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## INTRODUCTORY LECTURE

Montreal Veterinary College,—by D. McEachran, F.R.C.V.S

Subject:—*The Veterinary Profession and Cattle Disease in North America.*

Gentlemen,

I need not attempt to disguise the feelings of pleasure with which I meet you this evening, when I compare this bright intelligent assemblage of students before me with the small beginnings of eighteen years ago. I can well feel proud that I did not yield before the many discouragements which had to be surmounted. Gentlemen, from the province of Quebec, from Ontario, from different parts of the United States, from the West Indies, from England and from distant Japan, now fill our benches, so that we may infer that we are known abroad and that the reputation of the school is such as to merit the confidence of others besides our own people. Why is this the case? Chiefly on account of two great names which honour our prospectus. Of the one, it needs no eulogium from me. Our Sovereign Lady the Queen in acknowledgement of his great services in science and education has but recently conferred the honour of knighthood on him. I refer to the distinguished Principal of McGill University, Sir William Dawson; the other is one not yet so well known but like him a scientist by nature, he perhaps was not born with a microscope in his hands, but at an early age he showed, when a student with the late Dr. Borel, an extraordinary aptitude for histological and pathological investigation, even when a mere boy his predilection for P. MS. (sic) was strongly manifested. Having enjoyed the advantages of the teachings of Virchow, Zurn, Gerlach, and others, while a student in Germany, he was well fitted for the Chair of Institutes of Medicine in McGill University, which he has so ably filled for about ten years. It is with no little feeling of regret that I am obliged to inform you to-night that we have in the mean time lost him. I am sure that those of you who know him feel like myself that our guide and leader is gone, for while he belonged more particularly to the medical school, I doubt very much if his learnings were not with the veterinary branch of the medical science, as affording him better opportunities of prosecuting his researches in pathological anatomy.

Well, in the mean time he is about to leave us, and we trust he will be happy and prosperous in his new sphere, but I should feel sorry indeed if I supposed he would not come back to us. Canada cannot afford to lose such men, and had the value of such a scientist been but known to the country, he would never have been allowed to be taken from us. Osler is the *Pasteur* of Canada, the pathological investigator who has stimulated medical science and led the way to every advance in pathological research. It cannot be that the country will let him be lost to us. Do we not want him in the public employment in connection with the quarantine services, medical and veterinary, as consulting pathologist for the Dominion? It is a new position, but nevertheless, one of the most vital importance, and in making such an appointment, Canada would be but honouring herself and taking a progressive step which would be greatly in the interests of the public health.

It is usual on such occasions as this to enter somewhat in detail into explanations of the numerous studies which form the curriculum of your educational course. I hope you will excuse me to-night if I depart from that custom, and instead,

try to impress you with the higher aims and objects of the profession which you are now entering as students.

Veterinary science is no longer the simple art of the farrier, whose knowledge consisted of a few nostrums and the practice of a rude form of surgery, it is, in fact, a science, embracing within its scope the whole of the collateral sciences which are included in the curriculum of the foremost medical colleges.

For the successful prosecution of its study there is required a combination of qualities such as are not needed in any other of the scientific professions, viz. a well cultivated mind, a studious habit, and constant application, and in addition you require physical courage and tact to enable you to control your patients. It has been remarked that the tendency in the schools of the present day is to devote too much to the purely scientific, and too little to the practical application of the science. This is no doubt to a certain extent true, but it is due to the fact that the time devoted to the study by the pupil is far too limited for him to accomplish both the scientific and practical together, and it must come to it, that like the medical students, Veterinary graduates must spend both time and money in visiting those hospitals where large numbers of animals are being treated, not in hurried moments, between hours of study, but leisurely and when they have nothing else to do. There is no profession that has made such progressive strides as has this one, in fifty years, from the rude art of the farrier it has risen to a science which forms no small part in the progress of nations, from the fact that it is the hand maid of agriculture which is the backbone of national prosperity. You will thus see that you are entering on the study of a science which affords complete field for your ambitions and abilities, be they what they may.

A nation becomes great in proportion to the advancement of her agriculture, especially that branch of agriculture devoted to stock raising. The mere production of grains seldom results in making a country great or wealthy. It is a well known fact that on this continent at least the live stock of both the United States and Canada has formed a very important part of their agricultural greatness, and represent no small portion of the countries' wealth, and it behoves every country and government to promote the veterinary science as much as possible, so that they may enjoy the full advantages that it is capable of bestowing in the prevention of contagious diseases.

Let us look at the result of ignoring the warning voice of the profession in England half a century ago. When the bovine scourges were decimating the herds on the continent of Europe, and their introduction seemed imminent, the government turned a deaf ear to those members of the veterinary profession who had knowledge and courage enough to caution them, and urge the necessity of checking the importation of live stock or placing it under proper regulations. The result was the importation of continental plagues, Foot and Mouth disease, Pleuro pneumonia, Variola Ovina, and Rinderpest, from which followed the downfall of English agriculture Farm after farm was overrun by the plagues, stock after stock was decimated or destroyed, until, ruined and disheartened, the honest farmer was reduced from opulence to almost poverty, and forced to emigrate to a foreign land where he hoped to escape from the curse which drove him from his home. Could the government hold itself blameless for ignoring for years the valuable services which the veterinary profession could have afforded the country in averting the calamity?

Many of England's best though ruined farmers with their families crossed the Atlantic Ocean and settled in the New England or Atlantic States, hoping there to be beyond the curse of cattle plagues. But how short-lived were their hopes—instead of profiting by the better experiences of Great Britain, they were soon forgotten, and unrestricted importation was carried on from European infested countries, until, forty-one years ago, Pleuro pneumonia was introduced by a cow from Germany, and repeatedly since.

Foot and Mouth Disease on several occasions also, and soon the same experiences were gone through in The United States as in England, the difference being due to the greater isolation of farms, and much less intercourse of herds such as took place in England at fairs and markets. In several instances local action succeeded in stamping it out, but for want of general concerted action by the Federal Government, its eradication was never complete in all the States, and fresh importations insured its continuance. Fortunately for thirty-five years little or no movement westward of stock took place from the infected States and no outbreak of these diseases was known to have taken place until quite recently, when by the transportation of infected animals it is to be feared that both Foot and Mouth disease and Pleuro-pneumonia have been introduced into those great cattle rearing and feeding Western States which are also the nurseries of the great ranching country on the Western plains, where hundreds of millions of dollars worth of cattle replace the vast herds of buffalo, and it is now very problematical whether or not they can be prevented from reaching those great unfenced ranges, on which it would be beyond control and lead to unheard of calamity, which could not be otherways than disastrous to American agriculture.

At whose door must this terrible charge be laid? Who is responsible for this serious blunder, or worse than blunder, crime would be a more fitted term for the sacrificing of the meat supply of the world. For it is well known that, free from disease these great plains are quite capable of feeding sufficient cattle to supply the markets of every nation with beef of the primest quality.

Did the veterinary profession do its duty in the matter? A few of its members certainly did. To the credit of those who met in convention at the centennial celebration at Philadelphia in 1876 it must be said that they did their duty in warning the Government and people of the United States of the great danger to which their vast cattle industry was exposed in the absence of a quarantine system, to prevent disease and to deal with it when it appeared.

The subject was introduced both by Professor Law and myself, was freely discussed, and the papers were ordered to be published for distribution, at the expense of the convention, among the members of congress and agricultural associations. In that paper I remarked, "How often have invasions of these diseases passed like a blight over the whole length and breadth of the British Isles, bringing ruin to hundreds of England's best farmers, seriously curtailing her food resources and reducing her working classes to a state of semi starvation I am well aware that many will say of us, as was said of Professor John Garinger that we are alarmists, that the fears thus expressed are groundless, but I have little doubt that if no protective measures are adopted, like him, we will live to see the time when our rulers will wish that they had listened to us who at this great centennial gathering humbly endeavoured to point out their duty to the country, not to trifle with these diseases, but to take such steps as will insure their non-introduction into the country, an undertaking of little moment compared with that of eradicating them once they are introduced."

In the Report on Diseases of Cattle published by the government at Washington in 1871, Professor Gamgee in his article on Pleuro-pneumonia says, "I hope that not a few will realise after a perusal of this report, even though they may inhabit the far distant prairies and the mountains of California, that it is the duty of every American farmer to manifest his inter-

est in the extinction of a malady that may for centuries, if left unheeded now, harass the stock raisers of the entire continent and bring poverty and ruin to many thousands of families."

In November 1878, Commissioner Ledue, the energetic Commissioner of Agriculture at Washington, on information supplied by professional investigation, addressed a report to the President, in which he says, with reference to Pleuro pneumonia, "At present, the disease seems to be circumscribed by narrow limits and could be extirpated with but little cost in comparison with the sum that would be required should the plague be communicated to the countless herds west of the Alleghany Mountains. The disease is of such a destructive nature as to have called forth for its immediate extirpation the assistance of every European government in which it has appeared, many of them having found it necessary to spend millions of dollars in its suppression. The interests involved in this case are of so vast a character and of such overshadowing importance, both to the farming and commercial interests of the country, as to require the active intervention of the Federal Government for their protection, and for this reason the considerate attention of congress is respectfully asked to this important matter."

Professor James Law, of Cornell University, has unceasingly called the Government's attention to the danger of neglecting preventive measures, more especially in a pamphlet published by him in 1879, as well as in agricultural papers. In explaining the danger of infection of unfenced stock ranges, he says, "It is needful to note the insidious progress and stealthy invasions of the Lung Fever and to contrast them with the more prompt and open manifestations of the other animal plagues in order to show the great peril to which we are subjected by the presence in our midst of a pestilence which literally walketh in darkness. Let us now consider the prospective infection of our great stock ranges.

That this is inevitable, though slow at the present rate of progress in the plague, has been sufficiently shown. That it might occur any day by an animal infected on an eastern farm or stock yard or in a railroad car in which it was sent for the improvement of western herds must be abundantly evident to every one who has read this article. If we now add the fact that more than one thoroughbred Ayrshire and Jersey herd have been infected by this disease during the past year we are at once confronted with a strong probability of an early western infection."

Among the earnest workers in endeavouring to arouse the Government action on this matter must always be prominently mentioned J. W Gadsden. M.R.C.V.S, Philadelphia, and L. McLean M.R C.V.S, Brooklyn, N.Y., both of whom rendered me valuable assistance in investigating Pleuro-pneumonia in 1879, and both have since lost no opportunity of urging protective measures to prevent it reaching the great herds of the west.

In this connection too should be mentioned Professor Lyman, of Harvard Veterinary College, and various writers in the American Veterinary Review, so forcible, clear and often repeated, have been the warnings of the profession through the above named members of it that no blame can be attached to it for the present deplorable condition of the Western States to-day in this connection.

How then comes it that this fell plague has been allowed to make its slow but certain progress westward? simply this—gigantic railroad enterprises have at an enormous cost in money covered the United States as with an iron network, and in many instances the bulk of their earnings is derived from the live-stock trade Besides, wealthy corporations are organised and net large profits from stock yards, any hinderance such as quarantine regulations properly enforced would necessarily produce, was consequently opposed by such corporations, and thus the fight went on, the carrying companies and stock-yard owners opposing any interference with the free and untrammelled movement of stock from west to east or from east to west, had always influence enough to override the feeble efforts made by a few stockmen—as so far no united effort has been made by the cattle men of the west as they have not even yet been sufficiently aroused to exert their influence in the protection of their hundreds of millions of property, but they will soon find it necessary to do so, or see themselves beggared by the results of their own too long suffering carelessness, in allowing carrying companies to sacrifice their property. It is true also that complications present themselves in applying federal regulations which are not seconded by states legislation, but true it is that when the cattle men of the west get awakened to a sense of their danger they will bring such influence to bear that no government can stand in opposition to their rushes.

With reference to the contagious diseases, Foot and Mouth Disease, and Pleuro-pneumonia,—Foot and Mouth, is unimportant so long as it is confined to domestic herds, and attacks them during the summer, it will run its course usually in about fifteen days, often so mildly as to escape the attention of the owner, but very contagious as well as infectious, the vesicles continuing not more than five days, and the feet only being affected in some cases. Hence cattle owners who hear so much of the dreadful Foot and Mouth Disease, are at a loss to believe that the mild fever, the faint vessicles in the mouth, the absence of foot eruptions can be genuine foot and mouth, at all. We had several instances of such even in professional men, one at a United States quarantine station where the Inspector even after being told that it was foot and mouth, did not believe it till it had spread from the imported stock and infected 600 outside animals, and even at our own quarantine the same owner did not quite believe the correctness of the diagnosis till two weeks had elapsed and he saw it spreading and the symptoms becoming more marked in new cases. Even a Professor, himself an Inspector who visited the quarantine, was so disappointed by the mildness of the symptoms, as compared with what he supposed they should be, that he concluded that it was not Foot and Mouth, and went so far as to suggest to the school of Cavalry camped a few miles off that they should send for the milk and use it. Their own good sense however prevented them from being refused not only milk but admission to the quarantine.

The unimportant character of the disease however changes when we consider it as occurring on a range where in many cases they have considerable travelling to do in gathering their food as well as in going to water. Affected by this disease, we can understand that they would suffer severely for want of water and their sufferings would be aggravated, should it occur in winter. Its great contagiousness both by direct and intermediary objects is a marked feature of the disease. Railway cars, steamboats, cattle yards, wharves, men's clothing, hay, halters, bags, &c, &c., are all media of communication of the disease to other herds.

Pleuro pneumonia is slower in its progress and more defined in symptoms, an experienced veterinarian who wants to give a correct opinion need make no mistake in this disease, if he sees the animal living and makes an autopsy at the time of death. There is no other disease of the bovine lungs exactly similar to it either in the clinical manifestation or the post mortem lesions. Its contagiousness, its progressive stages, pathognomonic symptoms, and the characteristic pathological lesions are all so well marked as to leave no excuse but ignorance for an erroneous opinion of the disease.

Yet, strange to say, men occupying high positions in the profession, have urged that the lung disease of the United

States was "of a milder form than the European disease", many even deny its existence, and one leading British Veterinarian went so far as to insist that the disease as seen by him was Sporadic Pneumonia, and he had immediately several echoes on this side of the Atlantic who sought to bring themselves into notice by ranging themselves in line with him on the sporadic theory—but, echo like, they soon died away.

The great danger to be apprehended from these diseases arises from the subtle nature of their contagiousness. Pleuro-pneumonia, Foot and Mouth Disease, Hog Cholera and Scab on Sheep, are all spread through the channels of commercial communication, notably steamboats and railroad cars, and yards. Unless by a prolonged quarantine or actual prohibition it would seem to be almost impossible to prevent their spread once they gain a foothold in a country.

When we consider the numerous intermediary agents of communicating the virus, through the clothing of attendants, ropes, halters, blankets, hay, bags, buckets, feeding troughs, &c., which retain the virus for months in so active a form that if brought in contact with healthy animals the disease is sure to be communicated.

Take, for instance, the outbreak of Foot and Mouth Disease in February last at Portland, Me. The imported cattle were being landed at the wharf—a farmer driving a pair of black oxen ignorant of any danger followed them admiringly for a couple of miles on his homeward road.

Next morning he took his oxen to the forge to be shod, another pair of oxen were shod shortly after his—the result was that the black oxen sickened and infected his other cattle, the other oxen became infected at the forge, they carried the disease home with them and from these centres the disease spread till probably six hundred animals were affected.

Take the history of Pleuro-pneumonia in any country in which it exists and you will find similar history of its extension.

In Australia as related by Mr. Fleming:

"It was introduced by means of an English cow imported into Victoria and landed in Melbourne in 1858. When the disease was discovered among the imported cattle, steps were at once taken to eradicate it. All the cattle on the farm were paid for by private subscription and destroyed, and the farm placed in quarantine. Unfortunately, however, the quarantine was not strictly maintained, and a greedy, ignorant neighbour, who owned several teams of working Bullocks which he usually employed in carrying on the roads, seeing the good grass in the infected paddocks, put his cattle into them during the night and removed them at day break. His cattle soon became infected and as he shortly afterwards sent his teams on the roads on a journey to the border of the colony they spread the disease in all directions as they went. His other cattle mixed with his neighbours and in this way the malady was diffused around his own farm.

The great danger from this disease is its insidiousness, were it a rapidly spreading death dealing plague like Rinderpest, it would not be so dangerous, as it would then be more liable to rouse the people and government to united action for its effectual suppression. According to Fleming:

"The death rate from Pleuro-pneumonia may be estimated at from 15 to 20, and in many instances as high as 70 per cent In mild invasions they may only be 20 to 25 per cent but in those of a severe character they may amount to 70, 80 or 90 per cent.

In general however the loss from death and from animals slaughtered or disposed of on account of the disease may be estimated at about 60 per cent. This nevertheless does not represent all the harm wrought by the Lung Plague. What with the long duration of the malady, the slow and protracted convalescence, the consecutive disorders, perhaps permanent loss of condition, the expense of medical treatment, the non-productiveness of the animals for months, &c., all this makes Pleuro-pneumonia one of the most disastrous plagues that can affect a cattle producing country.

The truth of this may be easily verified in the history and literature of the malady particularly in England and Holland, two countries in which it was allowed to extend and prevail for many years before concerted action was resorted to for its suppression.

In England the loss in six years amounted to a million head, while in Holland in 230 parishes the yearly loss has been reckoned at 49,661. In France the disease has caused great losses in the northern departments where there is more importation and movement of cattle, owing to the facility with which they can be fed on the residues of distilleries and sugar refineries. According to statistics of the losses caused during seven consecutive years in 217 communes of the Department of the North, it would appear that the annual mortallity in a bovine population of 280,000 was 11,200 or a total in nineteen years of 218,000 head, whose value Reynal estimated as amounting to no less than fifty-two millions francs. In Australia the losses in thirteen years is estimated at about 1,404,097 head which if valued only at $30 each would amount to $42,122,910, from that disease alone.

In England during six years ending 1860 the losses are estimated at considerably more than 1,000,000 head, or at least $60,000,000, or $10,000,000 per year.

Gentlemen, these are the facts and figures which elicited from Sir Richard Temple when speaking of this great and promising country of ours the emphatic expression so full of meaning, so timely a warning: "*For heaven's sake try to keep out cattle disease.*" Knowing well that free from disease in our herds the agricultural progress of Canada cannot be hindered, but knowing well too the difficulty which will be encountered in fighting against so many insidious sources of infection, nothing but the most stringent measures and careful watching will avert the great calamity, but that the disease can be kept out I have not the least hesitation in affirming.

What position is Canada in with reference to cattle disease?

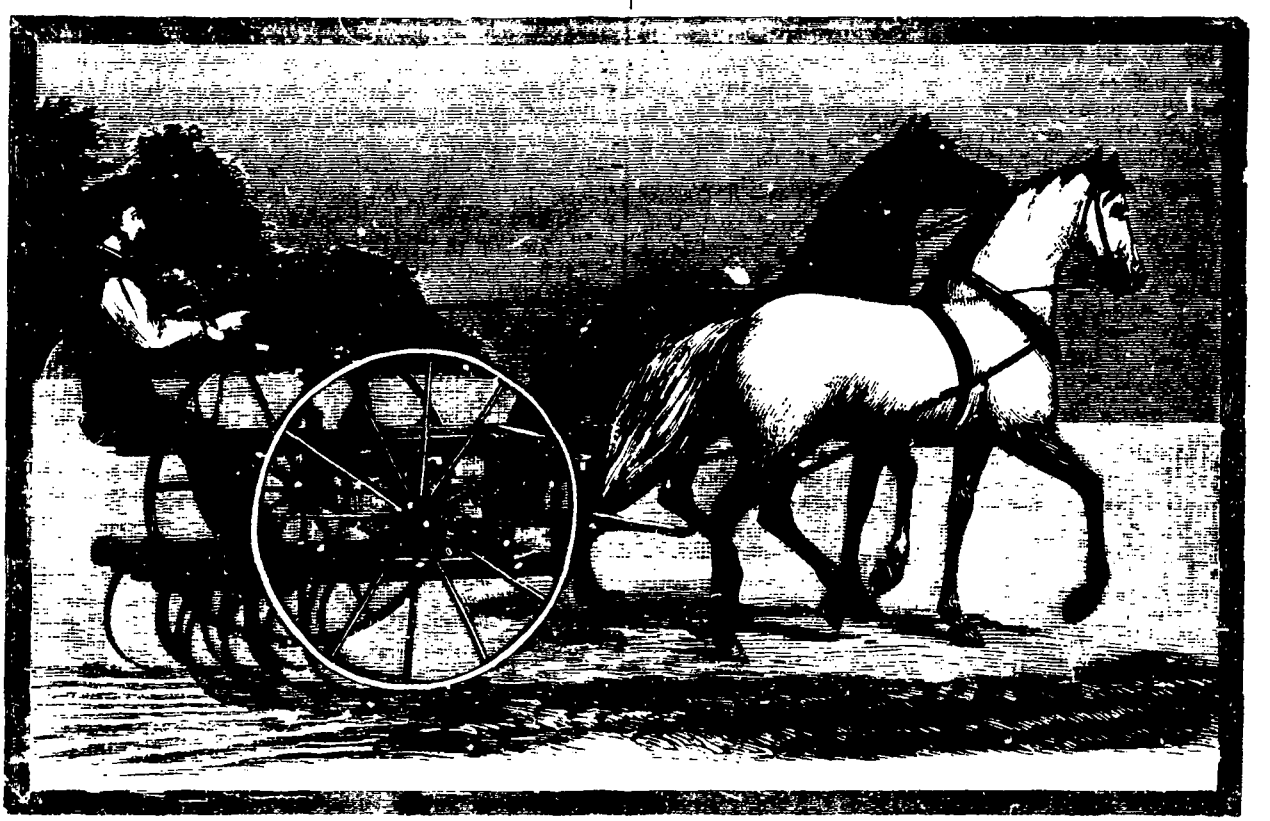
Canada to day is free from all contagious disease, thanks to the wisdom of our government in listening to and acting on the advice of those who had made a special study of the question. The establishment of the quarantine at Quebec in 1876, was the initial step in the formation of the quarantine system which has kept Canada in the proud position of being the only large cattle producing country in the world free from disease, whose cattle can enter alive any market in the world, placing them at a premium of about $20 a head over any other cattle, or a million and a half dollars on the exported cattle per annum. Not this alone, but the development in stock breeding, both in numbers and quality, the establishment of large ranches where cattle are bred in thousands, a general and very marked improvement in agriculture to meet the feeding requirements, the stimulus which all this has given to immigration of the proper class of farmers to our great north-west all confer advantages on the country which cannot be estimated, and in all this we feel justified in claiming that the veterinary profession as such has played no unimportant part, in seconding the efforts of the government in conducting and carrying out the quarantine system.

Of the importance of the livestock interests in the commercial relations of the country, I have only to mention the fact that no less than $208,633,500 are invested in live stock in Canada. That the European export trade alone amounts to over $8,000,000 per annum and that were it not for this

export cattle trade many of our principal transatlantic freight lines would have had to lay up half of their boats for the last few years, the effect of which on general commerce can be well imagined. Canada is essentially a cattle country, our grass, our water, our climate all favour it, let our live stock interests suffer, by any embargo which may be placed on our cattle by relaxation of regulations, or the introduction of disease, and the results would be deplorable. Thanks to the forethought and good judgment of the Hon. John Henry Pope, minister of Agriculture, thanks to the vigilance of our Hon. High Commissioner and the wise councils of the Veteran Premier Sir John A. MacDonald, and his cabinet, there need be no apprehensions as to the continuance of such regulations, from one end of the Dominion to the other as will insure our present proud position

shown by the census of 1871, amounting to $100,007,500, with that of 1881 amounting to $208,633,500, shows an increase of over five millions of dollars a year. It will thus be seen that an immense sum is invested in live stock, and I am proud to be in a position to say that our Canadian stock will compare favourably with that of Great Britain or any other country.

It may be interesting for you to know that the foot-hills of the Rocky Mountains are being stocked with animals of excellent quality. Senator Cochrane remarked to me only a few days ago, that he saw hundreds of cattle on the Cochrane Ranche which would in point of merit individually, apart from pedigree, compare favourably with the thoroughbreds on his Hillhurst Farm, which is saying a good deal, and when I tell you that there are already large numbers of pure bred



SPRING-TOOTH CULTIVATOR.

Can disease be kept out of Canada? Of course it can. Not one of the diseases referred to arises *de novo*. They are all due to a specific virus, and if all sources of contamination by that virus are avoided the disease is prevented. It has been argued that our extended frontier renders it impossible for us to prevent the smuggling of animals at certain points. This argument simply implies ignorance both of the diseases, and the means of preventing them. How far will cattle suffering from any of these diseases travel on a trail without showing them, not many hundred miles, with the carriage of animals on railways prevented, with the police and customs services co-operating with the quarantine service, it would be very difficult to introduce any animals suffering from disease, unless indeed it were done maliciously and purposely, no sane man would risk smuggling one or more animals which were liable to seizure, and himself to a heavy fine.

A comparison of the statistics of the value of the live stock in Canada, including horses, cattle, sheep and swine as

Hereford and Polled Angus Bulls on the ranges, and a strong desire to increase their number, you can see how in a few years Canada will take no back seat as a cattle country. By the papers last night we learn that the President of the Canadian Pacific Railway has gone to England to arrange for the establishment of a line of steamers between Port Moody, Japan and China. Who can tell but at no far distant date Canadian cattle will find a market in these countries for breeding purposes at least. It is far from improbable, I am told by Mr. Arakowa, that the northern part of Japan is admirably adapted for raising cattle, and that the market would be an excellent one. In fact it is more than probable that this enterprising people, who send their most promising young men to all nations where progressive ideas are to be gleaned, have some such object in view in sending him to Canada. At all events he will no doubt form a link in the chain which is being forged to connect the commercial enterprise of the east with this country.

It will thus be seen, Gentlemen, that in entering on the study of this profession to day you adopt a profession which in the future will occupy no mean position but one of great responsibility Current events all go to show that it is necessary for you "to be well trained (as Mark Twain said of the babies) for we are going to leave a big contract on your hands"

I hope therefore you will each commence feeling that you are preparing yourself for a position of trust and honour, and while you devote yourselves to the scientific study of the profession you should lose no opportunity of acquiring the practical as well.

I trust you will all be regular at your classes, strive not to miss one lecture, be diligent in your studies, and thus you will make progress and lighten the labour of your teachers.

In conclusion I may add for your encouragement that of those who have graduated before you three are engaged in teaching at the Veterinary College at Minneapolis, two are on the staff of the Veterinary College at Chicago, and another has been recently appointed on the staff of the Veterinary Department of the University of Pennsylvania. One has been appointed at a salary of $5,000 a year as veterinary inspector for the Sandwich Islands. One is chief inspector for the Province of Manitoba. The quarantines at Quebec are under the charge of another, and, as is well known, the port inspectors for Montreal are our graduates, and no less than eight of our graduates have taken the M. D. as well as V. S degrees

## OUR ENGRAVINGS

*Ayrshire Cow, Tibby*—Not an exaggerated udder, by any means. *Tibby* is evidently one of the larger sort of Ayrshires, of which I remember a fat cow of Mr Cochrane's weighing 1020 lbs deadweight

*Spring-tooth Cultivator.*—A satisfactory style of implement, but hardly heavy enough for rough land; still, the form of the teeth is infinitely superior to the form of the teeth of the ordinary cultivator.

*Two Jerseys cows.*

*Howard's string binders.*—This implement is described in the Oct. number of the Journal By some blunder or other it escaped the eye of the *éditeur*, and, in consequence was not engraved in time.

## SPRING-TOOTH CULTIVATORS.

A GOOD deal of interest is now manifested by farmers in spring-tooth cultivators. Several years ago a floating spring-tooth cultivator was sent to us to try. Its work was thorough, but the draft was too heavy, at least in our light soil. For the past three seasons we have used a spring-tooth mounted cultivator, which has pleased us in every way. The work performed is as thorough as that of the floating cultivator, while the draft is very light. We use it both as a harrow and, by taking out two of the teeth, as a cultivator for corn. The illustration shown (Fig. 165) is that of the new Buckeye Spring-tooth Cultivator, which, by the use of a centre attachment, serves as well for a harrow The teeth may be set to run as deep or shallow as desired and are controlled by levers within easy reach of the operator. We have not tested this particular machine, which is manufactured by P. P. Mast & Co., of Springfield, O; but we have talked with those who have used it and would recommend our readers to send for circulars and judge for themselves.

### First Steps in Farming—Young Man's Department.

## LIQUID MANURE.

LINCOLN COLL. FARM, NOV. 1884.

All about liquid manure: the toughest subject I have ever undertaken to treat. So much has been said and written about it, that a really practical view of the matter is hardly ever taken. Of its marvellously successful use among the Flemings there can be no doubt; of its utter failure, economically speaking, in the hands of the late Mr. Mechi, there can be as little. Hence, we are led to the unavoidable conclusion, that the profitable employment of liquid manure depends upon circumstances, and the task imposed upon me seems to be this: to show how and where we may hope to use liquid manure to the greatest benefit.

My readers will have seen by the article from the Vermont Watchman, printed in the October number of the Journal, that, owing to various causes, most of the liquid dejections of our live-stock is usually wasted, and that these liquid dejections contain the most valuable parts of the food eaten by the stock. Various means, tanks, pumps, irrigating pipes, &c., have been employed to preserve and utilise the precious liquid, but as far as my experience in England goes, after some time the whole expensive apparatus has been neglected; the cost of application having been found to exceed largely the return derived from it.

The great success which has attended the application of liquid manure in Flanders is proverbial: there it produces most astonishing effects upon soils which are almost completely barren. Any one who has ever passed through Belgium, and examined the nature of the soil, must have been struck with the wonderful change which liquid manure has produced, and perhaps he may ask why such a profitable system of applying manure to the land is not adopted more extensively in other countries; and the answer is simple: the system has been tried in other countries, especially in England, and has not been found to answer. Some instances have come under my personal observation in which considerable expense was incurred for the erection of tanks that are now abandoned, experience having shown that no good whatever was produced by the application of liquid manure to the land. There can be no reasonable doubt that this conclusion is well founded on fact, and that there are soils which are not benefited in the least by its use.

It must be borne in mind that the system in question can no longer be regarded as an agricultural novelty, but that it has been tested on a large scale under the most varied circumstances. At the best, its success has been but partial; and as the necessary arrangements involve a considerable outlay of money, it becomes a question of importance to decide whether on a particular farm it is likely or not to be more remunerative than the ordinary methods of applying manure to the land. The solution of this important question is difficult, since it is complicated by considerations of both a practical and theoretical kind. Means of procuring the necessary amount of water for the proper dilution of liquid manure do not exist everywhere, or can only be devised at a ruinous expense; the cost of constructing tanks is no trifle; and the time occupied in our short and busy seasons of open weather in the distribution of the dilute liquid by horse, cart, and man, will be found most terribly to interfere with the general cultivation of the farm.

But apart from the purely practical difficulties that stand in the way of properly estimating the merits of liquid manuring, there are several points which justly belong to the province of the agricultural chemist. Upon him it devolves to ascertain upon what principle or principles are based the astonishing effects which liquid manure produces in some ins-

tances, and to endeavour to explain the reasons why in others it does no good, or is attended with but partial success. The question of profitable return for the expense of proper arrangements for the distribution of liquid manure is one for after consideration; it may overrule or not the theory which informs us that in the liquid form manuring constituents are most conducive to the rapid development of certain kinds of agricultural produce. But we must first examine carefully whether this doctrine can be accepted unconditionally, or whether this very generally received opinion has not to be modified in a considerable degree. A principle like that which informs us that fertilising matters produce their maximum effect in a liquid form may be true in the abstract, or with reference to particular kinds of plants, or in certain climates, or with reference to soils of a particular character; but in other climates, or other soils, there may be operating causes which render it by no means advisable to administer manuring matters in a state of solution.

*On the composition and fertilising value of liquid manure.*—Liquid manure, it need hardly be said, may be produced in a variety of ways. It may consist chiefly of the fermenting urine of horses, or cows, or pigs, or a mixture of them all, or it may be produced by converting the *solid and liquid* excrements of our domestic animals into a muddy liquid, and distributing this liquid, mixed with an immense bulk of water, over the land by means of fixed pipes and steam engines The latter was the practice of Mr. Mechi—a practice not likely to be followed out in this province, and which may, consequently be put aside altogether.

I have taken very great pains to compare the five analyses of liquid manure, executed by Professor Voelcker for the Royal Agricultural Society of England, with each other; they are published in the Journal of the society for 1858, and the average composition is as follows: 7000 grains, evaporated to dryness on the water-bath, furnished 60.112 grains of solid residue, dried at 212° F. This quantity on burning gave 36.196 grains of mineral matter or ash.

Analysing the ash, it was found to contain in a hundred parts:

| | |
|---|---|
| Soluble silica | 2.76 |
| Oxide of iron | .19 |
| Lime | 6.96 |
| Magnesia | 4.24 |
| Potash | 31.02 |
| Chloride of potassium | 21.55 |
| " " sodium | 12.72 |
| Phosphoric acid | 2.63 |
| Sulphuric acid | 10.39 |
| Carbonic acid and loss | 7.54 |
| | 100.00 |

Of these, the quantity of potash is considerable, the quantity of phosphoric acid very small.

The following numbers express the per cent composition of the solid matters after drying at 212° F.:

| | |
|---|---|
| * Organic matters | 18.40 |
| Inorganic do | 81.60 |
| | 100.00 |
| * Containing nitrogen | 1.33 |
| Equal to ammonia | 1.61462 |

And then consider through what an enormous bulk of water this trifling amount of ammonia, potash, and phosphoric acid is diffused! But I referred above to the late Mr. Mechi's practice at Tiptree Hall. The liquid manure drawn from the tank at that place contains a notable quantity of phosphoric acid, but far less alkaline salts than the average, and Dr Voelcker expressly states that many drinking waters in daily use contain more solid matter in solution than Mr. Mechi's tank-water. Please recollect that the real value of all manuring matters is mainly dependent upon the amount of nitrogen, phosphoric acid, and potash which they contain; the magnesia, chloride of sodium, &c., are usually superabundant, at all events they will be present in all fairly cultivated soils in sufficient quantity to supply all the demands of the plants.

In the Government report by Mr. Austin, C. E., on the "Means of Deodorising and Utilising the Sewage of Towns," published in 1857, the author gives a short account of a visit to Mr. Mechi's farm, and, amongst other particulars relating to the working expenses for distributing liquid manure at Tiptree, states on p. 57:—

The quantity delivered daily in ten working hours would be 130 tons of water; but Mr. Mechi estimates the cost of delivery at from 1½ d. to 2 d. per ton, the specific gravity of liquid manure being so much greater than water. There will be delivered over the whole farm, on the average, from 45,000, *to* 50,000 *gallons* of liquid manure per acre per annum.

Taking our previous calculation into consideration, and assuming that the composition of the liquid manure does not vary materially at different periods, 50,000 gallons of liquid manure, thick and thin together, would yield 50,000 × 5,476 grains, or 273,000 grains of ammonia: in round numbers 39 lbs. of ammonia.

Now, the best Peruvian guano yields about 10 0/0 of ammonia, and is worth £13 a ton; 4 cwt. would be wanted to supply the 39 lbs of ammonia above-mentioned, or, in value, 52 s. For this outlay of money the same amount of ammonia would be obtained which is yielded by 50,000 gallons of of Mr. Mechi's tank-liquid. The potash and phosphoric acid in the guano are much more than equivalent to the potash and phosphoric acid in the tank-liquid; and taking all things into consideration, I would far rather trust to the guano than to the tank-liquid. To get the benefit of the one, you *must* use the 50,000 gallons of liquid, and only think what a dose that would have been in the recent seven wet seasons in England!

*On the character of soils upon which Liquid Manure is applied with manifold benefit, and of the reasons of success:*

Experience has shown that liquid manure produces the most beneficial and striking effects when applied to light, deep, sandy soils, resting upon a porous subsoil. However poor originally such a soil may be, after repeated applications of liquid manure it is rendered capable of yielding remunerative and even large crops; as in the before-mentioned case of Flanders.

Provided the subsoil be well drained or naturally porous, it may be safely asserted that *any* sandy soil, however sterile in its natural state, may be made to yield heavy crops through the instrumentality of liquid manure. Indeed, the poorer the soil the more striking would be the result.

For poor sandy soils, the system of liquid manuring cannot be too highly recommended, particularly in a climate like ours of the province of Quebec; always provided that a brook or stream of some kind flows past the farm buildings, into which the general drainage of the yards, stables, &c., run naturally, as more especially set forth in my article on irrigation, v. Journal, Dec. 1883.

In order to render more intelligible the explanation of the highly beneficial effects which liquid manure produces under

these circumstances, I shall introduce here the composition of two sandy soils analysed by Dr Voelcker.

| | No. 1 | No. 2 |
|---|---|---|
| Organic matter and water of combination. | 5·36 | 4·82 |
| Oxide of iron and alumina ..... | 5·78 | 12.16 |
| Carbonate of lime..... ..... ... . | 25 | 15 |
| Potash, soda, magnesia. . . . ..... ... | 49 | 46 |
| Phosphoric acid.... ..... ..... ..... | none. | faint trace |
| Sulphuric acid..... ..... .. ..... | trace. | trace. |
| Chlorine ..... ..... ... | trace. | trace |
| Insoluble silicious matter (chiefly fine quartz sand with but little clay). . ... | 88.12 | 82.41 |
| | 100.00 | 100.00 |

Both soils abound in quartz sand and are deficient in clay and lime. Number 1 contains positively no phosphoric acid, and less clay than number 2.

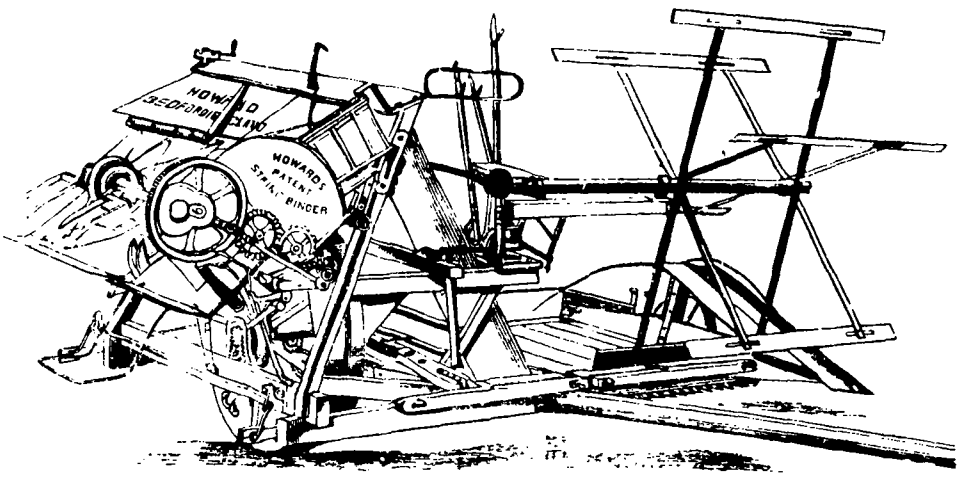
On land of this description, grain, roots, or grass cannot be grown without frequent dressings of manure, for in these soils all the more important mineral constituents which are required for sustaining a healthy and luxuriant vegetation are either absent, or are very deficient. Thus, No. 1. contains no appreciable quantity of phosphoric acid, and No. 2. mere traces of it. Again, it will be noticed that lime, which in smaller or larger quantities is contained in every kind of agricultural produce, occurs very sparingly in these soils, and that the percentage of potash and soda, in both, is far from what it ought to be to meet the wants of growing plants. Sulphuric acid is wanting. In short, both are poor soils that want frequent doses of manure to retain them in anything like a productive state.

Hence, we deduce the general rule: a liquid which is very poor in these fertilising constituents, when applied to land which contains already potash, lime, phosphoric acid, and other mineral substances required by plants, though possibly deficient in quantities, may not make any perceptible impression, simply because it does not materially increase the original store of the available substances in the soil; whilst the same liquid, when put upon land that contains no phosphoric acid whatever, and a much smaller proportion of lime, potash, &c, than is contained in the liquid manure, will produce a striking effect, inasmuch as the fertilizing constituents in the manure materially increase the store of plant-food in the soil.

Now, it is clear, from observation, that these sandy soils are, generally speaking, liable to *burn*, if highly concentrated manures are applied to them. Hence, we gather that liquid manure should be amply diluted with water. It is, under ordinary circumstances, the soil that furnishes to plants a considerable proportion of the mineral matters which are left behind on reducing them to ashes. As a rule, the manure, in addition to nitrogenised substances and other organic constituents, is required to supply those mineral matters which, like phosphoric acid and potash, are usually but sparingly distributed through the soil; for, as Dr Voelcker very sensibly says: the more common fertilising materials, such as lime, magnesia, sulphuric acid, silica, and even potash, are found in such abundance, that we need not care to replace them in the measure in which they are carried off the land in the different crops of a rotation.

There are a few soils where we can grow paying crops of roots, grain or clover, without restoring in the shape of manure the more valuable minerals, such as phosphoric acid; but where it is yet necessary to replace the nitrogenised foods of plants, which, it appears, is diminished in a high degree by the growth of white-straw crops. Upon land rich in available mineral matters, purely nitrogenous or ammoniacal manure may be used with far more safety than upon soils deficient in available mineral food The injurious effects of an excess of ready-formed ammonia or of nitrogenous matters ready to furnish ammonia on decomposition, show themselves nowhere more plainly than upon poor sandy soils. Daily experience in England warned me to use such stuffs very sparingly, though frequently, on such land. Hence, as I said before, on these soils, the liquid manure, always containing a considerable proportion of nitrogenous organic matters, as well as ready-formed ammonia, should be diluted with at least three or four times its bulk of water. There are many sandy soils, as we saw above, in which lime, &c., occur in very small quantities; and if such land be manured with a too concentrated description of liquid manure, the danger is that there will not be a sufficient quantity of available mineral food in the soil and the manure to counterbalance the injurious effects which an overdose of highly nitrogenous food is well known to produce.

Again, liquid manure is particularly well adapted for porous soils, because it penetrates them, when properly diluted, deeply and uniformly: a great advantage, since the porous nature of sand allows the roots of plants to penetrate



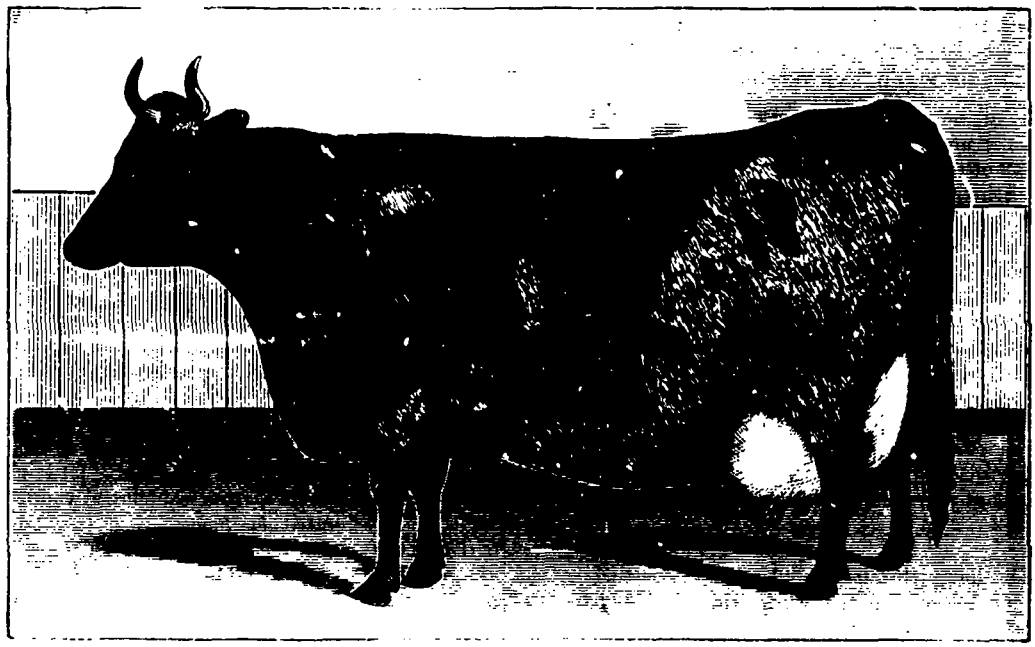

MESSRS. HOWARD'S SHEAF-BINDING REAPER.

the soil to a great depth, and in every direction, in search of food. Plants won't wait for their food; they want it at once, when they are ready for it, and they want it to be easy of access: both these wants are satisfied by the application of diluted liquid manure to light land.

*On soils not benefited by liquid manure, and on the causes of failure.* No two things can be more different from each other than soils containing a fair proportion of clay and a sandy soil. They differ both chemically and physically. The more retentive soils contain not only the more common mineral elements found in plant-ashes, such as lime, soluble silica, &c., in sufficient abundance, but also the more valuable mineral substances, such as phosphoric acid and potash

They moreover possess in a high degree the power of absorbing ammonia from the atmosphere, and retaining it; and in addition to this ammonia, under good cultivation, the vegetable remains left in such soils in the shape of roots and leaves

| | Surface soil | Subsoil |
|---|---|---|
| * Organic matter and water of combination. | 4 38 | 2 59 |
| Alumina | 2.15 | 5 39 |
| Oxides of iron | 3 15 | 7.16 |
| Lime | .77 | 26 |
| Magnesia | .13 | 1 22 |
| Potash | .49 | 38 |
| Soda | 13 | .28 |
| Phosphoric acid | .12 | .19 |
| Chlorine | trace | trace |
| Carbonic acid | 31 | 1 79 |
| Insoluble silicates and sand. | 88 31 | 80.24 |
| | 100 00 | 100 00 |
| * Containing nitrogen | .182 | .09 |
| Equal to ammonia | .220 | .11 |



AYRSHIRE COW, TIBBY.

from former crops, yield plenty of organic food for plants. Here, there is abundance of nourrishment ready to be made use of if the proper stirring of the soil is not neglected, as was fully proved by the late Rev. J Smith of Lois Weedon, Eng., who showed beyond a doubt that certain clay soils only require constant working in order to yield remunerative crops in succession for a number of years. This would be an utter impossibility if they did not contain a practically inexhaustible store of the mineral elements of nutrition, and if they did not, under his system of cultivation, provide also an ample supply of organic food. (1)

And now compare with the analysis, given above, of a sandy soil, the following analysis of a moderately retentive one; in 100 parts:—

(1) Mr. Smith's system, founded on the practice of old Jethro Tull, was as follows: three rows of wheat were sown at one foot apart; a space of three feet was left bare, which was ploughed and hoed, as were the foot intervals, as long as the crop was not damaged by the cultivation. The crop yielded for several years (I forget how many) an average of 38 bushels an acre. A. R. J. F.

A mechanical analysis gave:

| | Surface soil. | Subsoil. |
|---|---|---|
| Sand | 76.16 | 55.15 |
| Clay | 18 09 | 41.79 |
| Lime, magnesia &c. | 1 37 | .47 |
| Organic matter.. | 4 38 | 2.59 |
| | 100.00 | 100 00 |

The soil was clearly a friable loam on a clayey subsoil.

You will observe how richly the surface soil abounds in all the mineral elements required by our cultivated plants in conjunction with an appreciable quantity of organic matter containing nitrogen. Calculate the total amount of available fertilising substances for a depth of such soil of only 10 inches, and we shall find a quantity of mineral and organic fertilizing matters in comparison with which the amount of manuring constituents supplied in 50,000 gallons of tank-liquid, even more concentrated than the liquid manure of Mr. Mechi, appears altogether insignificant, and this is pro-

bably the chief reason why little benefit results from the application of liquid manure to clay soils and fertile friable loams

ARTHUR R JENNER FUST.

*(To be continued.)*

*Mr. Jocelyn on manures.*—Years ago, the farmers of the greater part of Scotland were in the habit of preserving their manure over the year, to use with their sweede crop. The practice vanished as soon as the employment of bone dust came into fashion. Mr. Jocelyn proposes to keep the land unmanured for three years, and to preserve all the dung made in that time in pits or tanks. How about the food of the country? The land is poor enough already, what would it be if no manure was applied for three years? Besides, the mechanical action of the dung in meliorating the texture of the soil and darkening its colour must not be lost sight of. I confess I can see no possibility of carrying out Mr Jocelyn's plan.

A R. J. F.

IN-FIELD AND OUT-FIELD

"The part of the Township properly arable, and kept as such continually under the plough, was called *in field*. Here the use of quantities of manure supplied in some degre the exhaustion of the soil, and the feuars raised tolerable oats and bear (coarse barley)."

"There was, besides, *out-field* land, from which it was thought possible to extract a crop now and then after which it was abandoned to the 'skicy influences,' until the exhausted powers of vegetation were restored."

This extract from Scott's description of the farming of the tenants of Melrose Abbey, in the reign of Elizabeth, may be transferred to the present state of farming in the province of Quebec. It is exactly the same The *in-field* is the part just round the *town*, as the Scotch call the farm-house and buildings, the *out-field* is the *pacage* left to its own devices for three or more years, and then sown with oats.

A. R. J. F.

Not much doing this last month, except getting in the roots. A fine season for the work, though chilly for the fingers. Ice on the 19th and 26th, and snow on the 18th, which lay some time on the higher land A raw unpleasant month of days alternately hot and cold, with many showers.

Nearly finished ploughing—the land bears a very different face to what it did in the spring—eight inches by eleven on the fallow, and six by nine for the grain-crop; easy work for a pair of lightish horses.

I begin bush-draining to-morrow; about 34 inches deep—shallow enough, I know, but on this soil the only use of the drains is to save water-furrowing and its subsequent inconveniences of open furrows in haying and harvest. Hollows will collect and hold water, and water-furrows are always necessary through them unless there are drains The ditches have all (a precious lot of them too, for I have to drain two other farms) been cleared out and deepened about a foot, and very well they were done; whereas, if I had waited for my neighbours to do their share, they would have scraped the bottoms, and scamped the work as usual.

The first 9 or 10 inches will be done with the plough, and three draws of a spade will finish the job. The bushes will be cut from the alders, plenty of which grows here: they will vary in diameter from an inch to an eighth of an inch. They will be laid with the butts up the drain, well trodden down, and covered with rough hay and *herbe Saint-Jean*.

Great triumph of the tobacco weather-test to-day! All the men said this morning that we had got a fine day at last; the tobacco said, No! and it was right, for it has just begun to rain.

My neighbour's cows are all still sleeping out of doors! Poor things. Mr. Lavallée's reason for not housing them is unanswerable: I have quite enough to do to clean the stable out in winter without doing it this time of year! Well, I get three times as much milk from mine that he does from his, so I shall keep on in my own way. (Nov. 14th)

I have one perfect model of a Canadian cow: dark bronze, with ring of tan-colour round the muzzle, and black tongue and switch! Starved when I bought her, but getting into better condition.

ARTHUR R. JENNER FUST.

## Raising Early Lambs for the Butcher.

JOSEPH HARRIS.

So far as my experience goes there is no more trouble in raising an early lamb than a late one. In fact, our earliest lambs are almost invariably our best lambs. I would rather have lambs come in January and February than in April and May, and if I could have them earlier, I should prefer it.

Merino ewes will take the ram earlier in the autumn than the English breeds of mutton sheep. For this reason, if for no other, in raising early lambs for the butcher, I should select common Merino ewes, or at any rate ewes having more or less Merino blood in them. There are other reasons why I should select such ewes. There are more of them in the country, and they can be obtained cheap They are healthy, hardy, thoroughly acclimated, and will stand rougher treatment than the English mutton sheep. They are smaller, eat less, and occupy less room in winter quarters. They will bear crowding better than the large English sheep—or rather, they suffer less, for it is a mistake to keep any sheep in too close quarters. Common Merino ewes, like Jersey cows, when well-fed, give rich milk, and if you want early, fat lambs for the butcher, the mothers, no matter what breed you may select, must have plenty of nutritious food

I do not say that common Merino ewes are, in themselves, the best for raising early lambs They are not. I have had grade ewes, the offspring of a mixed Merino ewe, and a Cotswold ram, that would produce larger lambs, give more milk, and the lambs would fatten more rapidly, and mature earlier But it is not always easy to find such ewes for sale. Those that you find in market are apt to be culls. The butcher, if he has a chance, gets the best lambs. A good plan is to go to some large market and buy a car load of sheep, or three or four times as many as you want Bring them home, and pick out the best ewes and then sell the other ewes and wethers to the butchers Select out more ewes than you expect to want Some of them may have been already served by a mongrel ram, and some of them will not take the ram as early as you wish. By painting or "ruddling" the ram on the brisket, you can tell each day what ewes are served, and all that are not served up to a certain date, can be disposed of. This will get rid of all that were served before you bought the flock. You can generally sell those which you reject for more than you have paid for them.

I need hardly say that as soon as you bring home the sheep, you should give them the best of pasture, and if they have some extra food, such as cotton-seed cake, linseed cake, oats, corn or mill-feed, you will get stronger, earlier and better lambs.

Every sheep in the flock, those already on the farm, and those which you buy, should have their feet pared and thoroughly washed with strong carbolic acid. The crude, black

acid is the cheapest. I put it on with a common paint brush, being careful not to let much of the acid drop on the body of the sheep. But see that every part of the foot, outside and between the hoofs, is completely wet with the liquid. In a few days go over the flock again. It is little work, and is a safeguard against foot-rot

Dipping the sheep to kill ticks is also very important, but the scent of the dip is supposed to interfere with the ram, and it is better on this account, when early lambs are desired, to postpone the dipping until all the ewes are served (1) Merinos are not as liable to ticks as the long-wooled sheep and their grades, but all sheep should be dipped twice in the autumn, say at intervals of three or four weeks apart.

As to the selection of a ram for early lambs for the butcher, opinions differ. There is a notion that the black faced sheep afford better mutton than the white-faced. There is a certain degree of truth in this, though the color of the head has nothing to do with the quality of the meat. Southdown mutton is not so fat as Cotswold, Lincoln and Leicester mutton—and the Southdowns have dark faces, and the Cotswold, Lincoln and Leicester have white faces. Hence the popular notion.

Cotswold mutton is too fat. Merino mutton is too lean, and there is not enough of it. There is too much tough skin, and bone, and tallow, in proportion to the nice, juicy, tender, lean meat. As a blacksmith once said, a carcass of Cotswold, and a carcass of Merino "should be welded together."

A carcass of a nice, moderately well-fed Southdown, affords better mutton than a large carcass of a fat Cotswold. And it has been supposed, therefore, that to get the choicest of lambs for the butcher we should use a Southdown ram This may be true, but it does not necessarily follow. We never get young lambs too fat. The truth of this matter is, that it will probably make very little difference what particular breed of mutton sheep we select the ram from. The real point is to get a good, well-bred ram of any of the mutton breeds.

The use of ram lambs is not desirable, except to a very limited extent, say a dozen or twenty ewes in a season.(2) A vigorous yearling ram or one two, three, or four years old, can be allowed to run with sixty ewes. If the ram and ewes have some extra food, say a quart of oats each per day, you will be likely to get earlier, stronger and better lambs. (3)

## Digging Early Potatoes.

When potatoes are dug during hot weather, some care is needed in storing or pitting them. Farmers who wish to sow winter wheat after potatoes, are obliged to dig them early in September. The work is frequently done in a hurry, and the potatoes are drawn to the cellar, or placed in a pit in the garden or elsewhere. The potatoes are full of juice, are warmed by the sun, and the skin is broken and bruised -- conditions, all of them, highly favorable for fermentation and decay. We have rarely met a farmer, who has not at one time or other lost potatoes in this way. "And it served me right," he would say, "because I knew better, but I was in a hurry to get in the wheat, and forgot to take the necessary precautions to prevent their heating." Spread the potatoes out on a barn floor, or if you pit them, put plenty of dry sand with them, and only a few bushels together in a heap. J. H.

(1) I don't like meddling with ewes after they are served They very often *return* and have to be served again. A R J F.

(2) A strong Hampshire ram-lamb with serve 40 ewes without detriment. Twenty would be quite enough for a backward one. A. R. J F.

(3) The ram should be put into a small pen by himself every day, and receive a pint of pease and ½ lb. of best oil-cake each day at noon, particularly if the werther be hot A R J F

## Do not Stack Corn Fodder.

In nine cases out of ten, stacked corn fodder will heat and spoil Sometimes corn fodder sown broadcast is so poor, yellow, and dried up, that there is not enough sap in it to ferment, and such fodder may be stored on a scaffold or even in a small stack, or mowed away in the barn. But good corn fodder that has been sown in rows, and the land cultivated between the rows, cannot be saved in this way. It must be either put into a silo, or tied into bundles and placed in shocks in the field.

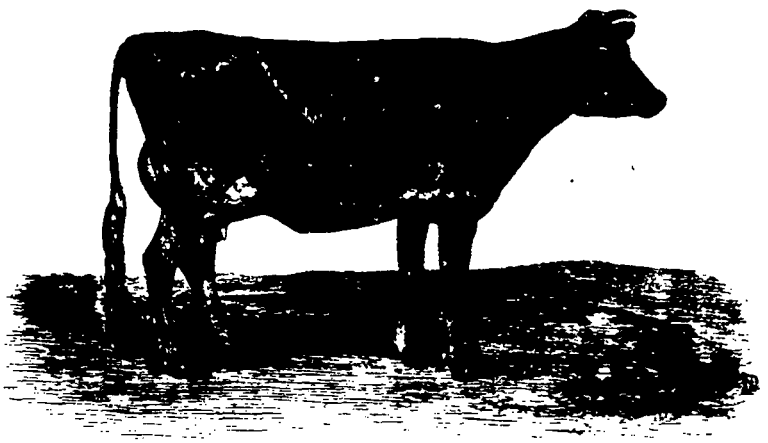
A good self-raking reaper will cut the heaviest crop of corn fodder, and throw it into bundles After they are well wilted, bind up with straw bands or corn stalks, or binding twine, and place the bundles in shocks at convenient distances, and let them remain until October or November Then make nine of these shocks into one large shock, and tie it with two bands on top. J. H.

## Danish Skimmed-Cheese.

Mr. Ryder, the United States Consul at Copenhagen, has issued a report on this subject, from which we take the following particulars: — "To all dairy proprietors it is a well-known fact that, while butter is an article at times eagerly sought after and easily disposed of, skimmed-milk cheese, on the other hand, is hard to sell. Many methods have been tried in its manufacture in the attempts to bring this description of cheese more into repute, but, unfortunately, so far without much success. The following mode of procedure would, however, appear to have met with much approval in many quarters: — As soon as the milk is separated from the cream by the centrifuge, it is taken, fresh and sweet, for cheesing, which in a great degree contributes towards the attainment of favourable results. There has then to be added a sufficient quantity of rennet, so that the milk can be curdled in the course of thirty minutes at a temperature of 28° to 30° C.(1)(22° to 24° R.). It is also of importance that the temperature should be carefully watched, and that just the right quantity of rennet is added, so that the cheesing shall be completed in the thirty minutes, for if the commencement is faulty, so surely will the result be of an unfavourable nature. So soon as the milk is well curdled, it is then cut up with the cheese knife, in a circular form, and with the aid of two cheese forks the pulp is broken up until it is subdivided into small irregular pieces, which will be effected in four or five minutes. The pulp is then left quiescent for about fifteen minutes, during which period as much whey as possible is run off The cheese mass is then rapidly stirred about for another five minutes at a temperature of 28° C. (22° R.). During the heating in the cauldron this should be kept over the fire, but in such manner that the temperature is never allowed to rise or fall more than 2° C. at the utmost, namely, from 30° to 28° C. (21° to 22½° R.). With this mode of treatment the cheese pulp has the appearance of clean snow down, and it may be removed after lying over for another five minutes. When more rennet is added, or the pulp allowed to lie over for a longer period, the cheese will become harder and more coarse. The cheese pulp is then placed upon the table in large moulds, and is carefully distributed into these. These moulds are subsequently replaced by others of proper size, which have a breadth of 60 and depth of 10 centimetres. The cheese is then pressed slowly and at the commencement, very lightly with a screw, but later on greater pressure may be made by placing heavier weights upon it. During the course of this work, the dairy-maid should on no account absent herself from the cheese-press, for the cheese being in a soft state, its position may

(1) 80° to 84° F

require to be frequently changed. After the lapse of 10 or 15 minutes the cheese is taken up and turned, and the cloth drawn more tightly together, and it is then put into the press to be treated in the ordinary manner. The cheeses must be turned frequently and the whey entirely squeezed out, which is a point of much importance. Thus, for example, if the cheese be first taken out of the press at noonday, by five o'clock in the afternoon it should have been turned five times, and each time encircled with a fresh cloth, namely, at twelve o'clock, one, two, half-past three and at five. In the evening at nine o'clock, and again next morning at six, the cheese must be wrapped in fresh cloths, and at nine to ten o'clock it may be placed in the press without a cloth; but in a short time with a mould covering, so that its exterior may be perfectly smooth and even. The cheeses are afterwards laid down without any covering into a salt pickle, where they should be left for at least three, and at most six days. The brine should be very strong, and should be kept of uniform strength, so that the pickle need not be drawn off, but may be carried over to another salting tub, and there again brought up to the required strength. If the brine is not of sufficient strength the cheese becomes sticky, and does not acquire a good rind.



KHEDIVE'S PRIMROSE, (JERSEY COW).

and the effect of the brine upon the cheese pulp is not sufficiently strong. The pickle should have the effect of binding the pulp together, so that the poorer substance which it contains becomes harmless, and a firm rind for the protection of the cheese is formed. All cheeses become slightly swelled in the stage of pickling, but when after a lapse of a few days they have become soft and mellow, they will receive a good shape, and will have neither cracks nor blisters when salted daily for about fourteen days in a damp place, where the temperature can be raised to 15° C (12° R.).(1)The cheese should therefore be laid upon dry shelves in a humid chamber with a temperature of 17° to 18°C.(13½°to 14½° R.),(2) and there daily dried, turned, and salted For the ensuing four weeks they should be dried, turned, and salted every second or third day, and in the last four weeks this should be done once a week, when the cheeses will be ripe and in a fit condition for keeping, so that they may be sent to the warmest climates If the cheeses have not been disposed of by the time they are three months old they should be kept on dry shelves, and in a room that is not too humid Here they should be dried and turned every eighth day; but should never be allowed to lie edgeways, as this tends to damage the interior of the cheese. Great care should be taken that the cheese is turned daily during the time it remains in the brine, otherwise it is liable to bulge out on the one side more than on the other. They must never be allowed to lie one on the top of the other in the pickle, but should be entirely covered by it. Cloths should not be used on the cheese; they only do damage. The size of the pickling tubs must be regulated by the number of cheeses which are made daily. A tub with lid, calculated for eight cheeses, will cost about $9, and such sized tub will be required when the dairy make is two cheeses. On an average, from 100 lbs of milk, 3½ lbs of fine butter and 7 lbs of cheese will be obtained. The following striking experiments which have been made are at the same time worthy of mention. When the cheeses were taken out of the pickle after the lapse of two to three weeks, they were put for about 14 days into a room without being salted. The room was kept heated by steam to 22°C.(18°R.)(1) so that the cheeses were made to sweat freely, thereby causing a deposit of a large quantity of impure matter, which was wiped off at intervals. The cheeses treated in this way, as compared with those made in the ordinary manner, showed so great a difference in respect to the state of the inner pulp as would scarcely be imagined. The cheese pulp was soft and pliant, and seemed to be richer than the other cheeses. As soon as this experience had been obtained, a room for the reception of 300 cheeses was arranged with powerful steam, and another of similar dimensions with less powerful steam, so that the same cheeses might gradually receive a lower temperature and less moisture. It is maintained that, in spite of all methods which may be used, nothing but poor-class cheese will ever be obtained from skim milk. This, however need not be so. It is quite certain that if, by some proper mode of treatment, such change can be successfully introduced that from the hydrogenous substances in the cheese fat can be formed, then it will be possible from the poor cheese, which is rich in these substances, to obtain a better quality, and this is undoubtedly within the range of possibility. It is unquestionable that strong brine operates against such fat formation, and it is maintained after these experiments that if the strong brine could be avoided and the cheese be exposed to a treatment of heat and moisture, there may be good grounds for thinking that this change may be brought about."

(1) 59° F
(2) 62° 5 F. to 64° 5 F

### A Travelling Dairy.

The Scottish Dairy Association inaugurated their course of instructions in butter making at the farm, Aitkenbrae, near

(1) 71°.5 F

Ayr, the other day. The dairy is a travelling one, and it is to stay a week in a place. The machinery and all appliances were lent by the Dairy Supply Co., of Museum Street, London, and consisted of churns and butter-workers of the latest and most improved patterns, milk testing appliances and a Laval separator driven by a small portable engine The separator is the cause of much astonishment in Scotland, where it is the almost invariable custom to churn the whole milk Mr. W. W. Chilton, who conducted the tour of the Irish Educational Dairy in 1881, superintends the present tour, and lectures daily on the art of butter making. Much credit is due to the thoroughly practical spirit of the Scottish Dairy Association's venture, and also to the Dairy Supply Co. for its enterprise in equipping the Association with the necessary appliances.—*Mark Lane Express.*

## Live Stock Notes.

A visit to the International Exhibition at Amsterdam last week afforded an opportunity of seeing the stock of the country on their native pastures. The country carries a very large quantity of stock, the pastures being very full, independently of the sheep, which also appear to be quite thick on the ground. The Dutch cattle and their so-called varieties are referred to fully in our report of the show, which appears on another page, as also the letter from J. Rosel, of The Hague, on the same subject, and from the latter source—apparently a duplicate of a letter sent to the *National Live Stock Journal*—we extract the following:—"The term of Friesian cattle is just now giving a great deal of trouble both in this country and in America. What is understood by Friesian cattle? Is it the black and white piebald breed? But all Friesian cattle are not black and white, other varieties are also found in Friesland. Even German cattle-dealers are wont to buy in Friesland all kinds of colours, though they give preference to red and white, but as for some years the importation into Germany has been stopped, the farmers in Friesland could no longer dispose of their red cattle, so they soon applied themselves, under the guidance of one Kuperus, to change their live-stock as rapidly as they could into black and white piebald, to suit the American market. This, however, was only a matter of policy, and has nothing to do with the purity of blood, there being among the red and other varieties quite as good milch kine as among the black and white, and even better. On the map you will see that Friesland is only a small part of the Netherlands, it is,in fact,only one province, and the good black and white cattle are by no means confined to this province; nor could Friesland alone supply all the countries, as America, France, Germany, Belgium, Russia, in all which places however, Dutch white and black cattle are found, though of course not exclusively from Friesland. In Holland even the Friesian cattle are not considered superior; the reverse is rather the case, the Friesian animals being considered rather bony and poor of flesh. Wherever the black and white piebald cattle come from originally nobody can tell, they are merely classed in the Netherlands Herd-book as black and white,born in such or such a province, either North Holland or such other province as they are born in . . . . Surely the Dutch dairy-men, or butter, cheese and milk producers, are no such fools as not to see that if by taking the black and white stock they would secure a higher production of everything, and that if the white and black cattle were the only good cattle in existence, they would only have to stick to such cattle, and then nothing but this breed could be registered, as being the most profitable kind. . . . . There are thousands and thousands of good cattle in Netherland besides the white and black. Only look on the following figures. In the year 1882 there were in Netherland 1,427, 936 head of cattle; of these Friesland had 199,330, including all kinds and colours; of these 199,330, the Dutch Friesian association in America heard from an officer of the Friesian Herd-book in Netherland, that by the 1st of May, 1884, there would be in the Friesian Herd-book 2,500 registered cows and bulls, heifers and calves, not reported; so that 2,500 cows and bulls, and say 4,000 to 5,000 heifers and calves make only about 7,000 head of cattle of the 199,330 cattle in Friesland in 1882. This is only to show that not all the Friesian cattle are pure black-and-white, but, as all over Netherland, of all kinds of colour"

PHILLIS, (JERSEY COW).

Mr. J. Rosel shows his point very well, and from what we saw in Holland there is nothing whatever in the differences of colour; let them be marked how they may they are all of the same stamp, and that stamp is a good one

In the detailed report of the show given in another report of this issue mention was accidentally omitted of a very creditable representation of the red-polled breed of cattle of Norfolk and Suffolk, the results of which will be found in the prize list.

There were several pens of Cotswold sheep exhibited by Mr Russell Swanwick, Cirencester, which had a tuft of wool on the right shoulder left in its natural length,to show what the fleece of a sheep trimmed for exhibition should really be. This was a good idea, and might be followed to advantage.

The horses are driven in Holland without collars, as a rule,

a leather strap round the chest (1) taking the place of a collar in all but the heaviest draught work. This necessitates the shafts of the vehicles being very low, and the plan is rather extensively followed in the United States It would seem that a horse cannot utilise the weight of his body in drawing from a strap which only crosses the point of the shoulder. It is all very well for light work or for trotting races.

## Weather, Health and Plant-Growth.

Meteorology, the science of the weather, of rains, frosts and dews, of storms and hurricanes, of heat and cold, of deluge and drought, is such a very complicated subject that very few agriculturists have seriously set themselves to study it, notwithstanding the obvious and essential connection that exists between meteorology and agriculture. There is no study which requires a more patient and dogged persistence in the accumulation of facts and observations, and few studies are slower in yielding fruits to those who pursue them. Delicate instruments and the most careful powers of observation alone constitute a demand which few individuals are either able or willing to comply with. Then, the results of meteorological inquiry are, as a rule, general, and apply to rather wide areas, whereas the individual farmer would much prefer local prognostications, and herein is introduced a difficulty to which we have not as yet discovered the clue A good deal of weather-lore has a legendary existence amongst farmers, ploughmen, and shepherds as plenty of local rhymes and couplets will testify, but, unfortunately, people are prone to magnify and give undue prominence to a solitary fulfilment, once in a way, of an old-fashioned weather prophecy while they take no notice of the hundreds of cases in which the saying is found to be at variance with the current phenomena of nature. We make bold to say that nine-tenths of the people in this country still believe that the moon influences the weather, and that a "change" in the moon will bring a change in the weather.(2) Particularly in rainy seasons do we hear the hope expressed that with the change in the moon which is imminent the weather will "clear up." No theory has been more completely exploded than that which attributed an interdependence between the lunar phases and the terrestrial storms. The fact is the moon "changes" once in every seven days, and any change in the weather cannot fail to happen either within two or three days before or within two or three days after the lunar change, so that phenomena which are nothing more than mere coincidences came in the old times to be regarded as having the relation of cause and effect, the more distant, less known, and more mysterious moon being naturally regarded by superstitious minds as the cause. The progress of the vigorous young science of meteorology has dispelled this lunar hallucination, and many another one beside. Some items of agricultural interest may be gleaned from the meteorological conference which recently took place at the Health Exhibition. Dr G W Tripp read a paper on some relations of meteorological phenomena to health and though his observations bore solely on human health, they are practically equally applicable to the health of our farm stock. He says a great deal too much attention is paid to the barometer if we regard it as indicating only, as it really does, variations in the weight of the column of air pressing upon the body, because, except at considerable elevations, where the barometer is always much lower than at sea-level, these variations produce but little effect on health In this country alterations in the barometric pressure are chiefly valuable as indicating an approaching change in the wind, as well as in the amount of moisture in the air; hence the instrument is often called the weather-glass. A sudden diminution in the atmospheric pressure, marked by a sudden fall in the barometer is likely to be attended with an escape of ground air from the soil, and therefore to cause injury to health, especially amongst the occupants of basement rooms, unless the whole interior of the building be covered with concrete.

The effects of a high temperature as marked by a high reading of the thermometer vary very much according to the amount of moisture in the air, as when the air is nearly saturated in hot climates, or even in summer in our own more or less languor is felt, with great indisposition to bodily labour, and no doubt our working horses feel it as well as ourselves. With a dry air these effects are not so noticeable, the reason being that in the former case but little evaporation occurs from the skin, and the normal amount of moisture is not given off from the lungs, so that the body is not cooled down to such an extent as by dry air. Sunstroke is probably the result, not only of the direct action of the sun's rays, but partly of diminished cooling of the blood by want of evaporation from the lungs and skin. Rapid changes of temperature in this country are often very injurious to the young and old, causing diarrhœa and derangements of the liver when great heat occurs, and inflammatory diseases of the lungs, colds, &c., when the air becomes suddenly colder, even in summer.

The effect of rainfall on the health of men and animals is chiefly due to alteration of level of ground water. This is a subject almost entirely overlooked, and special attention is directed to the fact that when ground water has a level persistently less than five feet from the surface of the soil, the locality is usually unhealthy, and should not, if possible, be selected as a residence. In other words, avoid a locality in which the surface of the water in a well is usually within five feet to the surface of the ground. Fluctuations in the level of ground water, especially if great and sudden, generally cause ill health amongst the residents. Dr Brehanon, in his reports of the Privy Council, has shown that consumption—using the word in its most extended sense—is more prevalent on damp than on dry soils, and it has been shown that an effective drainage of the land and consequent carrying away of the ground water, has been followed by a diminution of diseases of this class.

The quantity of moisture in the air exercises a marked effect. Moist air is a better conductor of heat than dry air, which accounts for much of the discomfort felt in winter when a thaw takes place as compared with the feeling of elasticity when the air is dry. In cold weather, therefore, moist air cools down the skin and lungs more rapidly than dry air, and colds consequently result London fogs are injurious, not only on account of the various vapours given off in the burning of coal, but in consequence of the air being in winter generally saturated with moisture at a low temperature.

Variation in the temperature and pressure of the atmosphere exert a considerable influence on the circulation of air contained in the soil, called ground air. The quantity of air in soil varies according to the material of which the latter consists; a gravelly or sandy soil will contain per cubic foot more air than a loam or clay Estimates vary from 3 to 30 per cent, but the latter is probably too high. Consequently, if a cesspool leak into the ground, the offensive effluvia, if in large quantities, will escape into the soil, and are given off it to the surface of the ground, or are drawn into a house by the fire; but, if small, they are rendered harmless by oxidation. Injurious gases and suspended or dissolved organic matters have been known to pass for 130 feet along a disused drain, and above 30 feet through loose soil.

(1) Common enough in England and there called a "cart-collar."
A R. J F

(2) A universal belief at Sorel.
A R. J F

We take our example from Dr. Tripp's illustrations of the known relations between weather and disease. A high summer temperature is related to excessive mortality from diarrhœa, but the immediate cause of this disease as an epidemic is not known. Summer diarrhœa prevails to a greater extent in certain localities notably in Leicester, and though the cause has been carefully sought, it has not been detected. Recent researches, however, point to a kind of *bacillus* as the immediate cause, as it has been found in the air of water closets, in the traps under the pans, and in the discharges of infants and young children. Statistics show that great care should be taken in hot weather to prevent diarrhœa, especially in young children, by frequent washing with soap and water to ensure cleanliness, and proper action of the skin; by great attention to the food, especially of bottle-fed infants; by free ventilation of living rooms, and especially of bedrooms; and by protection as far as possible from the hot sun and from excessive exertion. All animal and vegetable refuse should be removed from the vicinity of dwelling houses, and should be burnt instead of being consigned to the dust-bin, and the drains should be frequently disinfected and well flushed out, especially when the mean daily temperature of the air is above 60 deg.

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### Profitable Experience in Poultry Raising.

To show how poultry raising may be made as profitable perhaps as labor in the workshop, here are the details of what the wife of a small farmer in my neighbourhood is doing:

She wintered 37 hens and two roosters, and during this time the flock laid nearly eggs enough to pay for the cost of their food. Early in March she began setting the hens as fast as broody.

By the middle of May she had 141 chickens, and had only lost two. She is going to keep on setting hens until July, when she will probably have at least 300 chickens. In June the earliest will be two-and a-half to three months old, plump and fat and suitable for broilers. For them she will obtain a high price. As the Summer advances, prices will gradually fall, but even through Autumn, chickens pay a fair profit, and during the whole time she will be selling eggs, perhaps enough to pay for the feed of the flock.

Now, as to the fixtures to carry on this business: There is a cheap, well-ventilated poultry house, and old flour barrels with one head taken out are chiefly used for nests and for coops. The chickens are weaned when six weeks old, and placed in the barn at night, where they sit safe and warm on the thrashing floor till morning. (1) They are given feed, a drink of skimmed milk, and left to wander around the ground at will. The barn door is left open to the south, so they can go in for feed and drink as often as they desire, and also for shelter if it rains; but as the hens have been let out of their coops since the chickens were a week old, they grow up quite hardy and don't mind a little rain (2).

The soil here is admirably suited for raising chickens, it being a light gravel, which dries immediately after a rain, and is consequently never muddy.

When setting the hen, a piece of dry turf is cut 12 to 16 inches square, hollowed out a little on the under side, so as to make a corresponding hollow on the upper, to safely hold the eggs. The turf is now laid on the bottom of the coop or barrel, grass side up, and the eggs placed upon it. A little sulphur is sprinkled around the neck of the hen, beginning close to the head, also on her rump and under the wings. This kills lice if she happens to have any. The turf has the advantage of keeping warm while the hen is off to feed, drink, and wallow in the dirt, and it also prevents the egg-shells from getting so hard and dry as to make it difficult for the chickens to pick themselves out. After hatching, the turf is removed and a peck or more of sand or loam is put in to keep it sweet and clean. This is renewed weekly.

I have seen the almost incredible statement recently, that over 60,000,000 eggs were imported the past year, valued at $700,000. If the women of our country could supply these, the above large sum would be a very acceptable item to divide among them, to obtain many little comforts of which perhaps they are now deprived.

(1) And a nice mess they must make on the floor!

(2) Turkeys should never go out until the dew is off.

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### BREEDS OF BRITISH SHEEP... V.

#### Leicesters.

As we go south into England we find no distinct breed of rich-land sheep until we come to the Lincolns and the Leicesters. There was formerly a variety of large, coarse sheep that originated in the fertile valley of the Tees, and was called the Teeswater breed, but these are no longer found pure. This valley has honor enough in having given the Short-Horn cattle to the world. Lincolns come before Leicesters, geographically, but the latter will be considered first because they have been so largely used in improving the former, as well as many other breeds.

Warwickshire is at the centre of England, and Leicestershire adjoins it. The greater portion of the county is in the basin of the Trent, and its chief tributary, the Soar. The surface is undulating, the climate is mild, and for so wet a country as England, the rainfall is very moderate. The soil is a rich clay loam, the valley of the Soar furnishing remarkably rich pasturage. The percentage of land in pasture is very large. The lighter soils upon the old red sandstone formation are productive for grain and root crops. A larger proportion of the land is farmed by the owners than in most other counties. Stilton, the richest of English cheeses, is extensively made in the northern part of the county, especially about Melton Mowbray.

The native sheep of this district were large, coarse, inferior animals. They fattened slowly, and were late in coming to maturity. As almost every one knows, they were improved to very great excellence, something over a century ago, by Robert Bakewell, who lived at Dishley in this county. The strain he produced was for some time called the Bakewell, and occasionally the Dishley. He had a genius for his work, and fixing in his mind his standard of excellence, he made his selections of breeding animals with the greatest skill for attaining it. He took blood from any breed that could furnish the qualities he desired. This could be successfully done only in the hands of a master. The result of his labor was the production of the most perfect mutton-sheep the world had seen. It was a long time before he received any financial encouragement, but at length the victory was won, and he realized enormous prices at his ram lettings. The

practice of letting rams instead of selling them to farmers, which has since become so common throughout the country, was originated by him. In a compact sheep district it has many advantages, but it is not so well suited to the condition of things existing in America, and has never become general here. After Bakewell's death, the work of improvement was continued by the Dishley Club, an organization which he established, and which was governed by very stringent rules. The breed thus produced is remarkable for its perfection of form, its early maturity, its aptitude to fatten, and its small loss in dressing. They look "thoroughbred" all over. The head is without horns, bare of wool on the poll, finely shaped, and well and horizontally set on the tapering neck. The neck and back form a remarkably straight line, and the underlines are very straight and parallel with the back. The shoulders are perfect and the breast is very prominent, causing the animal to show particularly well forward. Indeed, its fore end is too good to be equalled all the way through. The ribs have a splendid spring from the spine, and the carcass is ribbed well home. The legs are short and well placed. Fat wethers dress from 120 to 150 pounds. They shear seven or eight pounds of long, soft, lustrous wool, not quite so valuable for combing as some of the coarser kinds.

Perfect as the Leicesters are in so many respects, their greatest value is found in crossing them with other breeds. There are many serious objections to keeping a pure-bred flock. Very high breeding is nearly always attended with disadvantages. With Leicesters it has resulted in a want of constitutional vigor, and an inability to withstand exposure to the weather. The ewes are not prolific and the lambs are tender. From these reasons we do not find many pure flocks even in their own district. There is, too, an objection to the breed in their disposition to put on too much solid fat, both inside and outside, instead of placing it in the fibre of the lean meat. A well-fed draft ewe is nearly all fat. Such meat in England finds its market among the colliers, who make a pound of it go a long way when stewed with vegetables.

But for a cross the Leicesters are everywhere in favor. With the Cheviots it has produced an exceedingly valuable sheep, found in great numbers upon the best lands in Northumberland, Berwickshire and Roxburghshire, and called the Border Leicesters. They are very highly esteemed, and it is claimed that they will do more on a given quantity of food in a short time than any other breed. Turnips are extensively grown there, and the lambs being mainly kept upon them after weaning are ready for the butcher at one or two years of age. Leicester crosses of some kind are commonly met with in nearly every part of the country, and it is said they touch no breed that they do not improve (1)

Leicesters were early brought to this country and have placed their mark upon much of our so-called native stock. When well sheltered and cared for, their crosses are every where valuable. Pure bred animals are not suited to our climate and general treatment.

It is a matter of interest that Bakewell also made great improvement in horses for agricultural uses, importing breeding animals from Flanders for the purpose.

JAMES WOOD.

*Mt. Kisco, N. Y.*

(1) About the best early lamb is a cross from a Down ewe and a Leicester ram.

A R J F