the comparative value of the different breeds of sheep from a wool standpoint,

it is clearly evident that the most profitable to the grower are the fine-woolled sheep, either the high grade Merino or the pure blood; and, furthermore, for the past few years there has been an increasing tendency towards the production of a finer class of goods. The prosperity of the country has created a demand for better clothing; and so long as we can look forward to continued success in our great agricultural and industrial enterprises, there is little prospect of a retrograde movement towards cheaper fabrics. No clearer evidence of the prevailing demand for better woollens is shown than in the case of one of the largest corporations in New England, whose machinery is adapted to, and whose consumption consists in the working of medium and low combing wools. The prosperity of this mill, in past years, has been so great, that its shares of stock were worth, a year ago, about threefold their par value; whereas the decline in the prices of low-grade goods during the past twelve months has depreciated the stock, from that point, more than 35 per cent.

In closing, I would say, emphatically, to those of you who have been breeding the coarser wools, or who have been negligent as to the quality of your flocks, lose no time in raising the standard of your wool; cull out the defective sheep, replace them with full bloods or high grades, and use the thoroughbred Merino rams for the increase.

Missouri has the name of being a coarse-wool State. Not more than two months ago, a manufacturer called on us for fine wool. We showed him a pile of fine, unwashed Missouri; when he remarked that he had not known before any fine wools were grown in that State. Within recent years a strong effort has been made, by a comparatively small number of growers, to establish fine-woolled sheep in Missouri. They have made good progress, but, gentlemen, the work is only begun; and let me encourage you all to use your best endeavors to make your State what it is capable of being, — equal to any in the production of fine, deep-grown staple, that it may take its proper place in the foremost rank of wool-growing districts of the world.

APPENDIX.

To render the foregoing sketch on the SHEEP-SCAB complete, it is necessary to append thereto some of the most popular prescriptions and the methods of preparing them for the effective cure of this parasitic disease.

WALTER BROWN & Co., of BOSTON, through their connections in the west and south-west, as well as from other authoritative sources, have received letters relating to the treatment of the scab, and containing in many instances, prescriptions with directions for compounding them. Several of these recipes are here offered to the reader, with the sincere hope that, should the necessity arise, he may find among the various formulas, at least one that will be efficacious in ridding his flock of this dreaded disease.

RECIPE NO. 1.

Four ounces of tobacco to one ounce of sul-

phur, for one gallon of water: bring the water to the boiling point, then put in the tobacco and let it steep until its strength is exhausted: then stir in the sulphur with a little soft soap: these are ratios to be used according to the quantity of "dip" required: it should be tepid or moderately warm, and kept so during the process of dipping or application to diseased sheep.

Recipe No. 2.

James Law, professor of veterinary science, Cornell University, N. Y., recommends the following:

Tobacco 16 lbs., oil of tar 3 pints, soda ash 20 lbs., soft soap 4 lbs., water 50 gallons: steep the tobacco and dissolve the other ingredients in a few gallons of boiling water, then add water to make up 50 gallons of the temperature of 70° Fahrenheit: this will suffice for 50 sheep: keep every sheep in the bath about 3 minutes, two men meanwhile breaking up the scabs and working the liquid into all parts of the skin: when taken out the sheep is laid on a sloping drainer,

and the liquid squeezed out of the wool. A second and even a third bath may be necessary to cure inveterate cases of scab.

Recipe No. 3.

[The following communication by I. P. Roberts, Professor of Agriculture in Cornell University, and who was formerly engaged in farming and sheep husbandry in the State of Iowa, where he had occasion to use the prescription he recommends, will be read with interest.]

As soon as the disease is discovered, the whole flock should be inspected and the diseased animals placed in a separate field. The disease is likely to be most virulent in the spring of the year, one or two months before shearing time. When the wool is long it is too expensive to dip the sheep, and the disease may be palliated until the time of shearing arrives, by opening the wool and pouring upon the diseased part a strong decoction of tobacco. An entire cure is seldom effected in this way. It is customary to shear at the first opportunity, and then the following remedy may be applied: an ooze made of strong plug tobacco steeped in hot water, and diluted in

the proportion of eight gallons of water to one pound of tobacco. This diluted ooze, as hot as may be, is applied by dipping the sheep in a potash kettle or in a wooden box in which it is contained. After dipping and rubbing off the scabs with a common horse-brush, the sheep should be lifted to a trough, made as wide as the box, with a few slats in the bottom and having one end slightly elevated, and there as much of the ooze as possible should be carried off and allowed to run back into the trough. Hot ooze is to be added from time to time as it is used up. If frosted, inferior or stem tobacco be used as is usual, two or three times the quantity specified will be necessary.

Some recommend that a tablespoonful of turpentine be added after dipping every half dozen sheep; I deem this unnecessary. After the process the sheep should be placed in a close pen or shed for a few days, where they will keep warm and steaming. To make sure of a permanent cure, they should be re-dipped 15 days afterwards. The English use arsenic, but where

tobacco is so cheap and so certain a remedy, no one should use the more dangerous substance.

Recipe No. 4.

Mr. A. Symes, Vice-President of the Texas State Wool Growers' Association, of Taylor, Texas, writes: "I never use anything for scab but tobacco and a little lye to soften the water: take 35 lbs. of the best leaf tobacco (sheep dip), 1½ lbs. of concentrated lye, boiled together in 100 gallons of water until the strength is all extracted: dip the sheep in this decoction when as warm as you can hold your hand in it, and keep them in the bath two or three minutes: repeat this dipping in 12 or 14 days: put your sheep on a clean range and I will ensure a cure. I have dipped thousands and I know whereof I speak."

Recipe No. 5.

50 lbs. of tobacco and 10 lbs. of sulphur to 100 gallons of water. After steeping the tobacco sufficiently, add the sulphur and heat the liquor when used, to 120 degrees. "This will cure,"

says J. S. Codding, President of the Kansas State Wool Growers' Association; of Louisville, Kansas.

Recipe No. 6.

[From Mr. E. W. Wellington of Ellsworth, Kansas, comes the following prescription and interesting letter.]

Recipe for sheep dipping used largely in Australia, as very cheap and effectual:

Take 60 lbs. of sulphur, 30 lbs. of quick lime, 60 gallons of water; boil, and keep boiling for ten minutes, when a clear orange solution will appear; add this to 180 gallons of water. Heat the dip to at least 100 deg. (Fahr.), and soak the sheep in it for at least one minute.

"The custom is in Australia to use the above dip three times at intervals of one week between each dipping, and at any time of the year. Owing, however, to the bad effects upon the wool, I have found by experience, that it is only advisable to use the lime and sulphur dip immediately after shearing, and then but once; making the second and third dip of tobacco and sulphur.

Always use the strongest kind of tobacco and never let it boil, but simply steep it. Put the tobacco into gunny sacks, from 25 to 50 lbs. in each sack; then soak three or four hours, then remove the sacks, put them into the boiling vats and *steep;* thus getting all the strength out of the tobacco. On the day of dipping the sheep (which should be the next day after the liquor is prepared) the two solutions thus obtained, one by soaking and one by steeping should be heated together. One reason why there are so many failures in curing the scab is because most men prepare their liquor the same day they use it, and being hurried, do not extract the entire strength of the tobacco. In case it is necessary to dip before the fleece is removed, do not use any lime, but dip *three* times in tobacco. Each dip should be exactly one week from the preceding one, or as nea that as the weather will permit. It will be found that the tobacco used after the lime dip, will bring back the life into the wool and counteract all the injurious effects of the lime. Two applications will generally

cure; but three are *sure*, provided the tobacco be properly prepared, and the sheep, after the final dipping, be changed on to a new range and into *new* (not *cleansed*) corrals. It is never safe to put sheep back into an old corral, even after it has been whitewashed, unless at least two months have elapsed."

Recipe No. 7.

Mr. F. H. Austin of Colorado Springs, Colorado, says: a decoction of tobacco, 25 lbs., arsenic 2½ lbs.; sulphur, 5 lbs.; to 100 gallons of water, is the standard Colorado dip; preferable to anything else; that they use a tank 30 feet long, and make the sheep swim in the solution, through its entire length.

Recipe No. 8.

Mr. W. D. Currier of Lookout, Wyoming Territory, writes: "We know tobacco is a sure cure, ½ lb. (stems and waste) to the sheep, and it can be bought at 2 to 3 cents per pound. In California and Oregon they use sulphur and

lime; but I think it injures the wool, unless used just after shearing. I prefer tobacco to anything, although it is some trouble to boil it down and get it ready for use."

The "Prairie Farmer," published in Chicago, being interrogated as to the best mode of treatment and cure of the scab in sheep lately responded as follows:

"Scab on sheep is a troublesome and vexatious affair. Various remedies are in use for its eradication, among which the following is recommended as harmless and easily prepared by any one: For 100 sheep, take 25 lbs. of coarse tobacco and steep it in as many gallons of boiling water, just taken from the fire. Stir it occasionally until it is cold, when it should be strained. Add to this fluid as much cold water as to make the whole quantity 100 gallons. Soft soap may be added, say 6 lbs., to the above quantity of fluid. The soft soap should first be dissolved in a sufficient quantity of hot water, and added to the strained liquid, before the cold water is added. The addition of the soap will

facilitate the loosening of the patches of scab. The compound should be put into a large tank in which each sheep should be dipped during three to five minutes by two men, one of whom holds the head above the surface to prevent the sheep from swallowing any of the fluid. The sheep should then be lifted out and laid on an inclined plane, such as a door, which should be connected with the tub so that the fluid wrung out of the wool is not lost. While lying on this plane the head of the sheep should be thoroughly wetted with the fluid by the hand. A mild day should be chosen, and if treatment be inaugurated during the cold season of the year, the sheep should be kept warm and dry afterwards at night. In summer, the sheep should be shorn previous to treatment, as they are then less trouble to dress. If not thoroughly eradicated the disease will be sure to show itself again. The partial cure of a scabby flock is a great cause of the disease being perpetuated on a farm. It will be necessary to repeat the dressing on the eighth or tenth day, because the scab

remedies do not destroy the eggs, which hatch out in the course of a week. The second dressing, properly done, will then effectually cure the disease."