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PROBLEMS OF PREVENTION AND ERADICATION  
OF BRUCELLOSIS IN CZECHOSLOVAKIA

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## FOREWORD

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PROBLEMS OF PREVENTION AND ERADICATION  
OF BRUCELLOSIS IN CZECHOSLOVAKIA

Following is the translation of an article entitled "Ochranna Opatreni Proti Bruceloze a Jeji Radikalni Tlumeni" by Dr. Ondrej Andrlé, V.M.D., in Veterinarstvi (Veterinary Medicine), Vol XX, No 9, Prague, September 1960, pages 322-325.

In certain areas there is still a significant livestock death rate due to brucellosis. Taking into consideration the unusually contagious character of an infected specimen's miscarriage, it is necessary to establish protective measures in such a way that they would counteract infection characteristics and thus become a truly beneficial means in the battle against brucellosis. The measures employed thus far, whether in the Ministry of Agriculture's so-called Blue Directives of 8 August 1951 on how to protect the animal from infection, or in the special 1952 Directives on how to prevent and eradicate infectious miscarriages in cattle, contributed significantly to the stabilization of contagiousness and stopped its rapid spread which reached such considerable heights. Even if the introduced measures have proven beneficial at this point, it will be necessary to examine them further. Therefore, the most immediate problem is to make sure that these protective measures against brucellosis will lead directly to its liquidation.

Such protective measures must be aimed against the particularly contagious character of brucellosis that tends to differ it from other diseases.

If we follow a number of phenomena during a normal observation of the brucellosis span in cattle, we can explain many of our set-backs of the various preventive methods. In the preparation or arrangement of new directives for brucellosis eradication, it is necessary to pay careful attention to any new signs that come up in the treatment of brucellosis, because these

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new discoveries, whether made in actual practice or in the laboratory, serve as new and safe leads for the practicing veterinarian in combatting brucellosis. It will, therefore, be appropriate to point out and evaluate some of these characteristics of contagiousness, so that the suggested preventive measures will then appear as logical conclusions.

Brucellosis in farm animals, particularly cattle, differs from other contagious diseases. Brucelli enter the organisms undetected and settle in an organ particularly predisposed to them without making the animal appear ill (for example, there is no temperature or loss of appetite, etc.) and wait for the animal's favorable physiological condition, i.e. they gravitate for five to seven months before being detected clinically (through inflamed placenta, miscarriage). In physically undeveloped or sterile animals the infection is not clinically evident.

It therefore follows that clinical diagnosis can be based only on the basis of miscarriage.

Bacteriological diagnosis can be established from a culture taken from the abortive offspring, fetus liquid or fetus glands. It, therefore, depends on the animal's pathological condition at a given moment. Milk culture is possible only with animals in lactation.

The result of seriological reactions depends on the momentary height of antibody titration which often vacillates under brucellosis. We must, therefore, repeat the tests at intervals of three weeks or more. From experience we know that even with the repetition of the so-called complex serodiagnosis, out of 100 diseased, at least 10 are lost because, during a routine serological test, they show negative reaction. We have also observed a long-term decrease in titration in negative animals, even down to normal. We often observe this condition in isolation wards that for some time (several years) were undisturbed by the admission of healthy cattle. Such animals even have a normal delivery, do not retain the placenta and therefore, one often hears people speak of a self-cure. I have noticed, however, that after some time, (even after several years) so far due to unknown reasons, titration again rises, probably with the potential infectiousness of the particular animal. This phenomenon I call the long-term titration hibernation. Academician Juskovec noticed the same phenomenon after active immunization of animals with virulent vaccines and called this effect

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the recidivous reaction.

In addition I wish to point out that serodiagnosis fails during a miscarriage or shortly afterwards when the cause of miscarriage has to be determined. As we saw in more than half of the cases in which brucellosis was later confirmed, the blood tests in these particular cases were negative, i.e. during a miscarriage or shortly after it. The same lack is seen in calves and the young undeveloped offsprings.

We must keep all of this in mind when evaluating a diagnosis and we must not forget that, regardless of all shortcomings, we must make the best of these methods, since we have, so far, nothing better to work with. In brucellosis eradication, we must overcome all diagnostic shortcomings with thoroughness and strictness in the preventive measures.

Furthermore, in cattle brucellosis, it is necessary to note the appearance and aspects of immunity. BAB animals placed in isolators have one or two miscarriages, yet afterwards, there is normal delivery. They made their own immunity that prevents a miscarriage. One must, of course, realize that this immunity is the so-called non-sterile immunity, that the brucelli are still present in the organism and may not be harmful to that particular carrier, but are dangerous to the environment. An infected cow, for example, when moved to a healthy stall, may have a normal delivery, but floods the area with fetus liquid and causes a miscarriage in a new specimen. Animals vaccinated with the B 19 vaccine have the same non-sterile immunity and they are able to reject brucelli for an indefinite period of time after the immunity begins.

Brucellosis prevention is, therefore, a very difficult, complicated and lengthy project. Success can be achieved only through determined and systematic work. From the 10-year experience in an area densely infested with cattle brucellosis, I divide the veterinarian's work into three phases:

1. To make epizootic analysis of all cattle raising areas by searching for all positive and dubious reagents. To mark them accurately and permanently and place all of them into BAB isolators.

As isolators, I mean those cowpens where effective miscarriages prevail and treatment by elimination cannot be accomplished.

2. The principal phase of infection-eradication. Here we have two basic opinions: Immuno-prophylaxis and

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radical liquidation. Personally, I am in favor of radical liquidation, but on the problem of immuno-prophylaxis one must point out that out of the various vaccines prepared from brucelli, only the live B 19 vaccine remains active in Czechoslovakia and achieves effective immunity in young animals. Even if they are put into BAB isolators and not exposed to an extra large dose of infection, they do not miscarry, but have a normal delivery of young. That is the only positive feature of the B 19 vaccine. On the other hand, it must be said that the B 19 usage is limited. Animals that show a positive reaction and those animals in the second stage of pregnancy cannot be vaccinated with it. In these cases, vaccination of B 19 can cause a direct miscarriage. For some time after the vaccination, animals emit brucelli out of their body (also in milk), and thus are a danger to their environment, i.e. either other animals or even people. Finally, the vaccination with B 19 completely obscures serological and allergy reactions for a certain but undetermined length of time that sometimes lasts the whole life-span. Therefore, we must group the vaccinated animals with the positive reagents and place them in isolators.

For that reason I do not consider the immuno-prophylaxis method as a cure, but only an escape resulting from a need that perhaps will produce some effect immediately but will certainly not eradicate the infection systematically on a broader basis. Here is a case. The 1952 MZ Directives made possible and recommended frequent use of the B 19 vaccine. The greatest increase of B 19 consumption can therefore be put into the period from 1952-1953; i.e. after the Directives came out. The greatest consumption of the vaccine was in the Prague area where B 19 vaccination was greatly propagated. It could therefore be expected, that in three years, a decrease in brucellosis could take place in this area of diminishing numbers of closed townships and farmsteads with infections, or at least result in a certain stabilization of the spread of infection. On the contrary, the decrease occurred only in 1953. By 1 January 1955, closed township infections tripled in number as compared to 1 January 1953, and increased ten-fold by 1 January 1954.

From 1955 until the middle of 1959, there was only a slight decrease of infected townships (only 18%), yet at the same time it remained ten times as high as before the beginning of B 19 vaccination in 1952. The MZ

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report has the correct figures on this.

On the other hand, it was possible to effect an almost complete cure in the relatively badly infected Podborany region, in the same length of time through the method of radical liquidation (infection will be checked completely the last quarantines will be removed by the end of 1960).

Radical liquidation employs the methods of using isolators and disposing of all animals that are clinically ill or have positive or suspicious reactions, without attempting to cure them medically. According to the type and extent of the occurrence, we can use either systematic elimination of the reagents or complete liquidations.

I use the method of reagent elimination in cattle where, during the regular blood test we get positive or suspicious reactions, but where there was no previous clinical evidence i.e. a miscarriage. In such cases we can still successfully prevent infection by eliminating the reagents detected after several blood tests.

If, however, a miscarriage had already occurred, then the reagent-elimination method normally fails. With repeated blood tests more and more new reagents will appear. These were infected in the environment infested with the fetus liquid from a miscarriage.

It is best to declare such cattle as outright isolation cases and to liquidate them in the stockyards as soon as their utility in agriculture ceases.

In order that the liquidation of isolators be agriculturally profitable, I have suggested and indicated a number of measures which eliminate this method's apparent disadvantages. In isolators whose liquidation is not planned in that particular year, I recommend mating with an unregistered bull. The bull can be often changed and the cows will remain fertile.

In the BAB isolators I do not recommend mechanical inseminations. The inseminating technician exposes himself needlessly to an infected environment and it has not been as yet positively determined that he cannot carry the disease into another, healthy environment. I definitely advocate removal of calves born in isolators to the slaughterhouse, because successful breeding of these so-called healthy calves from BAB cows is very problematical and any diagnosis of these undeveloped animals fails.

Otherwise, there were satisfactory results, in terms of milking, in the second or at least third year

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offsprings, that are by no means worse than those with animals immunized with the B 19 vaccine.

3. The following measures I consider as the last phase of eradication: continuous periodic checkups of healthy animals and of animals cured through elimination and maintenance of periodic examinations every time the animal is transferred. It will be necessary to continue these measures for a number of years after the general liquidation of infection, so that we can eliminate all the animals which, through wavering titration or long-term suppression, have re-entered the ranks of the healthy animals.

If we leave the reagent in the stall instead of eliminating it until it has a miscarriage or calves, a catastrophic revival of the disease can take place if the health examinations were stopped too early or relaxed as a result of recently popularized methods.

Even in the Podborany County, however, I ran into resistance in some agricultural organizations when I insisted on radical liquidation of herds of cattle, and had to postpone it for several years. As long as other cases did not show favorable results with this method, some representatives of state farms and JZD resisted the liquidation of the BAB stocks. Some requested "vaccination" so that the cows would not have a miscarriage and could be kept longer. It is true that immuno-prophylaxis is a much more pleasing method and can be much more easily enforced. It is even requested; directly. Even though it produces some sort of an effect in a relatively short time, still, it soon leads to disillusionment, since the actual eradication of infection has only been postponed. Enforcement of radical liquidation often took a great deal of work and convincing, primarily because there was no official support for it and it could be carried out only on the basis of understanding and a willingness to cooperate on the part of the animals' owner. The first five years were difficult. But as soon as favorable results of this cure began to appear, the whole action received greater understanding by the owners of the animals and support of the state organs.

What was actually the decisive factor of our success? Not the method, but the result. The use of the method is a problem of special services. It is of no interest to the owner or the people's committee, but it is the concern of the veterinarian. However, there is a demand for results and also economic validity of the whole enter-



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prise. As long as we carried out BAB eradication from the administrative level of the state farm and with administrative support, we could easily pick out isolators, carry out reagent elimination and finally undertake and evaluate various action connected with it. In the current year, the farms that had cows, carried out all the production goals for the farms in which cows had been liquidated, having, for example, only foodstuffs. It was more difficult with the JZD, because every collective is an independent economic entity, and in liquidation, one must consider the fact that it would have to be completely without cows and without milk for a year or as long as year and a half. It was first necessary to convince the representatives, and then the membership of the need of radical measures and to obtain the approval of the general assembly. It was necessary to change the production plan so as to insure a substitute fulfillment, and to obtain certain financial support from the state and also make sure that this output would maintain the collective's established financial level. In all cases this proved successful by the introduction of a "rapidly-inseminating bull", which from 1953 to 1956, was hardly a common occurrence in the JZD farms. In the counties where they were introduced into the liquidating BAB breeds, they became popular and even established a good reputation for themselves. Success depends on the assurance that the production norm will be maintained, and that through their own production the collectives can be reimbursed financially.

It is, therefore, the duty of the veterinarian not only to introduce a pertinent method but also to be responsible for its success and for the economic feasibility of its realization. The veterinarian cannot order and install a method of infection eradication without first making sure that it is possible to carry it out. Today the veterinarian is a responsible worker in animal production. His outlook must include both purely veterinarian problems and problems of economics. Only then, if he insures the economic feasibility of his own veterinary measures through his own complex methods, can he assure the accomplishment of the veterinary directives and the final success of the whole project.

Furthermore, I wish to consider the expediency and suitability of brucellosis isolators. The making of isolators at state farms whether through administrative measures or in today's departmental system, is an acceptable and economically expedient measure. However,

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I recommend for the JZD's not to make their isolators in this way. The whole brucellosis condition of one association would thus affect another association, so that one association at the expense of another, would be infested by brucellosis for two or three years longer than its liquidation could be begun. This solution would be improper both from the point of view of economics and of the threat to the care-taker's health. It evokes aversion to and dislike of the whole project, especially when at the same time, the first collective is already working normally with healthy materials and is showing economic gains. It is a different matter entirely when a smaller number of remaining animals is transferred and one accelerates the final liquidation in one collective. I definitely do not recommend an overly-zealous transfer of BAB animals to designated areas or regions. The well-known old rule that infection should always be eradicated where it arises and where it dwells certainly has its justification in combatting brucellosis.

As far as the relationship between the eradication problems of both TB and BAB are concerned, it is obvious, that where brucellosis is uncertain, one should not try to treat TB. First one must solve the problem of brucellosis because herein lies the decision of stock liquidation. We use this solution: after the BAB stock is liquidated, we make sure to purchase only TB-free animals for the new stock and thus solve two problems at the same time in the specimens affected, i.e. BAB is liquidated and the stock is free of TB.

Eradication within an environment. Brucellosis, as seen from its character and great germ perseverance and viability, requires extra-special care even in an environment where it was already eradicated. If we examine a number of incidents cited in the literature, brucellosis cannot survive more than 90 days, i.e. three months, outside the diseased animal's organism. This period would seem sufficient to proclaim the environment infection-free, as for example, the Directives have done in the restoration of healthy pastures after the 1952 BAB preventive measures. We must not forget, however, that brucellosis can result in a so-called secondary natural infectious environment, i.e. in areas where the BAB infected stock has been moved, and where other animals that move into the same surroundings can become infected (animals, dogs, cats, sewer rats and insects - ticks). These can preserve the viability of the infectious organism. A period of one year as indicated in the

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Directives, is not at all an overly long period before new stock is put in and it should be maintained. At the beginning (after the BAB animals have been liquidated) and at the end (before it is inhabited by new stock) there should be a thorough disinfection not only of the stalls, but also of the immediate surroundings, i.e. the yard, exercise area, canalization, dung-hill, and urine pit. At the same time the area, should be stripped of rats.

As far as pastures are concerned, I believe that animals with brucellosis, as well as its carriers, belong to restricted quarters in the stalls that can be enlarged by a small, perhaps annexed, but a carefully isolated run-way if the animals cannot be liquidated in a relatively short time. In any case, this BAB stock does not belong into the pastures because its presence there can lead to the formation of secondary natural environments conducive to infection. During the stock liquidation in 22 agricultural collectives (involving only the JZD's and state farms that breed cattle on a large scale) undertaken in the Podborany County from 1952 to 1959, we carefully observed the indicated measures and the deadlines relating to disinfection and re-settlement of the stalls. So far there was no recurrence of brucellosis in any of the areas mentioned.

CONCLUSION

Problems connected with final and systematic eradication of brucellosis in cattle can be divided into three working phases in this order:

1. To assure an epizootic test of the whole terrain, block off all of the specimens (with positive reagents), establish isolators (where there are animals with clinical symptoms, i.e. miscarriages) and mark those animals permanently. For such an aim it is necessary to devise diagnostic methods that will show the progress with the lowest percentage of error and determine the time when preliminary inquiry should be carried out, and when and to what extent to carry out complex investigation.

2. Infection eradication. In regard to the specific infectious characteristics of brucellosis and especially the problematic long-range titration suppression, it is necessary to declare the method of radical liquidation as the basic method of eradication. To allow B 19 vaccination only in those isolators where liquidated

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is not planned within two years and where breeding is still done. It is necessary to mark all the animals that have been vaccinated. It is also necessary to make an economic analysis of the agricultural collective's management, to introduce substitute compensation and to insure the economical expedience of the whole undertaking. After the BAB animals have been liquidated, it is necessary to carry out a thorough disinfection of the whole area, i.e. the stalls and surroundings and another disinfection a year later, before new material is resettled. To have a minimum transfer of positively reacting animals, not to make new isolators or collect positive reagents into definite areas or regions, but to keep the eradication infection constant. An isolator must be viewed as a closed project, i.e. admittance be denied to everyone, except the caretaker. Not to carry out mechanical insemination, not to allow the cattle to graze on pastures and to keep in mind the possible rise of secondary natural sources of infection.

3. Constant periodic check-ups of healthy animals lies in the regular diagnostic examinations of all the stock and in constant expulsion of the causative organisms. This examination should be also carried out every time the animal is transferred. Constant periodic testing should not be underestimated and it is necessary to continue it for a number of years after brucellosis has been completely eradicated:

The Directives that contain these major decisions and methods, which we are able to achieve in veterinary control and which for their simplicity and economic commendability can be carried out at the state farms and JZD, enable the eradication of brucellosis in a relatively short time.

This paper was read at the National Scientific Discussion on Brucellosis in Brno in February 1960.

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