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THE UNIVERSITY OF NEBRASKA
AGRICULTURAL COLLEGE EXTENSION SERVICE

March, 1926

Extension Circular 1440

Principles of Poultry Sanitation

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Principles of Poultry Sanitation

By L. VAN ES

GENERAL CONSIDERATIONS

The successful pursuit of poultry husbandry is to a marked degree dependent on our ability to maintain a flock in such a manner that a certain type of diseases is not readily contracted by the birds and that their spread be effectually prevented. When flocks are small and widely apart protection against disease is not an urgent factor, but with the increase in poultry population the time sooner or later arrives when serious attention must be given to this detail of management.

Disease problems to a large extent come about as a corollary to increases in the number of animals maintained on a given area and the mass diseases, unless restrained by artificial means, constitute one of nature's means to make overpopulation impossible. The maintenance of large flocks thus is fundamentally a deviation of the scheme of nature which cannot be persisted in for a great length of time unless methods be designed and followed which tend to remove the disease hazard peculiar to a dense population.

The remarkable development of our poultry industry with larger and more numerous flocks has by now reached a phase in which the disease problem is cruelly asserting itself. The time when this problem can be wholly ignored lies now well behind us and in the management of flocks a solution must be found so that the considerable assortment of prevalent diseases will not cut too deeply into the profits of our poultry growers.

In the maintenance of poultry health we are particularly dependent on preventive measures, not only because the most damaging diseases are not amenable to curative treatment, but also because of the many economic advantages which they offer. In dealing with poultry diseases we are nearly always more concerned with the protection of the flock than with the relief of individual birds.

Even more than in the ills of any other type of livestock is the solution of the poultry disease problem dependent on the intelligent application of the principles of hygiene and sanitation. It will therefore not be amiss to call attention to the most basic of those principles, so that flock owners may be informed of the ways and means now recognized as essential to success in poultry production. The application of the principles set forth on the other hand must vary under different local conditions, but on the whole it is possible to solve the individual problems without deviating very far from a general plan of action.

FACTORS INFLUENCING HEALTH

The task of poultry hygiene is twofold because it aims not only to promote health but also to protect and defend it. In connection with the former, conditions are sought to be established under which the vital functions of the animal body can be performed with the least hindrance and at a maximum efficiency, while the latter is designed to either ward off actual causes of disease, to interrupt their free movements, to bring about their destruction and, if possible, to do all these things in the same general attempt.

Among the factors conducive to health and to body efficiency mention must be made of (1) Sound body, constitution, and vigor; (2) Adequate nutrition; and (3) Suitable environment.

Soundness of Body. As has already been pointed out in another publication of this station,¹ a fundamental soundness and vigor of body is in a large measure dependent on the selection of sound breeding stock.

Preference must be given to the more vigorous and robust members of the flock, provided of course, that other desirable qualities, such as egg laying propensities, etc., be not overlooked. In any flock the less vigorous individuals should be constantly removed by a careful culling in order to exclude them from propagation as well as to eliminate them as possibly unprofitable boarders.

In the establishment of a new flock or in the improvement of an old one by the introduction of new blood, preference should be given to hatching eggs or day old chicks of a parentage of known perfection, health, and vigor to adult birds because of the greater chance that the latter be carriers of parasites or other disease-producing factors.

Adequate Nutrition. It is no secret that food is an all-powerful factor not only in the maintenance of health and body vigor, but also in the equally important matter of final profits. When the farm flocks were small and only of a limited importance in the general scheme of farming, the wastes around the farmstead and feed lots were quite sufficient to maintain such flocks in a fairly good state of nutrition or productivity. The birds could obtain what their bodies required and there was no great need for special attention being paid to the feeding problem.

With the larger flocks of a later day, however, when the small, fifty-bird farm flock of the past has gradually expanded into the five hundred-bird flock of the present, the wastes on the farm may no longer be sufficient to supply the nutritive substances of which the body is in constant need. All the nutrients may be in default or only a part, but the result is eventually an undernourished, unproductive lot of birds

¹ Consult Nebraska Agricultural Experiment Station Bulletin No. 195, *The More Important Poultry Diseases*. Revised March, 1925.

and there is no lack of evidence to be encountered in dressing and feeding establishments that birds taken directly from the farm flock are not infrequently suffering from semi-starvation, either due to a short ration in general or to rations merely faulty in some one particular.

As much valuable information on the feeding of poultry is contained in some other publications,² the reader may be referred to them for details. It should, however, be pointed out that not only will proper feeding promote egg and meat production, but that it also is of the greatest importance in the maintenance of body health and vigor. It is especially important to know that a good state of nutrition is particularly essential to birds which are to form part of long distance poultry shipments.

Suitable Environment. The surroundings in which birds have to live are of material influence in the maintenance of the health of a flock.

Not only may this influence be exercised in a direct manner but the environment or at least part of it may become a depository of many parasitic or microbic causes of disease and in this manner function as a transmitting agency for quite an assortment of infections.

Poultry yards and the sites for poultry houses should be selected with a view to dryness and shelter. A sandy, gravelly soil is most desirable for this purpose, while the lay of the ground should be such as to provide a free natural drainage. If the topography is of such a nature as to render the latter difficult or impossible, recourse must be had to some artificial means of securing dryness. Excessive moisture of the environment is always objectionable from the standpoint of poultry production, while furthermore the presence of surface water, which birds are apt to drink, must be regarded as a very serious source of mischief. For this reason pools and puddles, filled wagon ruts or open drains should never be tolerated in yards used for poultry.

Shelter against prevailing strong winds is advisable; it may be secured by having houses and yards located on the leeward side of a hill or some large building or by taking advantage of the presence of trees or tall shrubbery. A southern exposure is usually to be preferred and the shelter should never be so as to exclude direct sunlight altogether.

An important detail of the environment is the poultry house where the birds find shelter while at roost and where they must spend some of the time when laying. It affords protection against the inclemencies of the weather and the extremes of temperature. Poultry houses must be designed with a view to the number of the occupants to the main-

² Read Nebraska Extension Circular No. 1401, *Care and Feeding of Baby Chicks*, and Nebraska Extension Circular No. 1420, *Better Rations — More Eggs*.

tenance of cleanliness and to the comfort of the animals they are to shelter. How this may be best accomplished is adequately described in another publication issued by this institution.³

However advantageous a well constructed and properly managed poultry house may be, the fact must be recognized that it only solves a relatively small part of what may be called the sanitary problem of the poultry farm. The value of good housing is above all apparent as a detail influencing production and body efficiency, but its sanitary construction and management are only helpful in coping with the external parasites and possibly with the respiratory diseases of the roup type.

It should always be kept in mind that in Nebraska, at least, the most devastating poultry diseases such as tuberculosis, typhoid, cholera, black-head, and coccidiosis are but rarely contracted in the houses.

The yards, that is the place where the birds find their food and water, are much more important in connection with disease transmission than the houses.

The soil of the poultry yards presents a hygienic aspect of a tremendous importance because on it are deposited the body wastes of the fowls and those constitute for the diseases mentioned the most common, if not the usual vehicle for their transmission.

The small areas of soil occupied by large numbers of fowls are apt to receive a greater supply of body wastes than the ground can dispose of and when once any of the types of infection mentioned have been introduced into a flock the disease-producing germs or parasites are not promptly destroyed and the area affected is bound to become a more or less enduring hotbed of infection.

This actually happens on the many farms where disease outbreaks cause havoc with poultry profits. The superficial soil layers of these poultry yards have practically been changed over to dung and sewage and a most rigid sanitary law is being violated, namely; the one which decrees that no animal species can exist in a more or less intimate and enduring contact with its own body wastes without incurring an extraordinary hazard of becoming involved in outbreaks of disease.

Our poultry industry and the type of diseases by which it is menaced have by now reached a stage which demands attention to this detail of the business in a most imperative manner.

DISEASE PREVENTION

The More Important Flock Diseases In another publication the more important poultry diseases of Nebraska were discussed⁴ and hence will not require special mention at this place.

³ See Nebraska Extension Circular No. 1419, *Farm Poultry Houses*, August, 1925.

⁴ Read Nebraska Experiment Station Bulletin No. 195, *The More Important Poultry Diseases*. Revised March, 1925.

It was shown in the publication mentioned that the larger portion of the more commonly disastrous diseases: tuberculosis, coccidiosis, fowl typhoid, blackhead, fowl cholera, and many of the intestinal parasites are subject to the same means of control inasmuch as they are ordinarily transmitted in a similar manner. As this type of disease is responsible for the greater part of our poultry death losses, the following consideration will be largely devoted to them.

Disease Introduction and Propagation It is not always an easy matter to determine how a given disease was introduced into a flock. The diseases mentioned are always dependent on some germ as the primary cause. Such germs are true parasites, which cannot propagate themselves in any other place but the animal body, so it can be readily understood that somewhere back of an outbreak is an infected bird which served as the incubator for the germs responsible for the disaster.

Infected Stock Such a germ incubating bird may carry the infection directly into a healthy flock or the movable part of a contaminated environment in which disease germs can remain alive for certain lengths of time may in some manner become transported. It is by no means known how such transmissions may come about, but certain it is that newly purchased birds, for instance, should always be looked upon with suspicion. In fact the function of adult birds as carriers and distributors of infection is so well known that preference must always be given to either hatching eggs or to very young chicks if new stock is to be introduced in a poultry yard. Even then one is not always safe, largely on account of bacillary white diarrhea, but this disease needs not to become a menace to a flock as it is not long in declaring itself and can be readily localized.

The offal of birds killed for the table may also and quite readily become the means of introducing infection and therefore such material should always be disposed of by destruction by fire. Birds killed or dead as a result of sickness should be dealt with in a similar manner. In the killing of sick birds only such a method of procedure should be chosen which precludes the spilling of any blood because in certain diseases the latter is apt to contain the causative germs in great numbers.

Flying Birds While such flying birds as pigeons and sparrows are not easily convicted of carrying disease from farm yard to farm yard, it is quite conceivable that on occasion this actually does take place. Many birds are susceptible to the same diseases as the domesticated ones and must always be regarded with suspicion and be dealt with accordingly.

Soil In some preceding paragraphs the part played by the soil in the propagation of disease has already been mentioned in connection

with such diseases as tuberculosis, fowl typhoid, coccidiosis, fowl cholera, black-head, and possibly others also.

Those diseases are truly soil or filth born because their causative germs are thrown out of the body with the body wastes and enter that of other birds by means of food and drinking water contaminated with the droppings. In this transmission, the soil is the most important vehicle and the greater part of the task of poultry hygiene is concerned with the dealing with the soil of poultry yards in such a manner that its disease carrying functions may be reduced to the smallest possible proportions.

When soil has once become infected it may remain so for long periods, depending on the nature of the infection introduced and the character of the soil itself. In time, however, the disease producing germs succumb in the, for them, quite unnatural surroundings, are destroyed by soil organisms which prey upon them or die on account of a lack of the food which they require.

The soil tends to rid itself of all organic material and germs which do not strictly belong to it and this process is known as biologic purification, because the living matter of the soil is also entirely responsible for this cleansing process. This process is, however, not continuous during the year; throughout the winter months it is practically at a standstill, while during the warm and moist weather of summer it is the most active.

Disinfection of the soil by means of chemicals, as a rule, is not practicable and cannot be depended on to remove any infection which may be present in it.

Feeding Habits The feeding habits of domestic poultry have much to do with the fact that the soil of poultry yards plays such a prominent part in the transmission of certain diseases. Fowls pick up a considerable part of their food directly from the ground and as a consequence no small amount of soil is swallowed with the food. Wild birds roaming freely about, such as pheasants and partridges, do the same thing, but they range further, their numbers are smaller and they rarely feed at one and the same place for any length of time. Hence the soil on which they range is relatively free from contamination because the droppings of such birds are scattered widely and do not cause a given area to become overcharged with parasite eggs or the microbes of the more common diseases.

In the case of the domesticated birds, on the other hand, we find large numbers of the animals concentrated on comparatively small areas, with the result already explained, that the soil is apt to become surcharged with fecal matter and whatever harmful elements may be contained therein.

The fact that a flock may range far and wide does not ordinarily change this situation, because it does not extensively take advantage of this privilege and usually remains in close proximity to where it roosts and where it is fed.

In the sanitary management of poultry flocks the feeding habits of the birds must be reckoned with and this the more seriously as the number of the fowls becomes greater.

Drinking Water As a means of disease transmission, the part played by the drinking water is probably even more important than any of the other factors mentioned. Water lends itself particularly to contamination and the danger associated with polluted water is further increased by the fact that in certain cases it may constitute a favorable medium in which disease producing microbes or larger parasites can become more readily disseminated.

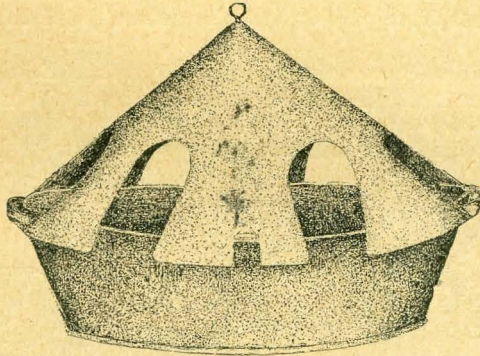


FIG. 1.—A convenient watering device. Not strictly sanitary, but if kept clean and placed well above the ground it provides a relatively safe water supply.

Even where the water is provided in otherwise suitable vessels, the way for pollution is always open, because either filth is deposited into the watering utensils by means of the soiled beaks or feet or they are often so constructed that the body wastes can be directly dropped into the water.

Watering devices may be so made or placed that pollution is rendered impossible and then the only remaining danger is offered by surface water accumulations in depressions of the ground, in open drains, or similar places where water can gather.

No matter how efficiently or how cleanly a water supply is made available, its value can never be superior to that of the worst water to which the flock may have access. Only after all possibility of polluted

water has been eliminated can one become certain that the use of sanitary drinking devices are really factors of value in disease prevention.

SANITATION

Were it possible to so surround our poultry flocks with safeguards and barriers, that the introduction of disease producing agents could be excluded, there would be but little necessity to take any other step in disease prevention. Under the prevailing conditions of flock management and especially because of the imperfect knowledge pertaining to the initial introduction of infection, this is as yet impossible and hence we are forced to adopt methods which tend to render disease transmission and spread impossible or difficult and in this effort we proceed by securing for the birds the safest possible environment and by the adaption of such methods of feeding and watering as tend to reduce the hazard of disease transmission to the smallest possible proportions. All such methods form part of which is generally included in the term "sanitation."

Poultry Yards From what has already been said in regard to the part played by soil pollution in the dissemination of disease, it is obvious that in the practice of sanitation considerable attention must be given to that source of danger and its possible elimination.

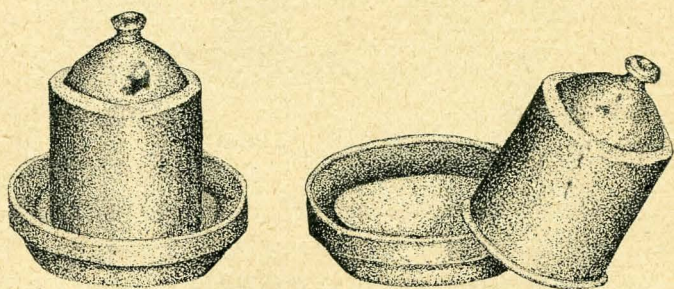


FIG. 2.—A watering device commonly used for little chicks. Not strictly sanitary, but if kept clean and above ground it will largely answer the purpose. Such a device is commonly used for the feeding of milk to brooder chicks.

Soil of which the superficial layers have a considerable admixture of poultry dung is always a menace to the bird population which occupies it, but more in particular to the younger birds. Like in the young of all other animals, the ones of the domesticated bird species are particularly liable to intestinal infections and are more apt to become infested with worms.

Older birds are more resistant to any harm which may come from the presence of such agents and as a matter of fact are frequently infected or invaded without sustaining any conspicuous damage. Older turkeys and even the common fowl are often found to harbor the germ of "blackhead"; the cause of coccidiosis is frequently observed in the older healthy birds and in other diseases the same thing may be observed, although in such diseases as tuberculosis and cholera the morbidity is greater in the older birds.

It is thus quite essential or safe to proceed on the theory that, if at all possible, young chicks and older birds should be kept on separate ground until the former are at least three or four months old. For the same reason it is wise that, at least until that age is reached, young birds should not occupy ground recently vacated by older birds and even the latter will be healthier and more thrifty upon soil which has either remained unpolluted or which has been kept unoccupied by poultry long enough to have completed the process of self purification previously mentioned.

Theoretically, at least, it seems possible to so construct and arrange yards as to render them quite safe as far as the likelihood of their acting as reservoirs of infection and parasites is concerned. Under present farm conditions, however, it is probably not yet necessary to go to such a length in order to secure the sanitary safety of the flock.

There is good reason to believe that specially enclosed poultry yards intermittently occupied by poultry and utilized for other purposes, will answer the same purpose. Or, what in principle amounts to the same thing may be attempted and that is to move the flock and its house periodically to new ground.

The choice between the two methods must be left with the individual flock master and local conditions and the factor of convenience must guide him in the selection. The fact remains, however, that with the increase in the disease hazard and the more and more populous poultry flock, the time is near when the permanently occupied farm yard can no longer be regarded as the proper and safe place on which to maintain this type of livestock.

When preference is given to a system of rotating poultry yards a flock unit of 250 adult birds should have access to two yards (Nos. 1 and 2) each one-half acre or more in area and if possible with the poultry house placed conveniently between. One yard (No. 1) can then be occupied by the flock while the other one (No. 2) is in use for garden purposes. The following year yard No. 2 receives the flock while yard No. 1 remains unoccupied and is used for some other purpose.

In order to avoid the undesirable contact of the younger birds with the adult fowls, the former can be permitted the outlying portions of the farmstead, where, housed in movable brooder houses, they can be

moved from time to time to newer range until the age is reached when they can join the older birds in their enclosure with a relative degree of safety.

When the method of movable houses is preferred the flock unit should be smaller as houses to be readily transported must be of reduced dimensions. The houses are moved from time to time and thus the birds are assured of fresh ground upon which to roam and feed. The method has the disadvantage of inconvenience in the supplying of food and water and makes an adequate general supervision of the birds more difficult.

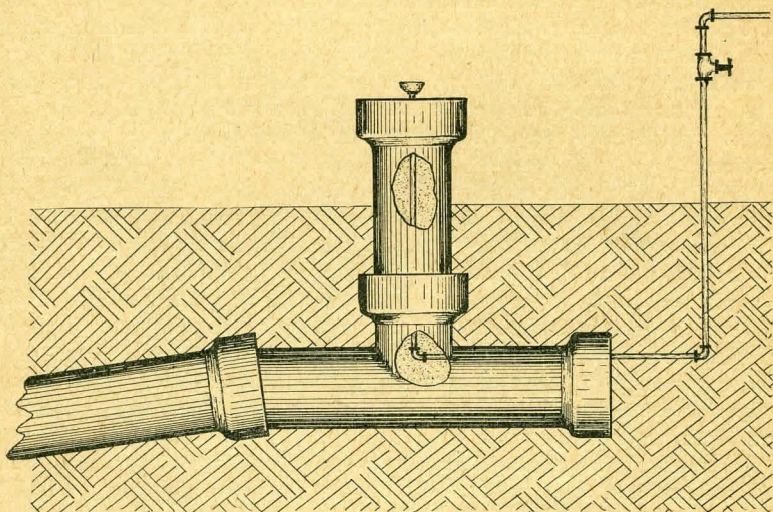


FIG. 3.—An ideal method of supplying water for poultry. The drinking cup is placed about 8 inches above the ground, is kept cleansed, and can be regarded as strictly sanitary. Its use is restricted to such yards where running water can be made available.

Supervision of the Water Supply To prevent contamination of water supply and to keep the drinking water from serving as a vehicle in disease transmission is one of the outstanding essentials in poultry sanitation and no single factor will contribute more to the protection of a flock against the inroads of disease than the elimination of polluted water and the provision of such as is safe from a sanitary point of view.

As the preceding statement suggests, two things must thus be accomplished and one of those is to render it impossible for poultry to obtain water from any source other than the one deliberately provided and safeguarded. A poultry yard is never an ideal environment from a disease prevention standpoint as long as surface water is available either

periodically or permanently. The value of well drained yards is entirely associated with this fact and in the protection of a flock against infection the best beginning always is to do away with surface accumulations including pools, open drains, filled wagon ruts, or animal footprints as well as what may collect in old pans, troughs, tin cans, discarded footwear and what-not.

A yard with a soil so pervious or with a sand or gravel top dressing so open as to preclude the gathering of water even after heavy rains comes very near being an ideal one. The writer has a vision that in a not very distant future such yards, deliberately established, will come to be recognized as an essential feature of the permanent poultry farm.

Next in importance after the removal of dangerous water accumulations is the provision of drinking water of unquestioned purity in containers so constructed as to reduce the chances of contamination with fecal matter to a minimum. The watering utensils should be so covered or otherwise arranged that the birds cannot deposit their droppings into the water.

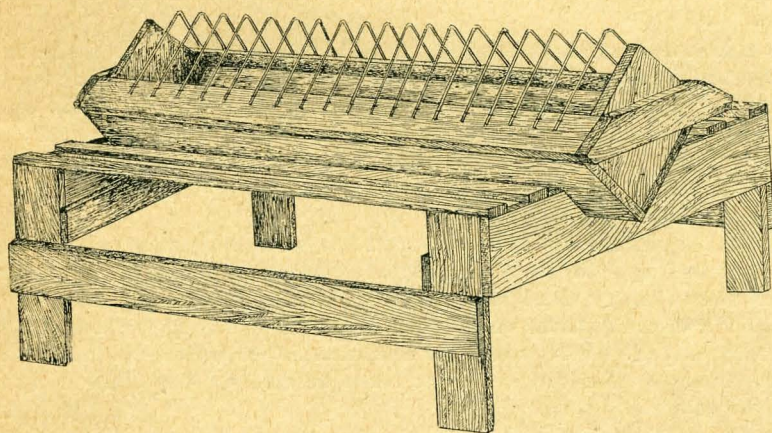


FIG. 4.—A practical device for feeding dry mash. Note that the trough is so constructed that the birds cannot readily get in a position to deposit their droppings in it and that it is placed well above the ground. The trough part and its cover are removable and can be readily cleansed. It can be easily made at slight expense.

With the type of equipment usually available an absolute protection is not readily accomplished, owing to the fact that birds with soiled beaks or which suffer from any of the roup-like diseases can always befoul the drinking water. Hence most, if not all utensils of this sort cannot

be designated as strictly sanitary even if the gross pollution common to the open trough or vessels is more or less effectually done away with in the manner indicated.

In order to reduce or eliminate the danger incidental to contamination, it is a common practice to render the water comparatively safe by the addition of certain antiseptics in amounts harmless to the birds. Permanganate of potassium is commonly chosen for this purpose. A standard solution in water to contain 5 per cent of the chemical is prepared and of this enough is added to the drinking water to impart to the latter a light purplish pink color. As long as this color persists the water is mildly antiseptic and disease producing elements in it will in a certain length of time be destroyed.

To a large extent the method is a mere makeshift and is not to be regarded as an absolute protection. It is sometimes looked upon as a cure for all possible poultry ills. Of course, it is nothing of the kind and the most that can be expected of it is that it rids the water of some of its impurities. In a large measure the daily cleansing of the water utensils is as dependable a measure of protection as the use of chemicals.

A more efficient method of supplying a safe water to poultry can be proposed in the form of a self-cleaning watering cup on the plan of the sanitary "bubblers" now in common use in public buildings, parks, etc. It can only be put into practice where running water is constantly available, but even the ordinary windmill and tank equipment of many farms could be utilized to advantage in providing this more or less ideal means of watering poultry.

Manner of Feeding Not only must the water supply be adequately safeguarded against the introduction of fecal matter, but the same precaution must be taken in regard to the feed offered to the flock.

It is commonly stated that in order that birds may have the amount of body exercise which is more or less essential to health, they must be made to scratch for their feed and hence the grain fed is often thrown on the ground.

The possible good derived from scratching for a living must, of course, be granted but the fact remains that for reasons already stated the dung-laden soil is scarcely a particularly safe dish to eat from when the subject is viewed from a hygienic standpoint.

For this reason the benefit derived from exercise may be largely cancelled by the disease hazard which is bound to accompany the feeding from the always polluted ground of the poultry yard.

It is therefore proposed that the bulk of the food be provided in containers so arranged and constructed that an admixture of soil or body wastes is rendered impossible. The feed may be offered in open

troughs, or hopper-self-feeders made in such a way that the birds cannot soil the contents with their droppings, while they should be placed far enough above the ground to preclude the possibility of any soil becoming mixed with the feed.

As a supplementary precaution, all utensils used for feeding should be thoroughly cleansed at frequent intervals.

