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INFECTIOUS DISEASES OF SWINE

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PREFACE

The present volume represents the third and considerably revised edition of the manual Infectious Diseases of Swine, first published in 1928 and reprinted in 1936.

During the 10 years since the second edition, a large amount of new scientific data has appeared, new infectious diseases of swine have become known and a wealth of practical experience has accumulated in the struggle against the infectious diseases of swine in the USSR.

In consequence of this, a number of substantial and important changes have been made in preparing this edition for publication. Additional material has been inserted in many chapters and a number of new diseases have been described: dysentery, Teschen disease [infectious encephalomyelitis of swine], and listerellosis.

Together with this the text has also been subjected to a certain amount of structural rearrangement so as better to satisfy the needs of practical veterinaries and specialists in hogbreeding.

It was necessary to a considerable extent to give up the former monograph style of exposition and drastically abridge all the historical data on the development of views on the etiology and character of this or that disease. The details of bacteriological investigations, especially on the classification of bacteria of the paratyphoid group, were similarly subjected to abridgement, together with the technique of preparing biological preparations.

These cuts permitted considerable expansion of those sections

of particular interest to the practical worker, and also made it possible to describe three new diseases.

With the participation of Docent K. P. Andreyev, questions of the general and specific epizootology of the infectious diseases of swine have been treated in detail in the present edition of this manual, and has been supplemented by indications of the necessary measures of prophylaxis and sanitation.

The bibliography has been limited to the most important works that have appeared since 1934. We refer scientific workers interested in the earlier works on the infectious diseases of swine to the first and second editions of this manual.

We express the hope that this newly issued manual will be of use and assistance to specialists and will enable them more successfully to solve the responsible problems set for them by the new Five Year Plan of reconstruction and development of the national economy of the USSR in the post-war period.

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I. QUESTIONS OF GENERAL EPIZOOTOLOGY AND THE CONTROL OF INFECTIOUS
DISEASES OF SWINE IN THE USSR.

The Law of the Five-Year Plan for the Reconstruction and Development of the National Economy adopted at the first session of the second convocation of the Supreme Soviet USSR envisages, in addition to other extremely important tasks in various branches of the national economy, the intensive development of hogbreeding. By the end of 1950 the number of swine in the USSR is to be trebled, and the share of swine production in the total output is to be sharply increased.

The successful solution of this task is a matter of honor to all workers in hogbreeding, including the veterinary specialists, who are called upon to take all necessary measures for the reduction and complete suppression of unproductive losses in animal husbandry.

Beyond doubt the fulfillment of the assignment set by the plan of the Fourth Stalinist Five Year Plan in the field of hogbreeding will demand great energy, initiative, knowledge and intensified work on the part of hogbreeders and veterinarians.

It will be necessary to overcome the many difficulties that stand in the way towards the achievement of this goal.

In connection with this the problem of the campaign against the infectious diseases of swine takes on special interest and importance. The successes registered in this field by Soviet veterinary science are considerable. The veterinary and sanitation condition of the country as regards the infectious diseases of swine has immeasurably improved.

But we cannot quietly content ourselves with past achievements, we cannot even for a moment relax our attention and our vigilance towards infectious diseases. It is necessary to work still harder, in deadly earnest, to wipe them out completely and to clear up various infections completely out of the hogbreeding picture. The elimination of losses from infectious diseases will to a great extent favor the successful accomplishment of the assignment set by the Five Year Plan in the field of hogbreeding.

CLASSIFICATION AND CHARACTERISTICS OF THE INFECTIOUS
DISEASES OF SWINE

In spite of the abundance of scientific works and practical observations on the infectious diseases of swine, up to the present time no one has ever taken steps towards working out the questions of the general epizootology of these infections. No data at all on this subject can be found in the literature either of the USSR or of foreign countries. This is apparently due to the extremely scanty work that has been done on questions of general epizootology. The need, however, for this kind of investigations and generalization has long been developing.

Thorough theoretical treatment of the general epizootology of swine diseases would undoubtedly encourage correct and broader orientation on the part of the veterinaries specializing in these diseases and working in the great hogbreeding trusts and sovkhoses.

The study of the regularities governing the incidence and distribution of infectious swine diseases and the vast and valuable experience accumulated during the fight against these diseases in

past decades permit a considerable number of important practical conclusions to be drawn with reference to the improvement of the system of prophylaxis against these diseases and to the enhancement of the effectiveness of all measures pursuant to plan.

Like everything else that is new, the development of the questions of general epizootology involves certain difficulties. Apparently some mistakes are also unavoidable during such a study, at least at first, the more so since a number of theoretical questions of general epizootology (like epidemiology) still remain disputed or unsettled.

But these difficulties will be overcome, and the errors that arise corrected, if the great creative asset of the scientific and practical workers of the USSR who specialize in swine diseases is put to work on these problems.

We consider it necessary, for our own part, to make a beginning with this type of investigation.

The epizootological analysis of all groups of infectious swine diseases should commence, in our opinion, with the classification of these diseases according to the most important epizootological criteria. Such a classification allows more rapid orientation on the significance of the various infections, together with their character and the few basic patterns that govern their incidence and spread among swine.

The classification of infectious swine diseases may be undertaken according to the following epizootologic criteria.

First of all, according to the degree of danger represented,

in the sense of danger of their spreading and the magnitude of the economic damage caused by them.

Hog cholera, swine erysipelas, brucellosis, anthrax, Aujeszky's disease, swine dysentery and bronchopneumonia of young pigs may be considered the most dangerous. The principal efforts towards prophylaxis should therefore be concentrated on these diseases.

Less dangerous are swine influenza, foot-and-mouth disease, swine pox, acute paratyphoid and Teschen disease.

The geographically localized infections -- swine plague [hemorrhagic septicemia], listerellosis, chronic paratyphoid and pyobacillosis [chronic septiceamia] -- may be considered least dangerous.

The infectious diseases of swine may be divided into three groups according to their contagiousness and dispersability. (The capacity or tendency to spread which is observed in an communicable disease is called dispersability. The degree of dispersability of an infectious disease depends on the infectiousness of its causative agent, the viability of that agent in an external medium, and to some extent on the character of the harboring and discharge of a virus by diseased and convalescent animals acting as carriers.

(Foot-and-mouth disease is a classic example of an infectious disease manifesting outstanding dispersability. The virus of this disease is highly infectious, that is, it can provoke the disease in animals even in the most minute quantities, due to its rapid multiplication in the organism. Animals infected with the foot-and-mouth disease discharge large amounts of the virus, which possesses

great viability in the external medium, and withstands desiccation, light, low temperatures and other unfavorable factors for long periods.

(Hog cholera is only slightly less dispersable than foot-and-mouth disease.) [end of footnote.]

The first group consists of infections manifesting outstanding contagiousity and dispersability: hog cholera, influenza, foot-and-mouth disease, swine pox, Aujeszky's disease and swine erysipelas.

The second group contains diseases of moderate contagiousity and dispersability: anthrax, brucellosis, listerellosis, dysentery, Teschen disease and paratyphoid.

The third group contains non-dispersable diseases and mildly contagious diseases: swine plague and pyobacillosis.

It is also of practical interest to divide these diseases, according to the character of their course, into acute and chronic.

1. Infections which are most often acute are: hog cholera, influenza and bronchopneumonia of young pigs, swine pox, foot-and-mouth disease, dysentery, erysipelas, Aujeszky's disease, listerellosis and Teschen disease.

2. Infections which most often run a chronic course are: paratyphoid, anthrax, brucellosis and swine plague.

The infectious diseases of swine may also be divided into three groups, according to the prevalent character of their dissemination.

The first group includes infections which are oftenest (more often than the other infections) of epizootic character: hog cholera, foot-and-mouth disease, swine pox.

The second group includes infections frequently of epizootic character: erysipelas, brucellosis, Aujeszky's disease, influenza, dysentery, paratyphoid, bronchopneumonia of young pigs.

The third group is of infections principally of a sporadic character (appearing seldom as epizootic): anthrax, swine plague and pyobacillosis.

With respect to their organotropic character, the infectious diseases of swine may be divided as follow:

(a) Pneumotropic: influenza, swine plague, pyobacillosis, bronchopneumonia of young pigs, and Aujeszky's disease (in adult pigs).

(b) Enterotropic: dysentery, paratyphoid, hog cholera (in its enteric form).

(c) Neurotropic: Aujeszky's disease (in suckling pigs), hog cholera (in its neurologic form), Teschen disease and listerellosis.

(d) Epidermo-and epitheliotropic: foot-and-mouth disease, swine pox, erysipelas (urticaria), anthrax.

Finally, according to character of origin and source of infection, these diseases may be divided into two main groups:

(a) Diseases originating principally in local sources of

infection: paratyphoid, bronchopneumonia of young pigs, listerellosis, swine plague, anthrax, and erysipelas.

(b) Diseases originating principally as a result of infection being brought in from outside: hog cholera, foot-and-mouth disease, swine pox, brucellosis, Aujeszky's disease, Teschen disease, influenza, dysentery.

We do not consider the above classification by principal epizootologic criteria to be by any means final and complete. Undoubtedly it still requires elaboration and further work.

Nevertheless, the information contained in such a preliminary generalization will permit noting a few of the principal epizootologic features of these diseases, with concrete conclusions for practical purposes.

PROBLEMS IN THE PRACTICAL CONTROL OF THE INFECTIOUS DISEASES OF SWINE

In analyzing the above noted features of the infectious diseases of swine, we may note that, in the first place, the vast majority of these infections are characterized by strong contagiousity and dispersability. Therefore, when such diseases originate, an efficient system of isolating the diseased and infected animals is necessary, as well as the disinfection of the rooms and objects infected by them and strict observation of restrictive quarantine measures.

In the second place, it must be noted and emphasized that all the most dangerous infections among swine take an acute course, with a pronounced tendency to rapid spread among the swine population,

in consequence of which the measures to localize and liquidate these diseases must be of an urgent character. Each day of delay increases the losses in geometric progression.

In the third place it is exceedingly important to note that almost all of the most dangerous infectious diseases of swine mainly originate as a result of infection being brought onto the farm from the outside (by infected feed or animal virus-carriers). This makes it clear what an immense importance a carefully thought out and strictly observed system of prophylaxis has in preventing these diseases by making it impossible for infection to be brought into a hog-farm.

These principal factors in the epizootology of the infectious diseases of swine -- their contagiousity, acute course, rapid spread and the fact that they may be introduced from outside -- determine, to a very considerable extent, the nature of the measures for their control.

In generalizing and making a critical evaluation of the experience of many years in carrying out these measures under USSR conditions, we consider it necessary to dwell insistently upon certain questions of practical importance, with the object of attracting the attention of hogbreeding specialists and all practicing veterinaries to these questions.

The Significance of the Predisposing Factors.

The predisposing factors play an exceedingly large part in the origination and spread among swine of epizootics of infectious diseases due to all causative agents.

The predisposing factors exert a particularly great and decisive influence in the pneumotropic and enterotropic infections, in cases where not only the general resistance of the organism but the local resistance of definite organs and tissues to infection is lowered by such factors.

Thus for the group of pneumotropic infections the predisposing factors are exposure to cold, catching cold, and increased atmospheric humidity. The importance of these factors is so great that in their absence hardly a single one of these infections finds conditions for its spread or is able to provoke mass affection among pigs.

Mistakes in feeding play the same role as predisposing factors for the enterotropic infections; such as dysentery and paratyphoid. The possibility of epizootics of these diseases developing among herds of swine fed a completely adequate ration of good quality still remains to be proved.

Although for a number of other infections today the decisive influence of the predisposing factors can still not be clearly traced and demonstrated convincingly enough, it may nevertheless be maintained, on the basis of data already available, that, except for hog cholera, there are no other infections of swine which are absolutely pathogenic and can provoke clinical manifestations of disease regardless of the state of the macroorganism or of the conditions of the surrounding environment.

The surprising resistance displayed by the organisms of many swine to such infections as anthrax is a significant example of how relative the idea of "absolute pathogenicity" of any causative microorganism really is.

In a large number of cases the predisposing factors in the infectious diseases of swine strongly influence the conditions (factors) of exposure as well, that is, the possibility and methods of infection. In some of these cases the predisposing factors coincide with the exposure factors.

Thus, for instance, increase of the dampness in pigpens not only predisposes to the spread of pneumotropic infections but also creates favorable conditions for the mass infection of all the animals in these pigpens, since when there is a high water vapor content in the air and ventilation is insufficient, the infected droplets expelled by the sick animals in coughing may remain in the air for long periods among the very minute water droplets suspended there.

On the other hand, inferior, poor quality and coarse feed of low nutrient value, which predisposes to ailments of the gastrointestinal tract, may at the same time favor the mass infection of swine by enterotropic infections, owing to the damage done to the mucous membranes and the disturbance of the natural barriers between stomach and intestines and to the normal functioning of these organs (development of dyspepsia.)

It is therefore necessary in the future to go more deeply into the study of the predisposing factors, with a view to eliminating them and to assuring the zoohygienic conditions that would prevent the possibility of the spread of the infectious diseases of swine.

Sources of Infection.

Knowledge of the sources of infection is very important for the effective prevention of infectious diseases and for their prompt liquidation in cases of epizootic outbreaks.

Analysis of many years' experience in the fight against the infectious diseases of swine leads us to the conclusion that in many cases ignorance of this important fact was the cause of the frequent incidence of one infectious disease or another in a few large-scale hogbreeding enterprises and of the lowered effectiveness of the sanitary measures in them.

The following are the principal sources of infection and the routes of its introduction into farms hitherto infection free:

- (1) bringing from outside into a pig-farm animals that prove to be infected and carriers of infection (incubation, chronic, convalescent or virus-carriers). In some cases such animals were already infected on the farm from where they were sent, while in other cases they became infected during the trip;
- (2) carriers of bacilli and viruses remaining on a farm after epizootics have been liquidated or naturally died down;
- (3) raw animal products from infected animals;
- (4) feed materials subjected to infection at their place of production or en route;
- (5) sections of territory and sources of water infected during previous enzootics and epizootics or newly infected by

animals becoming diseased;

(6) ~~pigs~~ pigs previously infected by diseased animals;

(7) persons working on pig farms who were previously in contact anywhere with infected animals;

(8) in close proximity to points of occurrence of infectious disease of swine: when operational or personal contact occurs, or when grazing fields or watering places or ponds are used in common.

After infection has reached a farm by one way or another, and cases of disease have already been noted, the principal source of infection then becomes the infected animals themselves. In many cases, however, the original source from which the infection was first introduced does not lose its importance.

Specifically, the virus-carriers already introduced may continue to infect the herd and the buildings. The infection of the herd on an infected pasture or from infected feed brought in, etc., may still continue.

In consequence of this, even the most careful sanitary measures, aimed at isolating the diseased animals and building up a cordon sanitaire around them, may (and often do) prove insufficient to localize the infection and prevent new cases of infection.

It is necessary in all these cases to check carefully all possible sources of infection and routes of its introduction into the farm and swiftly cut off all further infection of the herd. It is only under this condition that sanitary measures will be truly effective.

Disclosure and elimination of the sources of infection is a necessary condition for the success of the passive method of immunization, which confers a short-term immunity. The practice of past years is rich in examples of the continuing infection of a herd bringing to nothing the results of passive immunization.

Disinfection is a powerful weapon in the campaign against the infectious diseases of swine. It must, however, be noted that its importance is often underestimated at the scene of operations or it is unskillfully applied.

Very often veterinaries leave all measures of disinfection entirely to assistants or sanitation workers with low qualifications, without checking their work or the quality and technique of disinfection applied. In consequence, in spite of the large quantities of disinfectants used, the effectiveness of the disinfection is not infrequently poor, and the aim of the disinfection is not attained.

In many cases the first important stage -- mechanical cleaning of the place -- is done most unsatisfactorily, although its painstaking performance is a decisive condition for the effectiveness of the disinfection. On a large number of farms that had been visited by infectious disease we observed in pigpens that had already been "thoroughly disinfected", accumulations of liquids from manure, squelching beneath the foot when one stepped on the broken floors, filthy, unwashed and unscrapped feeding racks, great spots of blood or dried manure on the walls and partitions.

The light-grey strips of lime, which were far from completely covering the walls and floors, were the only "unquestionable"

evidences of disinfection.

The unsatisfactory performance of disinfection may be considered one of the important reasons for the stationary and continuous existence of many infectious diseases of swine on farms.

Disinfection of high quality, with substances of high coefficients, carried out according to all the rules of science, should play an exceedingly important role in the liquidation and prophylaxis of the infectious diseases of swine.

The tasks of disinfection can and must be considerably broadened. It is time now to pass from disinfection in the narrow sense of the word (destruction of infection) to disinfection in the broad sense by applying disinfectants that act not only on the causal agents of infectious diseases but are also capable of simultaneously destroying the dangerous carriers of these infections: rodents (by rat extermination) and various ectoparasites (by disinfection.)

Chlorine gas is such a universal agent. Its use in well-organized large-scale pig farms is technically entirely feasible.

For complete sanitation of the quarters it is expedient at the same time to take measures for exterminating the parasitic worms, since pulmonary and intestinal parasites not only, by themselves, cause immense losses to hogbreeding, but also to a great degree favor the development and spread of infectious diseases.

Diagnosis.

The timely and accurate diagnosis of the infectious diseases

of swine is exceptionally important for the success of prophylactic measures and the liquidation, as they occur, of outbreaks of such diseases. "

Only when diagnosis is timely and accurate can there be effective use of immunization methods, which play so important a role in the campaign against infections.

Timeliness of diagnostic examination demands that veterinary specialists take all measures to assure a precise diagnosis as soon as the first suspected cases of disease occur among swine. Simultaneously with the isolation of the suspected animals and with sanitary measures, it is necessary to concern oneself in the most scrupulous and painstaking way with the diagnosis, not putting it off for a single day, and especially with the differential diagnosis, applying all existing methods.

In view of the similarity between the clinical symptoms and the pathological anatomic changes observed in different infectious diseases of swine, the preliminary diagnosis made immediately on the farm and based on the clinical and anatomical findings must under all circumstances be confirmed by laboratory methods (bacteriological, serological, histologic, infection of test animals.)

It does not follow, however, that the entire work of diagnosing infectious diseases can or should be placed exclusively upon the veterinary bacteriological laboratory and its workers, as some practising veterinaries, who thus remove themselves from this important work, are inclined to assume.

The laboratory specialists are obligated rapidly and by correct methods to run through the cycle of necessary laboratory examinations, and to furnish their scientific consultation to the veterinaries of the districts and sovkhozy, but they should not and cannot take over the very serious obligation of diagnosing diseases, which obligation devolves upon the District and sovkhoses veterinary specialists.

The latter should, first of all, collect and analyze the epizootological data on a new case of disease, which will in most cases allow rapid orientation as to its character. Data of this kind include: information on the time and conditions of incidence, on the ages of the animals affected (and of those who have died), on the groups and pigpens where cases have been noted, on the possible sources of infection, on the predisposing factors, and also observations on the infectiousness of the incident disease and the methods of infection.

These epizootological data should be supplemented by the most careful clinical examinations and observations, with wide use of the thermometer in groups or pigpens where the disease has struck, and the no less careful post mortem examination of as many carcasses as possible of swine that have succumbed or been destroyed.

It is necessary to record and systematically arrange all the epizootological data obtained, as well as the results of the clinical observations and test examinations and of the post-mortems.

On making his preliminary diagnosis on the aggregate of all

data collected, the veterinary in the service of the farm may communicate this valuable data to the laboratory and at the same time correctly determine just what material should be sent, and in what form, for laboratory examination and confirmation of the diagnosis.

This facilitates and accelerates the diagnostic work of the laboratory to an immense degree.

Further than that, in a large number of cases the laboratory diagnosis of infectious disease in swine must be based principally on the epizootological, clinical and anatomical findings (for instance, in hog cholera, foot-and-mouth disease, and a few other infections, which have been very little studied) since in many infections methods of obtaining pure cultures and identifying them are still unknown or present great difficulties.

It is clear from all this how important for diagnosis it is for the District and sovkhos veterinary specialists themselves to participate in the work.

The directing veterinary organs and laboratory specialists should therefore decisively suppress and uproot the tendency noted here and there for practicing veterinary workers to unload all the work and responsibility for diagnosis onto the laboratories. This tendency is expressed in the dispatch of carcasses or parts of them to the laboratories with no explanation whatever, by workers either completely ignorant or completely unappreciative of the clinical-anatomic and epizootological methods of diagnosis.

In isolated and more complicated cases of swine diseases, such as are not infrequently encountered in practice, the spe-

cialists of the veterinary bacteriological laboratories and the veterinary experiment stations should proceed to the locality of the infection to help the practicing veterinaries in realizing these methods of diagnosis; and besides that such specialists can make the necessary experiments and carry out these or those examinations at the scene, on the farm itself. But even then the District and sovkhos veterinaries should not hold themselves aloof from the diagnostic work.

Immunization.

Immunization is a powerful weapon for the control of the infectious diseases of swine, but, like every weapon, it requires skillful and correct application.

Experience shows that this weapon is by no means invariably used correctly by the practicing veterinary workers in the field. As a result, the effectiveness of the large-scale inoculations is sometimes insufficient or even unsatisfactory.

Observation of the following basic conditions is necessary if full effect is to be obtained from immunization: selection of the correct method of immunization, timeliness of the inoculation, inoculation of all susceptible animals, use of the established dosages and techniques of inoculation, and, finally, without exception, accompanying the inoculations by sanitary and hygienic measures.

Both the administrators and the veterinaries and veterinary technicians actually performing the inoculations should, besides this, be well acquainted with the properties of the biological preparations used for the purpose, their advantages and weak sides,

and should correctly evaluate the significance of immunization in the general framework of all measures to be adopted.

They should understand that when inoculation is carried out, the condition of the animals and the condition of the environment is of great importance.

In spite of this, however, a peculiar "overestimation" of the significance of immunization is encountered with altogether extraordinary frequency among practicing veterinary workers, especially among veterinaries' assistants (feldschers) who think that when inoculations have been given, there is nothing more that can be done.

As a result of this, these workers do not adopt serious measures to improve the maintenance and feeding of the animals, do not eliminate insanitary conditions in the quarters and hog lots, and do not observe the animals carefully so those affected by illness may be isolated soon enough, and thereby the focus of infection is maintained.

Under such conditions immunization, even with high-quality biological preparations, frequently is not, and cannot be, adequately effective. In consequence of unhygienic and insanitary conditions, the immunity of the inoculated animals becomes weakened, and when there is any possibility of reinfection, new cases of the disease originate (loss of immunity).

Timeliness of inoculation is very important in both preventive and compulsory [curative] inoculations.

Delay in the administration of preventive inoculations favors the origination of new foci of infection (in hog cholera, erysipelas and anthrax) or to flare-ups of infection with new cases (of the same disease) appearing in the same place.

In compulsory inoculations, their timeliness, or more accurately, their urgent administration, decides their success. Every delay increases the number of losses and leads to a wider spread of the infection.

It cannot but be observed that these simple truths are often forgotten under practical conditions, and that, when we become familiar with the state of affairs at the various premises, we are still not infrequently obliged to note the inadmissible delay in inoculation.

In particular, the preventive inoculations against swine erysipelas, which should as a rule be completed before the pasture season commences, are not infrequently delayed and dragged out over an excessive length of time.

Nevertheless, for a number of reasons (interruptions in the supply of vaccine, employment of the veterinary cadres for other work, etc.), vaccination against erysipelas is carried on all summer in some Rayons and ends in the autumn. In consequence of the delay in inoculation, outbreaks of the disease appear on some farms, and the inoculation then takes on the compulsory [curative] character.

Frequently, too, there is incomplete coverage, and some of the animals that should have been inoculated are not. This is

observed especially often in the immunization of animals of individual use. Some of these animals are not brought in -- which is sometimes winked at -- and in consequence such immunization merely cuts the losses, but does not lead to the complete prevention or interruption of the disease.

To eliminate such conditions it is necessary to demand the establishment of a register of all animals on hand in a given sovkhos or village and subject to inoculation, and the inoculation of all such animals without exception within a definite time limit. It is necessary to call on the village soviets for establishing such registers and verifying the appearance of the animals for inoculation. In the cities, this should be done by the Rayon soviets.

In connection with these conditions for the effectiveness of inoculation, the plan for anti-epizootic measures should be considered fulfilled for sovkhos, Rayon and Oblast' only if these are observed, and there should be not only quantitative indices for these measures, but qualitative indices as well.

The registration of the measures taken, and their timely documentation, play a very important role. Nevertheless this side of the matter is often neglected, and this leads to difficulties and misunderstandings during the process of carrying them out.

In one large-scale hog-raising sovkhos, with a herd numbering several thousand swine, we witnessed an unfortunate hitch in the measures for control of hog cholera, because it was impossible to determine precisely in what hog houses and hog groups, when and

what inoculations had been given, when and what disinfection had been carried out. The inoculation of swine was not noted at the time it was done, and after some time they were inoculated a second time, in error, while animals not yet inoculated were thought to have been inoculated and therefore not processed, in consequence of which hog cholera broke out among them.

To avoid such cases, a veterinary-Sanitary journal should be kept on large animal farms, in which all data on disease and death of animals should be entered, together with data on post mortems, diagnostic examinations, inoculations, disinfections and all other measures of veterinary character. When veterinary workers were changed on the farm, the entries in this journal would be especially valuable to the new specialist entering the service of the farm.

The reporting system is no less important a link. It should be a mirror, accurately reflecting the actual state of affairs on the farm and in the Rayon. Without a well-established registration system there can be neither accurate reporting nor planning.

Errors in registration are observed even more often in the execution of measures among animals belonging to individual owners.

Specialized quarters devoted to carrying out prophylactic measures, namely: isolation and quarantine quarters, dissecting rooms and veterinary hospitals are either lacking entirely on many farms or do not satisfy the demands made on them.

This sometimes creates great difficulties in carrying out

prophylactic measures and in some cases brings them to nought.

Where special quarantine quarters are lacking, newly arrived shipments of swine are sometimes placed at once on the farm, among the other swine, without being held in quarantine. The consequences are obvious.

In view of the transmissibility over distance, the acute course and the rapid spread of most infectious diseases of swine, such organizational defects on hog-farms must be considered completely inadmissible. Specialized quarters should be provided on all hogbreeding sovkhoses and on kolkhozes.

The multiple and integrated nature of the measures.

The various measures aimed at preventing and liquidating the infectious diseases of swine should be of a multiple nature, that is, they should represent a planned combination of mutually supplementary links in a single chain, instead of being performed in an isolated way at various different times.

This agreement and mutuality of the measures should consist, firstly, in the planned combination of measures to be taken by organizations and farms under different jurisdictions and of the systems on Oblast' and Central Government national scale, and, secondly, in the planned combination of various measures of general and specific prophylaxis.

It is entirely obvious that if, in any Oblast' or Rayon, one farm carries out an efficient system of measures aimed at the entire liquidation of infectious disease among swine, while on the other farms no steps at all, or plainly inadequate steps,

are taken in this respect, serious success can hardly be expected in fully clearing up such disease in that Oblast' and in creating the conditions for the intensive development of hogbreeding.

It must be frankly admitted that up to now we have succeeded only in a few Oblast's in attaining full planned coordination of the measures to be taken by sovkhoses, kolkhoses, secondary farms and numerous individual owners of livestock. To attain this coordination is an important task of the operative veterinary organs.

On the other hand, as shown by experience, one of the important reasons for the ineffectiveness of the prophylactic and sanitary measures taken on a mass scale and with great expenditures of energy and material resources is their insufficient integration: the execution of some measures while the others are ignored or insufficiently performed.

Thus, for instance, in certain Rayons inoculation, isolation and destruction of swine with hog cholera is energetically pressed, while at the very same time strict quarantine is not enforced, so that the transmission of virus from the centers of hog cholera infection still continues.

The same local workers who annually fulfill and overfulfill the plans for immunization against swine erysipelas frequently leave completely out of view the necessary sanitary measures for restoring healthy conditions on the pig farms and thereby themselves encourage the prolonged existence of centers of this infection.

On some hogbreeding sovkhoses there is much energetic work done to create good sanitary and hygienic conditions for the herd,