

veterinarian, but he must go the other fourth to become a veterinarian at all."

As the medical sciences have not been limited in their beneficial results to the healing of the sick only, but have, by means of the knowledge of the human economy which they inculcate, thrown light upon all questions involving the physical well-being of man, so we are apt to expect that from the cultivation of veterinary medicine we will obtain guidance in many important matters which concern the physical state of domestic animals. Every question relating to their management, whether involving the condition of an individual or that of a race, is a question of the mode of action of physiological laws, and can only be satisfactorily answered by those who have made the physiology of animals their professional study.

The strength of this position will be readily admitted with regard to individual animals, and it may, I think, be shown that a necessity exists for a body of educated veterinarians, to take in charge matters that affect races and species of our domestic animals, rather than single cases.

Our domestic animals are, to a great extent, artificial productions, their most valuable qualities having been communicated to them by a kind of cultivation; thus breeds of horses have been produced far surpassing in size, strength, and fleetness, any animal of the species that exists in the wild state; the ox species has acquired in different races great capabilities of producing flesh for the butcher, or milk for the dairy; the sheep is clothed with a fleece more valuable for human use than that worn by his wild progenitor; and all valuable animals exhibit marked alterations from the original type of the race, which have been produced by human care and management. The extent of this change varies much with different breeds, and its importance is testified to by the high prices commanded by those animals in which it is most strongly marked.

Few improvements contribute as much to the wealth of a nation as these. The expense of feeding and of caring for an animal of good breed is but little more than that required for a very inferior one, and the profit derived from it, whether in the shape of labor, of flesh, of wool, or of milk, is often very different in the two cases. A farmer may raise a horse that will command one thousand dollars in the market, or one worth less than a twentieth of that sum, and spend nearly the same on either animal. In view of the strong motives which exist for raising the finest animals only it may seem a matter of surprise that there are so many bad ones, and that, especially among horses, where good quality is of such great importance, the general standard should not be higher. There is, however, a want of certainty and of permanency about these improvements, which arises from their artificial character. there is a constant tendency in the race to return to the condition of Nature, and, where measures are taken to prevent the loss of some one of its characteristics, it sometimes happens that those very means hasten the destruction of some other, or diminish very much the vitality of the race.

The maintaining of good breeds becomes thus a struggle between Nature and art, and the art is one that requires peculiar skill and

knowledge to manage with the best results; and while the intelligence and care of a number of enterprising persons, who have been stimulated by large profits, and possessed of considerable means, have done much for the improvement of breeds of animals, the success thus far attained has been attended by a host of failures and disappointments, and, in some cases, where the greatest care and expense has been bestowed, it is maintained, by good authorities, that a positive degeneracy has taken place.

The difficulties in the way of making a breed of animals just what we want it to be, and of maintaining it in that condition, are of a complicated character, and demand for their correct solution the attention of those who can regard them from a scientific point of view, and whose daily studies and experience relate to the animals which they concern.

### ADMINISTERING MEDICINES TO DOMESTIC ANIMALS.

TRANSLATED AND CONDENSED FROM AN ARTICLE BY DR. WAGENFELD, OF DANZIG, PRUSSIA.

Animals being unwilling to take medicine of their own accord, it must be administered by force, except when mixed with agreeable substances, for instance, with oats for the horse, and with meat or sugar for the dog.

THE HORSE may receive medicine in different forms; first, as a *powder*. This is to be mixed with short fodder, especially oats, with a portion of bran, which should be moderately moist, because he would otherwise blow away some of the powder with his nose. Though this mode is convenient, it can only be employed to a limited extent, as the horse will not eat his fodder if it be mixed with medicine of a considerable odor, or if his appetite be much impaired. Secondly, as a *drink*. For instance, several salts and acids, also insoluble powders, as red bale. But here, likewise, a difficulty becomes apparent. The horse, from an absence of thirst in certain diseases, drinks little or nothing, so that the medicine is not taken in the quantity desired. Thirdly, as an *infusion* or *potion*. This form deserves to be more fully considered, as many horses have been lost in consequence of potions being administered. If, for instance, a horse is suffering from colic, a potion is usually given, sometimes several of them, and even veterinary surgeons resort, especially in this case, to infusions through the mouth. Though it is known that the infusion is not wholly without danger, because part of the liquid might easily get in the windpipe, yet the injury that may result is not sufficiently considered, even by many surgeons.

The application of infusions, especially in colics, has been recommended, because a rapid remedy is desired, which is most likely to be attained by mixing the medicine with a certain quantity of liquids, and bringing it thus immediately in connection with a large surface of the stomach and the bowels. Though these advantages are not to

be denied, yet the incidental injuries are of so serious a nature that it becomes the duty of a surgeon to consider the propriety of giving infusions, when an electuary could be conveniently substituted. This is a medicinal jelly, to be spread on the tongue of the horse, for swallowing. The stomach always contains a certain quantity of humidity, serving to thin the electuaries, so that they will very soon show their effects, though perhaps not quite so rapidly as an infusion. When I commenced my practice in veterinary medicine, some thirty years ago, I had often to treat horses suffering from colic. I always administered infusions, adapted to the circumstances of the case, giving them myself, and using the utmost precaution. A cure usually resulting, I saw no reason to abandon this mode of treatment. Yet, in the course of time, I lost three patients of this sort. They were cured of colic, it is true, but the day following, or somewhat later, an inflammation of the lungs ensued, causing the death of the horse. At that time I did not see clearly enough the connection existing between colics and inflammation of the lungs; still, I refrained from that moment from applying similar infusions, and have not made use of them for the last twenty-five years.

In many books, otherwise reliable, it is stated that colics of the horse are frequently followed by inflammation of the lungs—an observation perfectly correct; but the cause and effect of this symptom, which, on infusions being avoided, is of rare occurrence, have neither been explained nor even anticipated.

It has been said that well-informed veterinary surgeons know very well the danger often connected with giving infusions, but none of them had ever, by direct experiments, disseminated a clear understanding on this subject until Mr. Günther, Director of the Veterinary School at Hanover, did so. Yet it is to be regretted that his investigations have not come to the knowledge of every owner of horses. As long as horses were cured, infusions were principally applied, and this has been the practice for a long time, perhaps as far back as history reaches.

Buttermilk given to horses for medicinal purposes has proved fatal, and hence originated the belief that it was poisonous to them—a belief which prevailed in many parts of the country, if not among surgeons, yet to a great extent among the people. Mr. Günther's experiments, however, demonstrated in what really consisted its poisonous quality.

Seven and a half pounds of buttermilk were administered to a healthy horse, as an infusion, through its mouth. The animal, immediately after, became restless, breathed heavily, opened violently and wide his nostrils, and exhibited, in the course of the day, symptoms of a severe inflammation of the lungs. The attacks, gradually increasing in violence, killed the horse in forty hours. On examination, the lungs were found to be inflamed, but the stomach and bowels, together with all other parts of the body, were in a healthy condition. To another, six and a half pounds were given, through a leather pipe, into his stomach. The animal continued, in every respect, healthy, and after being purposely killed, at the expiration of fifty-four hours, no disease was discovered in any part.

From both these experiments it is evident: first, that buttermilk is

not poisonous for horses, if it goes into their stomachs; secondly, buttermilk may produce a fatal inflammation of the lungs, if the horse, on its being administered through his mouth, swallows it in a way that part of it enters the windpipe and the lungs themselves.

The stomach only is destined for the reception of solid and liquid substances, the lungs being capable of enduring, without injury, none but the delicate food of the atmosphere.

Mr. Günther made an opening into the windpipe of the horse, thus bringing eight ounces of buttermilk through the windpipe into the lungs. Immediately after, the horse became restless, dropping its head, and tripping with its feet; it breathed rapidly, did not lie down during the night following, refrained from eating, and exhibited all the symptoms which were observed after the first infusion through the mouth; consequently, a portion of buttermilk had entered the lungs. After a lapse of thirty-eight hours the animal was killed, when the lungs were found to be inflamed, though all the other organs were in a healthy condition—corresponding with the first experiment.

Not only buttermilk, however, may create an inflammation of the lungs, on being administered as an infusion through the mouth, but every other liquid, even tepid water, may have the same fatal result.

Again, a horse received eight ounces of oil of turpentine through an opening into the windpipe. Immediately after, it began trembling and staggering, opened rapidly and wide its nostrils, breathed fast, &c. On its body being opened, the lungs were found to be swollen and inflamed, as in former experiments.

Another horse received two pounds of brandy as an infusion through his mouth. Soon he began coughing, breathing rapidly, &c. This case was observed for twenty-two days. He recovered to some extent, and ate tolerably, but coughed much, had a quick pulse, looked always melancholy, and grew lean. On opening the body, the lungs were found to be inflamed, all the other parts being healthy. A portion of the brandy had evidently gone the wrong way, that liquor not being injurious to a horse when in the stomach itself.

An ounce of oil of turpentine, and a like quantity of linseed oil, were administered to another horse, through an opening of the windpipe. He forthwith began staggering in his walk, trembled, threw himself on the floor, and sprang up again immediately; but after six or eight hours became more quiet, took a little food, coughed, and, in the course of the six days following, exhibited only a quick pulse, coughed often, and did not lie down, seeming otherwise not to be very sick. Six days and a half after the infusion was given, the horse was killed. Part of the lungs was found to be inflamed and obdurate. This case proves that even a small quantity of an extraneous liquid, penetrating into the lungs, is capable of producing a dangerous condition. How easy is it for such a small quantity to get into the windpipe, when given as an infusion! Even when the horse does not fall immediately, the consequences may still be pernicious.

The application of two ounces of brandy through an opening of the windpipe was accompanied by the same bad effects as in the former experiment.

Another horse received three-fourths of a pound of well water into the windpipe. Much of the liquid was ejected by coughing, but he continued to cough, and grew lean, though eating heartily. When he was killed, some sixteen days after, parts of the lungs were found to be obdurate, and therefore inflamed. Such is the delicacy of the lungs, that they are not even capable of enduring water without injury.

Examining why infusions, chiefly as to the horse, may become so dangerous, Mr. Günther arrives at the following conclusions: The horse, in consequence of his head being forcibly raised, is frightened, and in this involuntary position must feel but little disposed to swallow; he is averse to receiving a liquid which he usually finds disagreeable; in consequence of the coughing caused by the operation of giving the infusion, the flap of his throat is opened, through which some matter might easily get into the windpipe thus exposed; the danger is further increased, if the entire space of the mouth be at once filled with the infusion; and the pulling out of the tongue, which is a common practice, renders deglutition more difficult, of course increasing the probability of a portion taking the wrong course. Should he be suffering at the time from inflammation of the lungs or throat, the infusion will be so much more dangerous.

In consequence of the results of these and other experiments, the practice of giving infusions has been banished from the Veterinary School at Hanover, and most of the veterinary surgeons throughout the kingdom, ranking among the best in their profession, have also discontinued it.

It may be replied, by some, and even surgeons among them, that they often administered potions without having experienced any injuries—an assertion perhaps correct to some extent; but injuries have doubtless been done, even without the operators being aware of them. There are frequent cases in which an infusion will not immediately result in a serious disease, and after the horse has been relieved of his original sufferings, the owner is satisfied. Yet, if coughing should continue, perhaps for months, if the animal should have a bad breath, and if he should grow lean, some persons may attribute such symptoms of lung disease to other causes than the true one—the infusions formerly given. It is, nevertheless, true, and many horses having so called “rotten lungs,” owe them to infusions, even if they had been given long ago. If I may be allowed to draw inferences from my own experience, I must contend that infusions are, in most cases, fatal, and always dangerous.

That infusions given through the nose are far more dangerous than those through the mouth, is self-evident. It often happens that the horse thus treated will suffocate on the spot, and generally will die, sooner or later, of disease of the lungs. Yet, though this practice may not always be followed by fatal consequences, it will in the majority of cases, as my own experience would prove.

In fatal cases through either of these modes of administering infusions, I always found the pituitary membrane of the flap of the throat, of the windpipe, and even that of the lungs, to a great extent to be bluish-red, but more frequently very dark-yellow, almost blackish.

Aside from the evil consequences resulting from infusions, there are unavoidable inconveniences. Several persons are required to perform the operation, a portion of the medicine is apt to be lost or wasted, so that the quantity contemplated does not get into the stomach; the bottle is liable to be broken by the teeth, so that there is danger of the horse swallowing some of the glass; and the clothes of the persons engaged are more or less soiled. That infusions in diseases of the organs of respiration are a great deal more dangerous, has already been mentioned; but they must be absolutely censured in cases of tetanus, swollen tongue, inflammation of the brain, &c.

Fourthly, in the form of *electuaries*: These are prepared by converting the medicinal substances, for the most part powder, into a paste, by means of some agglutinant and cold water. Formerly, it was almost a general custom to employ honey, sirup, elderberry-jam, or some other sweet substance; but at present flour is preferred, inasmuch as these sweet substances cause the electuaries to be rather expensive, and also impart a tendency, in warm weather, to ferment and become acid. In some cases, for instance, inflammation of the throat, or lock-jaw, honey may still be used, as the animal will be more inclined to swallow the electuaries when seasoned by this addition.

Almost every medicinal substance, liquid as well as powder, may be made into jellies, or electuaries. Thus, if it be desired to prepare oil of turpentine, it is first mixed with the powder, receiving afterward some flour and water, so that it becomes a jelly simply by being stirred. Rye-flour is best for this purpose; but wheat-flour, or even groats, may be used. In the latter case, the jelly is less convenient to administer. The amount of flour is not a matter of importance, as adaptability alone should be considered, the quantity being proportioned to the amount of the medicine itself. If there are many salts, for instance, Glauber's, more flour will be required than if the medicine were to consist of powders made of seeds, roots, or worts. Some electuaries, after standing, become too thin, on account of the salts being dissolved, in which case they should be mixed with the requisite quantity of flour. Again, if powders are employed, the electuaries gradually become too stiff and crumbling, when water should be added. By flour or water, according to circumstances, the electuaries may always be given the form desired. A proper consistency would be such that the jelly will not flow off the spatula, below described, nor fall when the instrument may be reversed. Any person may prepare the jellies, after having procured the requisite medical substances.

The jelly may be applied with the hand upon the horse's tongue, which should be pulled to some extent out of his mouth. A preferable mode, however, is by means of a wooden spatula, the blade of which should be from two to two and a half inches long by one and a half wide.

In administering the jellies, one person places himself at the left side of the horse, and seizes the halter with the noseband, so as to hold its head steady; or this object may be accomplished by one hand taking hold of the back of the nose, while the lower jaw is kept by the other. A second person, standing on the right side, draws out with his left hand the tongue of the horse, and with the spatula applies the

jelly to the back part of it, when the tongue is immediately set free. The horse commences a chewing movement, endeavoring, in this manner, to get rid of the disagreeable medicine; in which, however, he does not succeed, as he cannot spit. In consequence of the chewing, &c., a great deal of saliva is produced in the mouth, thus thinning the jelly; and shortly after he is seen to swallow. Should both his mouth and tongue remain still, the broad end of the spatula is brought across the fore-part of the mouth and turned like a twirling stick, by which he is forced to chew and swallow. It is not necessary to hold up the head of the horse after the performance, for if the jelly is well prepared it will adhere to the tongue.

By the application of jellies, almost every other form of medicine may be dispensed with, and all danger avoided. But little practice will be necessary to perform the operation well. For a series of years, I have been in the habit of using this mode almost exclusively, finding that my patients do better than with infusions.

Fifthly, as *pills*. With the exception of jelly, this is the best form of medicine. The horse receiving the pill, which is not chewed, wholly and without loss into his stomach, the doses to be applied can always be given accurately, which is of great importance, especially where a powerful effect is desired. Even the most disagreeable medicine must be swallowed, when administered in the shape of pills. They are usually made of several substances, which, by means of an agglutinant, such as flour, black soap, &c., can be readily formed, without adhering to the hands or changing their shape. This should be oval, of about three-fourths of an inch in diameter, from one to one and a half inches long. If too small, they are liable to get between the molar teeth; if too large, they are apt to remain in the throat.

To administer the pills properly, will require some practice. As the horse usually tries to resist, his position in the stall is reversed. Then his tongue is pulled out by the left hand toward the right side, and the pill, placed at the end of a pill-stick moderately pointed, and of the size of a finger, is introduced into the mouth, and deposited upon the back part of the tongue, after which the tongue is immediately let loose. Should the horse not at once swallow the pill, he should be given some water to drink, or a light slap on his mouth, in consequence of which he will be scared, and thus swallow it. Precaution should be used, not to injure with the stick the palate or other portions of the back of the mouth.

It is better to give these pills merely with the hand. The tongue is pulled out, as above, the pill is taken between the tips of the fingers of the right hand, and, by moving it along the palate, brought upon the back part of the tongue, which is immediately let loose, care being taken to prevent injury to the operator from the molar teeth of the animal. The hand, therefore, should be kept in the middle of the cavity of the mouth.

The "pill-stick," a wooden instrument, similar to a syringe, is well adapted for giving the pills. Within a cylinder, there is a stick about the size of a finger, and of the same length as the tube, having a handle at the end. At the other end, the instrument, being thicker than at the longer portion, is provided with a hollow, as a convenient

receptacle for the pill. The tongue is now pulled out, the instrument containing the pill introduced into the mouth, and the rod, which has previously been drawn backward, is pushed in, so that the pill is forced into the mouth. This method is easily operated; and neither the horse nor the hand can be injured. To facilitate the entrance of the pill, it may be moistened with oil, soap, or even with water.

In some diseases, pills do not seem to be applicable, for instance, in colic, as they require too long a time to dissolve in the stomach. What duration may be necessary to reduce them to a liquid state, I do not know; neither am I aware that any experiments have been made on the subject.

In case the pills become old, and therefore hard, they should not be given, for it is to be feared that they may not sufficiently dissolve, but pass off undigested.

Beside these, there are several other modes of administering medicines; thus, liquids may be given by opening an artery, or by inserting an elastic tube through the mouth and throat immediately into the stomach. None of these latter methods should be attempted, however, by the unprofessional operator.

CATTLE.—With this species of animals there is no difficulty, nor is there scarcely any danger in giving medicines; which, as in the case of the horse, may be administered in different forms:

As powder, they may be given when mixed with crushed tubers, among malt dust, groats, oats, &c.; or, as a mixture, with the drink. Here, too, as was remarked of the horse, this method is rarely employed, for substances of an intense odor or taste are usually refused. Some liquids are taken, for instance, vinegar and other acids, if mixed with their drinking water. Pills and electuaries are rarely given to cattle, and, indeed, they may be generally dispensed with. On the other hand, infusions deserve the preference with cattle, being quite the reverse as to horses. The liquid is given with a common beer or wine bottle. For this purpose, the mouth of the animal is raised and opened a little by means of the fingers, after which the neck of the bottle is brought in, either from the right or the left side. So simple is the operation that it requires no further description; yet it would seem to demand precaution, as a mistake committed in applying it might result in a disease of the lungs. If possible, the medicine should be given when the animal is standing, and not when lying down, though, in the latter case, hardly anything can be feared, if the necessary caution is employed. The head should be held horizontally; if it should incline sidewise toward the breast, the swallowing is not only made more difficult, but part of the liquid may be liable to get into the windpipe, causing coughing and perhaps still worse accidents. Furthermore, the mouth of the animal should not be held up too high; it is sufficient that the mouth be kept a little higher than the cavity of the throat, so as to give but a small descent for the infusion. If too high, a portion of the liquid may get into the windpipe. It is advisable to give a third or half the contents of the bottle, and then to wait until after it is fully swallowed before more should be offered. In inflammation of the throat and lungs, or especially in diseases of

the lungs, particular attention must be paid to the giving of medicines, which ought always to be administered in small portions.

**SHEEP.**—It is still easier to administer medicines to this species of animals than to cattle; beside, a single sheep rarely becomes the object of medical treatment. To give medicines repeatedly to whole flocks is hardly practicable. Fortunately, the sheep seldom abhors even such remedies as have a bad odor or taste; it takes them voluntarily. The usual form is by licking. A pulverized medicine, (sometimes with the addition of pine oil,) mixed with an adequate quantity of groats, oats, or kitchen salt, is laid before the sheep, by spreading the mixture equally in long troughs. It may occur in this mode that some of the sheep will lick a greater portion than they should, while others consume little or none. This is, indeed, an evil, perhaps unavoidable; yet there is no great reason to fear that a sheep will thus be permanently injured, as the opportunity only occurs at long intervals. If it be desirable to give medicine to a single sheep, it is best administered in the form of an infusion, or even as electuaries. Some remedies may also be given in drinking water.

**SWINE.**—Medicines, in many cases, may be given to swine in drinking water, or among the fodder. An emetic, for instance, may be administered within a potato made hollow, or in a dumpling. In doing this it is presumed that the hog has not yet lost its appetite; in all other cases force must be employed. But none of our domestic animals show so great an opposition to compulsion as the hog. Its violent screaming on being taken hold of, and during the performance of the operation, increases the liability of a portion of the medicine to get into the windpipe, thus causing all the incident evils.

The medicine should be made into an electuary by means of flour, adding honey so as to make it agreeable to the hog. This jelly should always be thinner than that destined for the horse, its consistency being about that of sirup. A small spatula should be used, by which to spread it on the tongue and palate. In many cases it is hardly avoidable to give liquids, when great difficulty is experienced, but it must be overcome as well as possible. To secure the hog, requires the assistance of several resolute persons. The animal is shoved with his hind-part into a corner, where it must be kept tight, and if possible placed on the hind-part. A cudgel is then brought, in an oblique direction, into its mouth, which is opened in consequence of its screaming. By the insertion of this cudgel, (or a short, thick piece of rope,) the mouth of the animal is kept open. Another person then pours the liquid with a spoon (perhaps best of tin) into the mouth, after which the cudgel is immediately removed, so as to facilitate the process of swallowing. This operation is repeated until the quantity of medicine required has been given. In using the spoon, the interval during which the hog does not scream must always be taken advantage of. In many cases the liquid may be given in a less violent way. By continually scratching and rubbing the back of the hog in a gentle manner, it will usually become quiet and lie down. During this soothing process, a corner of the lip is drawn backward from the cheek, and the liquid poured in through a thin neck of a bottle, or by a spoon. Pills and stiff jellies are not suitable for hogs.

**THE DOG.**—This animal is endowed with such a fine sense of tasting and smelling that he does not willingly take a medicinal substance; yet an emetic may now and then be given by putting it into cakes or meat. Emetics may also, in a dry state, be placed on its tongue. Pills are fastened at the top of a round piece of wood, or of a quill, and thus inserted deeply into the mouth. Liquids are poured into the opened mouth, or are still more easily given by raising the nose of the dog, taking hold of one of the corners of the mouth, and drawing it up and sidewise, so that a kind of pouch is formed for pouring in the liquid, which will thus enter through the openings between the teeth. This does not require any particular precaution, as the dog will not be liable to swallow the liquid the wrong way.

## ACCLIMATION AND DOMESTICATION OF ANIMALS.

BY DR. B. F. CRAIG, OF WASHINGTON, D. C.

There is a matter of very wide interest which, like those spoken of in a preceding article, requires, for its successful prosecution, to be put in the charge of educated veterinarians; and, as a preliminary to the consideration of it, I would ask leave to quote from a lecture delivered by Daubenton, the celebrated collaborator of Buffon.

“The object of veterinary science is to set forth the proper methods of perpetuating among domestic animals those good qualities which they have acquired by means of the culture which we have bestowed upon them, and to endeavor to increase still further their useful characteristics. It should also aim at reducing to the domesticated condition those wild animals which promise to be of service to us by means of their labor, or of their useful products.

“There are many animals of foreign countries which might be very useful to France, if they were once naturalized there.

“It is as practicable to tame the zebra as to have tamed the wild ass and the wild horse. If the tapir were naturalized in France it would furnish, not only a new kind of butcher's meat, but an additional article of commerce. There are many animals in America whose flesh is very good food, such as the peccary, the cariacou, the Guinea pig, the agouti, the akouchi. There are, in that country, armadillos, whose flesh is as white and as good as that of a sucking pig. Attempts should be made to introduce all these animals into France, and to reduce them to the condition of domestication.

“The investigations of veterinary economy need not be confined to quadrupeds, but should be extended to other classes of animals, and to