

## Journal of the Hellenic Veterinary Medical Society

Vol 4, No 2 (1953)



### ANIMAL BRUCELLOSIS IN DENMARK METHODS OF CONTROL AND ERADICATION

H. C. BENDIXEN

doi: [10.12681/jhvms.17543](https://doi.org/10.12681/jhvms.17543)

Copyright © 2018, H. C. BENDIXEN



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

#### To cite this article:

BENDIXEN, H. C. (2018). ANIMAL BRUCELLOSIS IN DENMARK METHODS OF CONTROL AND ERADICATION. *Journal of the Hellenic Veterinary Medical Society*, 4(2), 321–338. <https://doi.org/10.12681/jhvms.17543>

# ΔΕΛΤΙΟΝ

ΤΗΣ ΕΛΛΗΝΙΚΗΣ ΚΤΗΝΙΑΤΡΙΚΗΣ ΕΤΑΙΡΕΙΑΣ

## BULLETIN

DE LA SOCIÉTÉ VÉTÉRINAIRE HELLÉNIQUE

ΠΕΡΙΟΔΟΣ Β'.

ΑΠΡΙΛΙΟΣ - ΙΟΥΝΙΟΣ 1953

ΤΕΥΧΟΣ 10<sup>ΟΝ</sup>

Ἡ Ἑλληνικὴ Κτηνιατρικὴ Ἑταιρεία ἐν τῇ προσπάθειά αὐτῆς ὅπως ἐνημερώσῃ τοὺς Ἑλλήνας Κτηνιάτρους ἐπὶ τῶν τελευταίων προσκλήσεων τῆς Κτηνιατρικῆς Ἐπιστήμης παρεκάλεσε τὸν διεθνοῦς φίλης Καθηγητὴν τῆς Βασ. Κτηνιατρικῆς καὶ Γεωπονικῆς Σχολῆς τῆς Κοπεγχάγης κ. Bendixen ὅπως τιμῇ τὸ Δελτίον μας μὲ ἄρθρον ἀναφερόμενον εἰς τὴν ἐν Δανίᾳ ἐνεργουμένην ἐπιτυχῶς καταπολέμησιν τῆς Βρουκελλώσεως.

Ἐπὶ τῇ εὐκαιρίᾳ ταύτῃ ἡ Ἑλληνικὴ Κτηνιατρικὴ Ἑταιρεία ἐκφράζει πρὸς τὸν Σεβαστὸν Καθηγητὴν τὰς θερμὰς αὐτῆς εὐχαριστίας.

### ΑΙ ΒΡΟΥΚΕΛΛΩΣΕΙΣ ΤΩΝ ΖΩΩΝ ΕΝ ΔΑΝΙΑ, ΚΑΙ ΑΙ ΕΦΑΡΜΟΖΟΜΕΝΑΙ ΜΕΘΟΔΟΙ ΔΙΑΓΝΩΣΕΩΣ ΚΑΙ ΚΑΤΑΠΟΛΕΜΗΣΕΩΣ ΑΥΤΩΝ

Ὑπὸ

H. C. BENDIXEN

Καθηγητοῦ τῆς Εἰδικῆς Παθολογίας καὶ Θεραπευτικῆς  
ἐν τῇ Βασιλικῇ Κτηνιατρικῇ καὶ Γεωπονικῇ Σχολῇ Bülowsvej - Κοπεγχάγης

Ἀφ' ἧς ἐν ἔτει 1896 ὁ Bernhard Bang ἐν συνεργασίᾳ μετὰ τοῦ Vald. Stribolt ἀπεμόνωσαν καὶ περιέγραψαν διὰ πρώτην φοράν τὸν μικροοργανισμόν τῆς μεταδοτικῆς ἐκτρώσεως τῶν ἀγελάδων ὑπὸ τὸ ὄνομα Bacterium Abortus, ὅπερ βραδύτερον ἀντεκατεστάθη ὑπὸ τοῦ ὀνόματος Brucella Abortus, ἡ νόσος αὕτη ἐπέσυρε ἀμέριστον ἐνδιαφέρον λόγῳ τῆς μεγίστης οἰκονομικῆς σημασίας της διὰ τὴν Δανικὴν Ἀγελαδοτροφίαν.

Κατὰ τὸν λήξαντα αἰῶνα, μία ὁμοιόμορφος καὶ βελτιωμένη ἀγελαδοτροφία ἀνεπτύχθη μὲ ἀποτέλεσμα τὴν αὔξησιν τῆς παραγωγῆς αὐτῆς. Ὁ ἀριθμὸς τῶν ἀγελάδων τῆς χώρας ἀνέρχεται περίπου εἰς 3.100.000 κεφαλὰς, κατανεμουμένας εἰς 200.000 ἀγέλας, πρᾶγμα τὸ ὁποῖον σημαίνει ὅτι ἐκαστὴ ἀγέλη ἐν Δανίᾳ περιλαμβάνει κατὰ μέσον ὅρον 15 ζῶα, ἐκ τῶν ὁποίων τὸ ἥμισυ εἶναι γαλακτοπαραγωγὰ.

Ἡ βρουκελλώσις τῶν βοοειδῶν ὀφειλομένη εἰς τὴν Brucella abortus ἀποτελεῖ ἀναμφισβητήτως τὸ σπουδαιότερον ἀπὸ ἀπόψεως

βρουκελλώσεως πρόβλημα. Διὰ τῆς διενεργείας ἐντατικῶν ὁροσυγκολλήσεων ἀπεδείχθη ὅτι κατὰ τὸ 1940, 25% τῶν ἀγελῶν περιεῖχον ζῶα θετικῶς ἀντιδρῶντα. Ἡ *Brucella suis* διεπιστώθη ὅτι ἦτο τὸ αἷτιον περιορισμένων ἐπιζωοτιῶν εἰς τοὺς χοίρους κατὰ τὸ 1929, ἀλλ' ἡ νόσος αὕτη ἐξηφανίσθη τελείως κατὰ τὸ 1931 διὰ τῆς ἐφαρμογῆς τῶν μέτρων τῆς ὁροσυγκολλήσεως, τῆς ἀπομονώσεως καὶ τῆς σφαγῆς τῶν ζώων τῶν μεμολυσμένων ἀγελῶν. Νέα περιορισμένης ἐκτάσεως ἐπιζωοτία τοῦ ἰδίου εἴδους διεπιστώθη κατὰ τὸ 1951, ἀλλὰ καὶ αὕτη ταχέως κατεστάλη.

Ἡ βρουκέλλωσις τῶν προβάτων καὶ τῶν αἰγῶν οὐδέποτε ἀνευρέθη ἐν Δανίᾳ. Ὁ ἀριθμὸς ἄλλωστε τῶν ζώων τούτων εἶναι λίαν περιορισμένος.

Κρούσματα ἀνθρωποείου βρουκελλώσεως διαγιγνώσκονται ἐτησίως ἐπὶ 200 ἀτόμων, ἐν ᾧ πρὸ 25 ἐτῶν ὁ ἀριθμὸς τῶν κρουσμάτων ἀνήρχετο εἰς 600 ἐτησίως.

Ἀνεκαθεν ἡ ἔρευνα ἐπὶ τῶν βρουκελλώσεων διεξάγεται εἰς τὴν Βασιλικὴν Κτηνιατρικὴν καὶ Γεωπονικὴν Σχολὴν ὡς καὶ εἰς τὸ Κρατικὸν Κτηνιατρικὸν Ἐργαστήριον Ὁροπαγωγῆς. Τὸ τελευταῖον τοῦτο λειτουργεῖ ταυτοχρόνως καὶ ὡς διαγνωστικὸν κέντρον εἰς τὸ ὁποῖον ἐνεργοῦνται αἱ συνήθεις πρόχειροι ἐξετάσεις, τοῦτο δὲ ἀποτελεῖ ὡς γνωστόν, ἀναγκαῖον μέρος τοῦ προγράμματος καταπολεμήσεως. Ἐκ παραλλήλου, ἀριθμὸς μικρῶν ἐργαστηρίων διὰ διαγνωστικὸν σκοπὸν ἔχει ἰδρυθῆ εἰς διαφόρους περιφέρειας τῆς χώρας. Τὰ ἀποτελέσματα τῶν ὑπ' αὐτῶν διενεργουμένων ἐξετάσεων ἀναφέρονται εἰς τὴν Διεύθυνσιν Κτηνιατρικῆς, ἣτις ὑπάγεται εἰς τὸ Ὑπουργεῖον Γεωργίας. Ἡ Διεύθυνσις Κτηνιατρικῆς εἶναι τὸ διοικητικὸν ὄργανον εἰς τὸ ὁποῖον ὑπάρχοντα ὅλα τὰ Κτηνιατρικὰ θέματα, ὡς ἐπίσης καὶ ἡ εὐθύνη διὰ τὴν καταπολέμησιν τῶν μεταδοτικῶν νοσημάτων τῶν ζώων ἐν γένει.

Πολλὰ ἔτη παρήλθον ἀφ' ἧς τὸ πρῶτον διεγνώσθη ἡ μεταδοτικὴ ἔκτρωσις τῶν ἀγελᾶδων. Βαθμιαίως ἡ αὐξησις τῶν γνώσεων ἡμῶν συνετέλεσεν εἰς τὴν ἐφαρμογὴν προληπτικῶν μέτρων ἐχόντων ὡς σκοπὸν τὴν προστασίαν τῶν ἀγελῶν ἐκ τῆς εἰσβολῆς τῆς νόσου. Διεπιστώθη δὲ ὅτι ἡ βρουκέλλωσις εἰς τὰς μικρὰς ἀγέλας εἶναι περιορισμένης ἐκτάσεως, ὡς ἀποδεικνύεται ἐκ τοῦ κατωτέρω πίνακος 1, εἰς τὸν ὁποῖον ἀναφέρονται τὰ ἀποτελέσματα τῆς ὁροσυγκολλήσεως ἐπὶ 60.000 ἀγελῶν διαφόρων μεγεθῶν.

ΠΙΝΑΞ 1 (\*)

Ἀριθ. ζώων κατ' ἀγέλην	1-5	6-10	11-20	21-30	31-50	51-75	76-100	Ἀνω τῶν 100
Ποσοστὸν ἐπὶ τοῖς % ἀγελῶν περιε- χουσῶν θετικῶς ἀντιδρῶντα ζῶα.	9%	16%	30%	45%	58%	77%	78%	94%

(\*) Πίναξ δημοσιευθεὶς ὑπὸ τοῦ κ. F. Woldike Nielsen Δ/ντοῦ Κτηνιατρικῆς.

Ὁ ἄνωτέρω πίναξ ἀποδεικνύει σαφῶς ὅτι αἱ πλεῖσται τῶν μεγάλων ἀγελῶν εἶναι μεμολυσμένα καὶ ἀντιπροσωπεύουν τὸ δυσκολώτερον μέρος τοῦ προγράμματος καταπολεμήσεως. Ὅσον μικρότεραι εἶναι αἱ ἀγέλαι τόσοι ὀλιγώτεροι εἶναι τὰ εἰς αὐτὰς περιεχόμενα μεμολυσμένα ζῷα. Ταῦτοχρόνως μὲ τὰς προσπάθειας, αἱ ὁποῖαι κατεβλήθησαν εἰς τὰς ἀγέλας, πρέπει ἐπίσης νὰ γίνῃ μνεῖα τοῦ γεγονότος ὅτι μέχρι τοῦ 1920 καὶ κατόπιν μέχρι τοῦ 1930 ὁ ἐμβολιασμός τῶν μοσχίδων μὲ ζώσας καλλιεργείας βρουκέλλας, εἰς τὰς ἀγέλας εἰς τὰς ὁποίας διεπιστοῦτο κλινικῶς ἡ ἀποβολή, ἔγινε συνήθης, τοῦτο δὲ συνετέλεσεν ἀναμφισβητήτως εἰς τὴν ἐλάττωσιν τῶν ἐκ τῆς νόσου οἰκονομικῶν ζημιῶν. Τοῦτο ἦτο εἰδικώτερον προφανές εἰς τὰς μεγάλας ἀγέλας ὅπου ὁ συστηματικὸς ἐμβολιασμός τῶν ἀνίβων μοσχίδων ἐλάμβανε χώραν καθ' ἕκαστον ἔτος.

Εἰς τὰς περιπτώσεις ἐκεῖνας εἰς τὰς ὁποίας ὁ ἐμβολιασμός ἐλάμβανε χώραν κατὰ τὸν ἄνωτέρω περιγραφέντα τρόπον ἐν συνδυασμῷ μὲ τὴν ἐφαρμογὴν ὑγιονομικῶν τινων μέτρων ὥς π.χ. 1ον) Τῆς ἀπομονώσεως τῶν ἐπιτόκων ἀγελάδων εἰς εἰδικὰ διαμερίσματα ἢ εἰς εἰδικούς στάβλους κατὰ τὸν τοκετὸν καὶ 10-20 ἡμέρας μετ' αὐτὸν καὶ 2ον) τῆς καταστροφῆς τῶν λοχίων, τοῦ πλακοῦντος καὶ τῶν νεκρῶν ἐμβρύων (εἴτε προερχομένων ἐκ φυσιολογικῶν τοκετῶν εἴτε ἐξ ἀποβολῆς), ἐπετεύχθη μία σταθεροποιήσις τῆς καταστάσεως διότι ἀπεφεύγετο ἡ ἐπέκτασις τῆς μολύνσεως.

Ἡ ἄνωτέρω ἐργασία ἐπιτρέπει τὴν προπαρασκευὴν τῶν ἀγελῶν διὰ τὴν τελείαν ἐκρίζωσιν τῆς νόσου διὰ τῆς ἐφαρμογῆς τῆς μεθόδου τῆς στηριζομένης εἰς τὴν κατόπιν ὁροσυγκολλήσεως σφαγῇ τῶν θειτικῶς ἀντιδρῶντων ζώων.

Ἐν ἀπὸ τὰ δύσκολα προβλήματα κατὰ τὴν ἐφαρμογὴν ἑνὸς εὐρέως προγράμματος καταπολεμήσεως καὶ ἐκρίζωσεως μιᾶς χρονίας λοιμώδους νόσου, ὅπως ἡ βρουκέλλωσις τῶν ἀγελάδων, εἶναι ἡ δημιουργία μιᾶς μωρφῆς ὁργανώσεως, ἡ ὁποία νὰ λαμβάνῃ ὑπ' ὄψιν τῆς ὅλα τὰ δικαιολογημένα συμφέροντα, τόσοι τὰ πρακτικὰ καὶ οἰκονομικὰ ὅσον καὶ τὰ ἐπαγγελματικὰ καὶ ἐπιστημονικά. Ἀπὸ τῆς ἀπόψεως ταύτης εἶχεν ἀποκτηθῇ μεγάλη πεῖρα λόγῳ τοῦ μακροῦ καὶ καλῶς ὁργανωμένου προγράμματος ἐκρίζωσεως τῆς φυματιάσεως τῶν βοοειδῶν. Ὑπὸ τὴν ἡγεσίαν τοῦ Bernhard Bang μία ὑπομονητικὴ ἀλλὰ δραστηρίαι καὶ ἀκατάπαυστος ἐργασία διαφωτίσεως ἐπὶ τῆς φύσεως καὶ τοῦ τρόπου καταπολεμήσεως τῆς φυματιάσεως ἤρξατο κατὰ τὸ 1890, καὶ κατὰ τὴν διάρκειαν τῶν παρερχομένων δεκαετηρίδων μέχρι περίπου τοῦ 1920, μέγας ἀριθμὸς μεμονωμένων ἀγελῶν ἀνηκουσῶν εἰς προοδευτικὸς κτηνοτρόφους ἀπηλλάγη τῆς νόσου ταύτης.

Ἐν τούτοις μόνον κατὰ τὸ 1930 αἱ σπουδαιότεραι γεωργικαὶ ὁργανώσεις ἐμπνεόμεναι ἀπὸ τοὺς κτηνιάτρους ἤρχισαν χορηγοῦσαι ὅχι μόνον ἠθικὴν ἀλλὰ καὶ πρακτικὴν καὶ οἰκονομικὴν ἐνίσχυσιν εἰς τὸ πρόγραμμα



ἐκριζώσεως. Κατὰ τὴν ἐποχὴν αὐτὴν οἱ ἀγελαδοτροφικοὶ συνεταιρισμοὶ ἤρχισαν τὸν διὰ φυματίνης ἔλεγχον ὄλων τῶν ἀγελῶν τῶν ἀνηκουσῶν εἰς τὰ μέλη των καὶ τὴν ἐφαρμογὴν μέτρων ἐκριζώσεως τῆς νόσου ἐκ τῶν ἀγελῶν, αἱ ὁποῖαι ἀνευρίσκοντο μεμολυσμένα. Ὁ ἀριθμὸς τῶν συνεταιρισμῶν τῶν λαμβανόντων μέρος εἰς τὴν ὁργανωμένην αὐτὴν προσπάθειαν ἠὔξησε βαθμιαίως ἕως ὅτου κατὰ τὴν χρονικὴν περιόδον μεταξὺ 1930 - 1940 ὅλοι οἱ ἀγελαδοτροφικοὶ συνεταιρισμοὶ τῆς χώρας, ἀνερχόμενοι περὶ-που εἰς 1.500, συμμετέσχον εἰς τὸ πρόγραμμα τοῦτο.

Ἐπειδὴ δὲ οὗτοι ἀντιπροσωπεύουν τὰ 85 % ὄλων τῶν γαλακτοκομείων, ἡ συμμετοχὴ αὐτῶν ἐσημείωσεν ἕν ἀποφασιστικὸν βῆμα διὰ τὴν καθ' ὅλην τὴν ἔκτασιν τῆς χώρας ἐφαρμογὴν τοῦ προγράμματος καὶ ἠνάγκασε τὰ ὀλίγα ἰδιωτικὰ γαλακτοκομεῖα νὰ λάβουν καὶ αὐτὰ μέρος, εἰς τρόπον ὥστε περὶ τὸ τέλος τοῦ 1940 εἶχεν σχηματισθῇ ἕν δραστήριον μέτωπον καλύπτον ὁλόκληρον τὴν χώραν.

Δὲν εἶναι βεβαίως δυνατόν νὰ ἀντιμετωπίσῃ τις ἐργασίαν τοιαύτης ἐκτάσεως, ἐὰν δὲν διαθέτῃ ἐπαρκὲς εἰς ἀριθμὸν καὶ ἐκπαίδευσιν προσωπικόν, δύναται δὲ νὰ λεχθῇ ὅτι κατὰ τὰ ἔτη αὐτὰ οἱ κτηνίατροι τῆς χώρας μας ἠναγκάσθησαν νὰ καταβάλλουν ἐξουθενωτικὴν προσπάθειαν τὴν ὁποίαν ὅμως ἀντεμετώπισαν μὲ ἐνθουσιασμόν, ὁ ὁποῖος ἐγένετο ἔτι μεγαλύτερος, ὅταν βαθμιαίως τὰ ἀποτελέσματα ἤρχισαν νὰ γίνονται καταφανέστερα.

Ἀφ' ἑτέρου δὲν εἶναι δυνατόν νὰ ἐφαρμοσθῇ τοιοῦτον πρόγραμμα εἰς κλίμακα καλύπτουσαν ὁλόκληρον τὴν χώραν ἄνευ νομοθετικῆς καὶ οἰκονομικῆς ἐνισχύσεως ἐκ μέρους τῆς Κυβερνήσεως. Ὑπὸ τὴν καθοδήγησιν τοῦ Ὑπουργείου Γεωργίας, ἀντιπροσωπευομένου ὑπὸ τῆς Διευθύνσεως τῆς Κτηνιατρικῆς Ὑπηρεσίας, προτάσεις διὰ Νόμους καὶ Κανονισμοὺς κατηρτίσθησαν ἐν συνεργασίᾳ μετὰ τῶν ὑπευθύνων Γεωργικῶν καὶ Κτηνιατρικῶν Ὑπηρεσιῶν καὶ ἐπεκυρώθησαν ὑπὸ τοῦ Κοινοβουλίου.

Τοιοτοτρόπως ἐδημοιουργήθη μία ὁργάνωσις, ἥτις ἐιργάσθη ἀποτελεσματικῶς. Συμφώνως πρὸς ἐπισήμους ἀριθμοὺς δημοσιευθέντας ὑπὸ τῆς Διευθύνσεως Κτηνιατρικῆς κατὰ τὸ 1937, 26, 5 % τῶν ἀγελῶν δὲν περιεῖχον θετικῶς ἀντιδρῶντα ζῶα. Κατὰ τὰ ἐπόμενα ἔτη ὁ ἀριθμὸς αὐτὸς ἠὔξήθη βαθμιαίως καὶ σταθερῶς μέχρι τοῦ 1952, ὁπότε ἡ χώρα ἐκηρύχθη ἐλευθέρως βοείου φυματιάσεως μὲ τὴν ἐπιφύλαξιν ὅτι νέα μόλυνσις τῶν ἀγελῶν θὰ ἦτο δυνατόν νὰ ἐπέλθῃ ἐπὶ τινι ἔτη, ὀφειλομένη εἰς ἀγνώστους πηγάς, μεταξὺ τῶν ὁποίων κυριωτέραι εἶναι οἱ ἄνθρωποι, οἱ παρουσιάζοντες πνευμονικὴν φυματίαν ὀφειλομένην εἰς βάκιλλον φυματιάσεως βοείου τύπου.

Ὅταν τὰ εὐνοϊκὰ ἀποτελέσματα ἐκ τῆς ἐργασίας τῶν συνεταιρισμῶν κατὰ τῆς **φυματιάσεως τῶν βοοειδῶν** ἤρχισαν ἀναφαινόμενα, ἐγεννήθη ἡ σκέψις τῆς ἐνάρξεως παρομοίας ἐκστρατείας κατὰ τῆς **βρουκελλώσεως**. Ἡ ἐργασία ἤρχισεν εἰς νήσους τινάς, ἥδη ἀπαλλαγείσας ἐκ τῆς φυματιά-

σεως, ὑπὸ μορφὴν τοπικῆς προσπάθειας τῶν συνεταιρισμῶν πρὸς τὸν σκοπὸν τοῦ προσανατολισμοῦ αὐτῶν. Βαθμιαίως ὅμως ὅταν ἀπεκτῆθῃ σχετικὴ πείρα ἐπὶ τῆς ἐκριζώσεως τῆς νόσου ὑπὸ τῶν συνεταιρισμῶν τὸ πρόγραμμα ἐπεξετάθη εἰς ὁλόκληρον τὴν χώραν. Ἐνῷ δὲ εἰς τὴν ἀρχὴν δὲν εἶχε ληφθεῖ νομοθετικὴ μέριμνα, ἐγκαίρως ἐγένετο ἀντιληπτὴ ἡ ἀνάγκη εἰδικοῦ Νόμου, ὁ ὁποῖος καὶ τελικῶς ἐτέθη ἐν ἐφαρμογῇ κατὰ τὸ 1948. Ὁ Νόμος οὗτος βασιζόμενος ἐπὶ τῆς κτηθείσης ἤδη πείρας ἐκ τῆς καταπολεμήσεως τῆς φυματίσεως συνετέλεσε κατὰ πολὺ εἰς τὴν πρόοδον τῆς ἐργασίας.

Οἱ γαλακτοκομικοὶ συνεταιρισμοὶ κατόπιν γενικῆς συνελεύσεως ἀποφασίζουν ἐὰν θὰ συμμετάσχουν εἰς τὸ πρόγραμμα τῆς καταπολεμήσεως. Τὸ ἐνδιαφέρον ὅμως εἶναι τόσον μέγα ὥστε ὅχι μόνον σχεδὸν ὅλοι συνειργάσθησαν, ἀλλ' ἐξήσκησαν καὶ πείσιν ἐπὶ τῶν ιδιωτῶν, οἱ ὁποῖοι δὲν ἐπέδειξαν τὸ πρέπον ἐνδιαφέρον συμμετέχοντες εἰς τὴν ἐργασίαν ταύτην.

Δὲν εἶναι δυνατόν νὰ ἀναπτύξῃ τις ἐνταῦθα τὰς λεπτομερείας τῆς ἐσωτερικῆς ἐργασίας τῶν γαλακτομικῶν ὁργανώσεων. Δυνάμεθα ὅμως νὰ εἰπώμεν ὅτι αὐταὶ χρησιμοποιοῦν τοὺς κατὰ τόπους ιδιώτας κτηνιάτρους, οἱ ὁποῖοι προβαίνουν εἰς τὴν διάγνωσιν καὶ ἐνεργοῦν ὡς σύμβουλοι τόσον κατὰ τὴν ἐφαρμογὴν τοῦ προγράμματος ἐν γένει ὅσον καὶ κατὰ τὴν ἐκκαθάρισιν τῶν μεμολυσμένων ἀγελῶν. Σύμπασα ἡ κτηνιατρικὴ ἐργασία διενεργεῖται ὡς εἰκὸς ὑπὸ τὴν ἐπίβλεψιν καὶ καθοδήγησιν τῆς Διευθύνσεως Κτηνιατρικῆς, ἡ ὁποία μέσῳ ἀριθμοῦ Κρατικῶν κτηνιάτρων ἐπιβλέπει τὴν ἐφαρμογὴν τοῦ προγράμματος καὶ ἀντιμετωπίζει τὰ ἀναφυόμενα ζητήματα εἰς τὴν περιοχὴν τῆς ἀρμοδιότητός των.

Ἐφ' ὅσον οἱ γαλακτοκομικοὶ συνεταιρισμοὶ ἐργάζονται συμφῶνως πρὸς τοὺς προκαθορισθέντας κανονισμοὺς τότε ἀπολαμβάνουσι τῆς Κυβερνητικῆς ἐνισχύσεως. Τὸ ἥμισυ τῶν δαπανῶν τῆς κτηνιατρικῆς ἐργασίας καταβάλλεται ὑπὸ τοῦ Κράτους καὶ αἱ ἀναγκαῖαι ἐργαστηριακαὶ ἐξετάσεις (δοροσυγκολήσεις, ἐξετάσεις γάλακτος κλπ.) διενεργοῦνται δωρεὰν εἰς ἐξουσιοδοτημένα ἐργαστήρια.

Ὅταν οἱ γαλακτοκομικοὶ συνεταιρισμοὶ ἐργασθῶσιν ἐπιτυχῶς ἐπὶ χρονικόν τι διάστημα καὶ ἐπιτευχθῇ σημαντικὴ πρόοδος εἰς τὴν καταπολέμησιν, τότε λαμβάνουν μέρος εἰς τὴν τελειωτικὴν προσπάθειαν.

Πρὸς τοῦτο ὑπογράφεται νέα συμφωνία μετὰ τῆς Κτηνιατρικῆς Ὑπηρεσίας βάσει τῆς ὁποίας οἱ συνεταιρισμοὶ ἀναλαμβάνουσι τὴν ἀποπεράτωσιν τοῦ προγράμματος ἐκριζώσεως εἰς ὅλας τὰς ἀγέλας ἐκ τῶν ὁποίων λαμβάνουν γάλα.

Πολὺ συχνὰ ἔνιοι κτηνοτρόφοι δὲν ἐπιθυμοῦν νὰ λάβουν μέρος εἰς τὸ τελικὸν αὐτὸ στάδιον, ἐὰν ὅμως 90 % καὶ πλέον τῶν κτηνοτρόφων τῆς περιοχῆς ψηφίσουν ὑπὲρ τῆς τελείας ἐκριζώσεως τῆς νόσου, τὸ Ὑπουργεῖον τῆς Γεωργίας δύναται νὰ ἐπιβάλλῃ τὴν ἐξυγίανσιν τῶν ὀλίγων αὐτῶν

ἀγγελῶν. Εἶναι φυσικὸν ὅτι κατὰ τὴν προσπάθειαν τῆς καταπολεμήσεως τῆς νόσου εἰς τὰς μεμολυσμένας ἀγέλας συναντῶνται πραγματικὰ ἐμπόδια.

Πάντως τὸ ἐφαρμοζόμενον σύστημα βασίζεται ἐπὶ τῶν ἑξῆς ἀρχῶν :

- 1) Μέτρων ἀπομονώσεως καὶ ἀπολυμάνσεως.
- 2) Ἀπομακρύνσεως τῶν μεμολυσμένων ζώων, καὶ
- 3) Ἐμβολιασμοῦ.

Ἐὰν οἱ κτηνοτρόφοι ἐφαρμόσωσι τὸ συνιστώμενον ὑπὸ τῶν κτηνιατρικῶν ἀρχῶν πρόγραμμα, θὰ ἔχωσι τὴν οἰκονομικὴν ὑποστήριξιν κατὰ τὸ τελικὸν στάδιον, ὅπερ σύγκειται εἰς τὴν ἀπομάκρυνσιν τῶν θειτικῶς ἀντιδρῶντων ζώων ἢ ἀγέλη ἀπαλλαγῇ τῆς βρουκελλώσεως.

Ἡ ἀποκομισθεῖσα ἐκ πολλῶν χωρῶν πεῖρα, ἀπέδειξε πόσον δύσκολος καὶ δαπανηρὰ εἶναι ἡ ἐκρίζωσις τῆς νόσου ἐκ τῶν μεγάλων ἀγγελῶν κατὰ τὸ ὅξυ στάδιον ὅταν ἡ λοίμωξις εἶναι ἐν δράσει. Πρὸς τοῦτο καταβάλλεται προσπάθεια διὰ τὴν διαπαιδαγώγησιν τῶν κτηνοτρόφων εἰς τρόπον ὥστε νὰ καταστοῦν ἱκανοὶ εἰς τὴν ἐφαρμογὴν τῶν ὑγειονομικῶν μέτρων.

Εἶναι γενικῶς παραδεκτὸν ὅτι ὁ κίνδυνος μόλυνσεως ἐκ βρουκελλώσεως εἶναι κυρίως ἐντονος 3-4 ἡμέρας πρὸ τοῦ τοκετοῦ ἢ τῆς ἀποβολῆς καὶ 10-14 ἡμέρας κατόπιν. Τὰ ζῶα πρέπει κατὰ συνέπειαν, νὰ ἀπομονοῦνται κατὰ τὴν περιόδον τοῦ τοκετοῦ ἢ τῆς ἀποβολῆς, διὰ ν' ἀποφεύγηται ἡ μαζικὴ διασπορὰ μικροβίων ἐκ τῶν λοχιῶν, τὰ ὅποια πρέπει νὰ καίωνται ἢ καθ' οἷονδ' ἴποτε τρόπον νὰ καταστρέφονται.

Ἡ σπουδαιότης τῶν λελογισμένων προληπτικῶν μέτρων εἶναι μεγίστη. Ἐκτὸς τῆς προαναφερθείσης περιόδου τῆς ἀπομονώσεως τῶν μεμολυσμένων ζώων, ταῦτα ἐνσταβλίζονται εἰς εἰδικὴν θῆσιν τοῦ στάβλου ὅσον τὸ δυνατὸν πλησιέστερον πρὸς τὸν βόθρον. Ἐπίσης δὲ κατὰ τὴν περιόδον τῆς βοσκῆσεως τὰ μεμολυσμένα ζῶα πρέπει νὰ εἶναι ἀπομεμονωμένα. Ὁ ἀντικειμενικὸς σκοπὸς τῶν ἀνωτέρω μέτρων εἶναι ἡ ἐπίτευξις τῆς σταθεροποιήσεως τῆς καταστάσεως, εἰς τρόπον ὥστε νὰ εἰσέλθωμεν εἰς τὸ ἀποκαλούμενον χρόνιον στάδιον κατὰ τὸ ὅποιον δὲν λαμβάνουσι χώραν ἀποβολαὶ ἢ ἐὰν συμβαίνωσι τοιαῦτα εἶναι ἐλάχισται.

Ὁ ἐμβολιασμός, ὡς καὶ προηγουμένως ἀνεφέρθη, συντελεῖ τὰ μέγιστα εἰς τὴν ἐπιτυχίαν τῆς καταπολεμήσεως. Ἡ χρησιμοποίησις ὅμως αὐτοῦ πρέπει νὰ θεωρηθῇ ὡς εἷς ἀπὸ τοὺς κρίκους τοῦ συστήματος καὶ ἡ ἐφαρμογὴ του νὰ λαμβάνῃ χώραν εἰς τὰς περιπτώσεις ἐκεῖνας, εἰς τὰς ὁποίας εἰδικῶς ἐγκρίνεται ὑπὸ τῆς Διευθύνσεως Κτηνιατρικῆς. Τοιαύτη ἐγκρίσις χορηγεῖται μόνον ἐπὶ τόσον χρονικὸν διάστημα, ὅσον εἶναι ἀναγκαῖον διὰ τὴν τελικὴν ἐκρίζωσιν τῆς νόσου, συνήθως ἐπὶ ἓν ἔτος.

Τὸ ἐμβόλιον παρασκευάζεται πάντοτε ἀπὸ τὴν φυλὴν 19 καὶ χρησιμοποιεῖται μόνον εἰς μοσχίδας ἡλικίας 6-9 μηνῶν.

Ἡ πεῖρα εἶναι ἐκεῖνη ἡ ὁποία θὰ καταδείξῃ πότε ἡ προσπάθεια ἔφθα-

σεν εἰς εὐνοϊκὸν σημεῖον, δηλαδή εἰς τὴν ἀπομάκρυνσιν τῶν θειτικῶς ἀντιδρώντων. Πρὶν ἢ ὅμως προβῶμεν εἰς αὐτὴν πρέπει νὰ διενεργηθῶσι δύο ἕως τρεῖς ὁροσυγκολλήσεις ὅλων τῶν ζώων, ἡλικίας 12 μηνῶν καὶ ἄνω. Αἱ ὁροσυγκολλήσεις πρέπει νὰ ἐνεργῶνται εἰς διαλείματα 5-6 μηνῶν εἰς τρόπον ὥστε νὰ καταστῇ δυνατὴ ἡ ἐξακριβωσις ἐνδεχομένης ἐπεκτάσεως τῆς νόσου διὰ τῆς ἐμφανίσεως νέων θειτικῶς ἀντιδρώντων ζώων. Μόνον ἐφ' ὅσον δὲν ὑπάρχει αὐξήσις ἢ παρατηρεῖται καὶ μείωσις τοῦ ἀριθμοῦ αὐτῶν τότε προβαίνομεν εἰς τὴν ἀπομάκρυνσιν τῶν ἀνωτέρω ζώων.

Ὡς παραδείγματα τῶν κινδύνων, οἱ ὅποιοι δύνανται νὰ ἀπειλήσωσι τὰς ἐξυγιανθείσας ἀγέλας, ἀναφέρομεν: ἀγορὰν ἐξ ἀγνώστου ὑγειονομικῆς καταστάσεως ἀγελῶν, μεταφορὰν τῶν ζώων διὰ δημοσίων ὁδῶν καὶ ὀχημάτων, παραμονὴν τῶν ζώων εἰς κοινοχρήστους βοσκάς. Οἱ ταῦροι οἱ χρησιμοποιοῦμενοι διὰ τὴν τεχνητὴν σπερματέγχυσιν, πρέπει νὰ εἶναι ὑγιεῖς καὶ νὰ παραμένουν εἰς χώρους. ἔνθα δὲν ὑφίσταται βρουκέλλωσις. Εἶναι εὐνόητον ὅτι οἱ κίνδυνοι οὗτοι δύνανται ν' ἀποφευχθῶσιν εὐκολώτερον ὅταν τὸ πρόγραμμα ἐφαρμόζεται εἰς μεγάλην κλίμακα, ἐνῶ ἀντιθέτως οὗτοι ὑφίστανται ὅταν ἡ προσπάθεια διενεργεῖται ἀτομικῶς ἄνευ ἐπισήμου ἐνισχύσεως.

Πρέπει νὰ τονισθῇ ὅτι ἐν συγκρίσει μὲ τὴν καταπολέμησιν τῆς φυματιώσεως, κατὰ τὴν ἐφαρμογὴν τοῦ προγράμματος κατὰ τῆς βρουκελλώσεως ἀνευρίσκομεν πολὺ περισσοτέρας νέας μολύνσεις εἰς τὰς ἐξυγιανθείσας ἀγέλας. Τοῦτο πράγματι ὑπῆρξεν ἐν ἐμπόδιον, ἀλλὰ παρ' ὅλα ταῦτα σημαντικὴ πρόοδος ἐπιτυγχάνεται διὰ τῆς παρόδου τῶν ἐτῶν. Νῦν δὲ ὅτε ὁ ἀριθμὸς τῶν μεμολυσμένων ἀγελῶν βαθμιαίως ἐλαττοῦται θέλει ἀσκηθῇ μεγαλυτέρα πίεσις ἐπὶ τῶν τελευταίων ἐστιῶν μολύνσεως ἐκάστης περιοχῆς, διότι πᾶς τις ἀντιλαμβάνεται ὅτι μία μεμολυσμένη ἀγέλη δύναται εὐχερῶς νὰ καταστῇ κέντρον διαδόσεως τῆς νόσου ἰδίως εἰς τὰς περιοχὰς ἐκεῖνας, αἱ ὁποῖαι ἐκτρέφουν μέγαν ἀριθμὸν βοοειδῶν.

Ἐξετάζοντες τὰς στατιστικὰς τῶν μεμολυσμένων ἀγελῶν κατὰ τὴν πρώτην ὁροσυγκόλλησιν τὴν γενομένην ἐπὶ μεγάλῳ ἀριθμῷ ζώων παρατηροῦμεν ὅτι 30 % τῶν μεμολυσμένων ἀγελῶν περιεῖχον μόνον ἓν θειτικῶς ἀντιδρῶν ζῶον, 16 % περιεῖχον μόνον δύο καὶ 11 % περιεῖχον 3. Αἱ ὑπόλοιποι 13 % ἦσαν σοβαρῶς μεμολυσμένα. Οἱ ἀνωτέρω ἀριθμοὶ ἐκφράζουν τὴν αὐτοπεριοριστικὴν (self-limiting) φύσιν τῆς νόσου ταύτης καὶ τὴν σημασίαν τὴν ὁποίαν ἐνέχει ἡ ἀπομάκρυνσις τῶν θειτικῶς ἀντιδρώντων ζώων ἐκ τῶν ἐλαφρῶς μεμολυσμένων ἀγελῶν. Ἀποτελοῦν ἐπίσης σοβαρὸν ἐπιχέρισμα ὑπὲρ τῆς τάσεως ἣν ἔχει ἡ νόσος πρὸς αὐτόματον ἐξυγίανσιν.

Ὅσον ἀφορᾷ εἰς τὰς σοβαρῶς μεμολυσμένας ἀγέλας, αὗται διὰ τῆς βαθμιαίας ἐφαρμογῆς τῶν λελογισμένων μέτρων καθίστανται ἱκαναὶ νὰ φθάσωσι ταχύτερον εἰς τὸ στάδιον ἐκεῖνο κατὰ τὸ ὁποῖον ἡ ἀπομάκρυνσις τῶν θειτικῶς ἀντιδρώντων ζώων καθίσταται δυνατή. Ἡ ἀνωτέρω προ-

σπάθεια κατὰ συνέπειαν σκοπὸν ἔχει νὰ εὐνοήσῃ τὴν φυσικὴν τάσιν τῆς νόσου πρὸς αὐτοπεριορισμὸν ὅπως αὕτη παρατηρεῖται εἰς τὰς μικρὰς ἀγέλας.

**Χρησιμοποιούμενα διαγνωστικὰ μέσα.** Ἡ ὁροσυγκόλλησις εἶναι ἡ μέθοδος ἡ ὁποία ἐξ ὑπαρχῆς ἐχρησιμοποιήθη διὰ τὴν ἐξακρίβωσιν τῶν μεμολυσμένων ἀγελῶν καὶ ζώων.

Ἡ «δοκιμασία τοῦ δακτυλίου» τοῦ γάλακτος προστετέθη μεταγενεστέρως ὥς μία ἐξυπηρετικὴ καὶ ἀδάπανος μέθοδος διὰ τὴν ἐξακρίβωσιν μόνον τῶν μεμολυσμένων ἀγελῶν. Ἡ δοκιμασία αὕτη δύναται νὰ ἐφαρμοσθῇ διὰ τὴν ἔρευναν μιᾶς ὁρισμένης περιοχῆς, ἀλλ' ἐπίσης καὶ ὥς μία μέθοδος ἐλέγχου τῶν ἀγελῶν, εἰς τὰς ὁποίας ἐφαρμόζεται τὸ πρόγραμμα καταπολεμήσεως. Πρὸς τὸν σκοπὸν τοῦτον ὅλα τὰ γαλακτοκομεῖα, τὰ ὁποία ἔχουσιν ἀποδεχθῇ τὸ ἀνωτέρω πρόγραμμα, εἶναι ὑποχρεωμένα νὰ ὑποβάλλωσι πρὸς ἐξέτασιν τὸ γάλα ἐκάστης ἀγέλης τρεῖς φορὰς τὸ ἔτος. Ἰδιαίτερα δείγματα γάλακτος λαμβάνονται ἐξ ἐκάστου δοχείου ἐκάστης ἀγέλης, ὅταν ταῦτα παραδίδονται εἰς τὸ γαλακτοκομεῖον καὶ ἀποστέλλονται εἰς εἰδικῶς πρὸς τοῦτο καθορισθὲν ἐργαστήριον πρὸς ἐξέτασιν.

Κατὰ τὸν τρόπον τοῦτον παρακολουθοῦμεν τὴν ὑγιεινὴν κατάστασιν ἐκάστης ἀγέλης καὶ ἐπεμβαίνομεν ὁσάκις παρατηρεῖται θετικὴ ἀντίδρασις.

Ἀντικειμενικὸς σκοπὸς ἡμῶν εἶναι νὰ ἐπιτύχωμεν ὥστε πᾶσαι αἱ ἀγέλαι νὰ εἶναι ἐλευθέρα βρουκελλώσεως. Ἐννοεῖται ὅμως ὅτι δὲν χορηγεῖται τὸ σχετικὸν πιστοποιητικόν, ἔστω καὶ ἐὰν ἔχουν γίνῃ ἐπανειλημμέναι ἐξετάσεις τοῦ γάλακτος, εἰμὴ μόνον ἀφοῦ ἐξετασθῶσι διὰ τῆς μεθόδου τῆς ὁροσυγκόλλησεως πάντα τὰ ζῶα ἡλικίας ἄνω τῶν 12 μηνῶν καὶ ἀποδεχθῇ ἔλλειψις πάσης θετικῆς ἀντιδράσεως. Ἀλλὰ καὶ ἀφοῦ μία ἀγέλη θεωρηθῇ καὶ πιστοποιηθῇ ὡς ἐλευθέρη βρουκελλώσεως, τὸ γάλα ἐλέγχεται ἐξακολουθητικῶς εἰς τρόπον ὥστε νὰ ἀσκήται σοβαρὸς ἐλεγχος ἐπὶ τῆς ὑγιεινῆς καταστάσεως τῶν ζώων τῶν διαφόρων διαμερισμάτων τῆς χώρας.

Ἐὰν εἰς ἀγέλην, τῆς ὁποίας μέχρ' ἐν τούτῳ πάντα τὰ ζῶα ἀντέδρων ἀρνητικῶς, παρατηρηθῇ θετικὴ ἀντίδρασις σημαίνουσα ὅτι ἐσημειώθη ἀναμόλυνσις, λαμβάνει χώραν ἐνδελεχὴς ὁροσυγκόλλησις καὶ λαμβάνονται τὰ ὑγειονομικὰ μέτρα τὰ ἀποσκοποῦντα εἰς τὴν ἐξυγίανσιν αὐτῆς.

Τὰ προβλήματα τὰ ὁποία παρουσιάζονται εἰς αὐτὰς τὰς περιπτώσεις ἐπιλύονται δυσχερῶς. Κατὰ γενικὸν κανόνα ὁ ἰδιοκτῆτης πωλεῖ ἢ ἀπομονώνει αὐστηρῶς τὴν ἀγελάδα ἢ ὁποία ἀποβάλλει. Ἐν τούτοις συνήθως παρέρχεται μέγα χρονικὸν διάστημα ἕως ὅτου καταστῇ γνωστὸν πόσα ζῶα ἐμολύνθησαν.

Ἡ μηνιαία ὁροσυγκόλλησις πάντων τῶν ζώων ἀποτελεῖ ἓν καλὸν μέσον πρὸς τοῦτο. Ἐὰν ἐν μόνον ζῶον ἀντιδρῇ θετικῶς μετὰ τὴν πρώτην ἐξέτα-

σιν τοῦτο ἀπομονοῦται ἢ μᾶλλον θανατοῦται καὶ διενεργεῖται νέα ὁρσσυγκόλλησις. Ἐνῶ ἐὰν πλείστα ζῶα παρουσιάζωσι μόλυνσιν τότε πρέπει ν' ἀναλάβῃ τις μακροχρόνιον ἀγῶνα διὰ τῆς ἐφαρμογῆς ὑγειονομικῶν μέτρων ἀπομονώσεως καὶ ἐμβολιασμοῦ.

Ὡς καὶ προηγουμένως ἀνεφέρθη κατὰ τὸ ἔτος 1939 περίπου ὅτε ἤρξατο ἡ προσπάθεια τῶν συνεταιρισμῶν πρὸς καταπολέμησιν τῆς νόσου, 25% περίπου τῶν ἀγελῶν τῆς χώρας περιεῖχον θετικῶς ἀντιδρῶντα ζῶα. Ἐκτοτε ὁ ἀριθμὸς οὗτος βαθμιαίως ἡλαττώθη καὶ τὰ στοιχεῖα τὰ δημοσιευθέντα ὑπὸ τῆς Διευθύνσεως Κτηνιατρικῆς κατὰ τὸ τρέχον ἔτος, ἀποδεικνύουν ὅτι νῦν μόνον 5% τῶν ἀγελῶν εἶναι μεμολυσμένα.

Σημειωτέον ὅτι πλείσται νῆσοι ἀπηλλάγησαν τελείως τῆς βρουκελλώσεως καὶ εὐρεῖαι ἀγελαδοτροφικαὶ περιοχαὶ ἡλάττωσαν τὸ ποσοστὸν τοῦτο κάτω τοῦ ἡμίσεως τοῖς ἑκατὸν (0,5%). Περαιτέρω ἔνδειξις προόδου εἶναι ὅτι σήμερον 77% τῶν ἀγελαδοτροφικῶν συνεταιρισμῶν τῆς χώρας προώθησαν εἰς τοιοῦτον σημεῖον τὸ πρόγραμμα, ὥστε εἰσῆλθον εἰς τὸ τελικὸν στάδιον αὐτοῦ μὲ τὴν πρόβλεψιν ὅτι πᾶσαι αἱ ἀγέλαι αἱ ἀνήκουσαι εἰς τοὺς ἀνωτέρω συνεταιρισμοὺς θ' ἀπαλλαγῶσι τῆς βρουκελλώσεως ἐντὸς τριετίας. Εἰς τὰς περιπτώσεις ἐκείνας εἰς τὰς ὁποίας ἀγελαδοτρόφοι τινὲς δὲν σημειώνουν τὴν ἐπιθυμητὴν πρόοδον, λαμβάνονται ὑπὸ τῶν συνεταιρισμῶν διάφορα μέτρα, μεταξὺ τῶν ὁποίων καὶ ἡ ἐλάττωσις τῆς τιμῆς τοῦ παραδιδόμενου ὑπ' αὐτῶν γάλακτος κ.λ.π.

Δὲν ἀρνούμεθα ὅτι ἐν ἀρχῇ πλείστοι ἀντεμετώπιζον μετὰ σκεπτικισμοῦ τὴν ἐπιτυχίαν τοῦ προγράμματος ἐκριζώσεως τῆς βρουκελλώσεως. Ἐν τούτοις ὅταν βραδύτερον ἐδημοσιεύοντο τὰ εὐνοϊκὰ ἀποτελέσματα τὰ ἐπιτυχανόμενα εἰς διαφόρους εἰδικῶς ἐπιλεγείσας πρὸς πειραματισμὸν περιοχὰς ἐσημειώθη αὕξησις τοῦ ἐνδιαφέροντος τῶν συνεταιρισμῶν καὶ βαθμιαίως ἡ συσσώρευσις τῶν ἱκανοποιητικῶν ἀποτελεσμάτων μετέτρεψε τὸν σκεπτικισμὸν εἰς αἰσιοδοξίαν.

Σήμερον πλείστοι προβλέπουν ὅτι ἡ τελικὴ ἐξυγίανσις θέλει ἐπιτευχθεῖ ἐντὸς μιᾶς πενταετίας. Ἐν τούτοις θεωρῶ ὅτι ὁ καθορισμὸς μιᾶς χρονολογίας οὐδεμίαν ἀξίαν ἔχει καὶ πιστεύω ὅτι τὸ τέλος τοῦ προγράμματος πλησιάζει καὶ ὅτι ἐντὸς ὀλίγων ἐτῶν θέλει ἀχθῆ εἰς αἶσιον πέρας.

K.B.T.

## ANIMAL BRUCELLOSIS IN DENMARK METHODS OF CONTROL AND ERADICATION

by

H. C. BENDIXEN

Professor of Special Pathology and Therapeutics  
The Royal Veterinary and Agricultural College  
Büllowsvej - Copenhagen

Since Bernhard Bang in collaboration with Vald. Stri-bolt in 1896 for the first time isolated and described the organism of contagious abortion in cattle under the name of *Bacterium abortus*, which later on was changed to *Brucella abortus*, this disease has attracted increasing attention on account of its great economic importance for Danish cattle breeding. During the last century a typical intensified dairy industry has been developed with increasing yield of the cows.

The cattle population of the country amounts to about 3.1 million heads distributed over a little more than 200.000 herds, which means that the average Danish cattle herd contains around 15 animals out of which 7.5 are milking cows.

Bovine brucellosis caused by *Brucella abortus* constitutes beyond comparison the main brucellosis problem. By extensive blood testing it was found at the end of the 30 'ies that about 25% of our cattle herds contained brucella reactors. *Brucella suis* has been found as the cause of a limited epizootic in swine in 1929, but this infection was again totally eradicated in 1931 by means of blood testing, isolation, and slaughter of animals in infected herds. A new limited epizootic of the same kind was found in 1951, but it was very soon brought under control.

Brucellosis in sheep and goats has never been demonstrated. The number of these animals is, however, very limited.

Human brucellosis is now found in about 200 individuals per year, compared to 600. 25 years ago.

From the very beginning research work has been carried out at The Royal Veterinary and Agricultural College and The State Veterinary Serum laboratory. The latter functions at the same time as diagnostic centre of practical routine examinations, which is a necessary part of the eradication programme. Simultaneously, a number

of small laboratories for diagnostic work have been established in certain districts of the country. The results of all these examinations are due to be reported to The Veterinary Directorate, which is under the Ministry of Agriculture. The Directorate is the administrative body of all civil veterinary matters, and thus also in charge of the official management of control and eradication measures concerning infectious animal diseases in general.

Many years have passed since the abortus bacillus was demonstrated for the first time. Gradually, the growing knowledge contributed to the use of preventive measures aiming at protecting the individual herds against introduction of the disease. It was found that brucellosis in small herds is of a self-limiting nature.

An account of blood testing of 60.000 herds of different sizes are given in Table I. (\*)

TABLE I.

No of animals per herd	1-5	6-10	11-20	21-30	31-50	51-70	76-100	over 100
pct of herds containing reactors	9	16	30	45	58	77	78	94

Table I demonstrates clearly that most of the large herds were infected and thus representing the heavy end of the eradication problem. The smaller the herds are the lower is the percentage containing reactors. Together with the efforts to control the disease in individual herds should also be mentioned that during the 20 'ies and 30 'ies vaccination of heifers with living cultures of brucella bacteria in herds with clinical abortion became rather common, and no doubt it lowered the economic losses of the disease. This was especially evident in such big herds where systematic vaccination of all virgin heifers were carried out year by year.

In the cases where vaccination was carried through in this way in connection with such hygienic measures, as isolation of animals in special boxes or stables during the period of birth and the following 10 to 20 days, combined with destruction of discharges from deliveries and abortions, a stabilisation could sooner be reached because the number of new reacting animals was reduced.

In this way herds could more easily be made ready for total era-

\* Published by F. Woldike Nielsen, Veterinary Director.



dication of the disease by means of blood testing and slaughter of reacting animals.

One of the difficult things on the way forward towards a country-wide programme for control and final eradication of a chronic infectious disease as bovine brucellosis is to create the right form of organization by means of which all justified interest—practical and economic as well as professional and scientific—may be expressed. To this end a lot of experience was available from many years work, in an organised eradication programme on bovine tuberculosis. Under the leadership of Bernhard Bang a patient, but energetic and never ceasing educational work on the nature and control of tuberculosis started about 1890, and during the following decades up till about 1920 a great number of individual herds belonging to interested owners was freed from the disease.

It was, however, not earlier, than in the 20 'ies that the leading agricultural organizations inspired by practising veterinarians started giving not only moral, but also practical and economical support to the eradication programme. At that time cooperative dairy circles started carrying through tuberculin testing in all herds belonging to their members, and eradication measures were stimulated in those herds, which were found infected. More and more circles started organised work and in the beginning of the 30 'es all the cooperative dairy circles of the country (about 1500) joined the programme.

As they represent 85 % of all the creameries a decisive step in a country-wide work was taken, and the few private creameries had to follow up and an active front covering the whole country was made effective during the 30'es.

It is, of course, not possible to handle work of this extent without a sufficiently big staff of trained personnel, and it may be said that these years gave our veterinarians an almost overwhelming amount of work, although from the time of the pioneers it was met with enthusiasm, and gradually as encouraging results from different districts were evident, this feeling was further stimulated.

No country-wide programme of this kind can be carried through without legislative and economic support from the government. Under the guidance of the Ministry of Agriculture represented by its Veterinary Directorate proposals for laws and regulations were elaborated in collaboration with the responsible agricultural organizations and the veterinary organization and passed through Parliament.

In this way an organisational instrument was created, which

showed work effectively. According to official figures published by the Veterinary Directorate, it was in 1937 only 26.5 % of the herds which did not contain reactors. During the following years this figure increased constantly until 1952, when the country could be declared free from bovine tuberculosis with the reservation that new infections of herds may occur for some years ahead caused by infection from some hidden sources among which the most prominent is human beings with pulmonary tuberculosis caused by tubercle bacilli of the bovine type.

When the successful results of the cooperative work against bovine tuberculosis started to demonstrate themselves, a growing interest to develop a similar campaign against bovine brucellosis asserted itself. The work was started as a local, cooperative orientating work on certain islands, which at that time had been made free from tuberculosis. Gradually, when special experience had been gained in cooperative eradication of this disease, the programme was brought to work all over the country. Starting without official law regulations, the point was soon reached where such rules were imperative for further progress and in 1948 a law was brought into force. As it was based on comprehensive experience already gained from the tuberculosis campaign it at once yielded a great stimulus to progress.

The dairy circles themselves are through their general meetings deciding if they will join the programme. The interest has been so great that nearly all of them have cooperated and in this way their executive committees have been able to put pressure on such single owners, who have not shown any interest in taking active part in the work.

It will not be possible to go into details as to how the dairy organizations work inside their member circles. They engage, however, the local veterinarians, who do the diagnostic work and in all respects function as advisers concerning the implementation of the programme in general as well as the special efforts which are to be made in the infected herds aiming at cleaning the guidance and supervision of the Veterinary Directorate, which has a number of state veterinarians taking care of the development and of existing problems in their respective provincial districts.

If a dairy circle is working properly according to the rules agreed upon when starting, it will get support from governmental funds. Thus half of the expenses to the veterinary work will be reimbursed

by the State and all laboratory examinations (blood and milk samples etc.), which are due to be performed at an authorised laboratory are free of charge.

When dairy circles have worked in the programme for some time and a certain progress has been demonstrated, the organisation is supposed to join the so called finalising plan. To this end a new agreement between the circle and the veterinary administration is made according to which the former undertakes to terminate the eradication programme in all herds from which milk is received.

Very often a few owners are not willing to cooperate at this stage, but if 90 % or more of the cattle owners of the district in question vote in favour of total eradication of the disease, the Ministry of Agriculture is authorised to force through the cleaning of these few herds.

Real obstacles to the progress of the campaign are, of course, met with in many of the infected herds. According to the state of disease the principles of control work may be conducted in different ways in such herds.

The main principles followed are :

1) Measures of isolation and disinfection ; 2) Removal of infected animals ; 3) Vaccination.

If the owners follow the plan recommended by the veterinary authorities, they will get economic support at the time when the herd is ready for final elimination of reactors to make it free of brucellosis.

Experience from many countries has revealed how difficult and expensive it is during the acute and active stage of infection to eradicate the disease in herds of considerable size. For this reason special stress is laid upon the education of the owners and managers so as to make them competent to carry through the hygienic measures.

As generally recognized, the risk of infection with brucellosis is in a dominating degree concentrated on the last 3-4 days before calving (abortion) and the first 10-14 days thereafter.

Animals should be isolated during the period of calving or abortion to prevent the massive spread of bacteria from the deliveries, which should be burnt or in other ways carefully destructed.

The importance of rational preventive measures cannot be emphasized strongly enough. Apart from the above mentioned period of isolation infected animals are kept together in the stable at a place

as close to the sewer as possible, and also during the grazing season such group isolation is carried through as far as possible. In this way it is attempted to stabilize the situation in such herds as soon as possible. In other words the purpose is to reach the so-called chronic stage where no - or at any rate very few - abortions take place.

Vaccination has - as previously mentioned - proved to be a valuable aid in this work. The use of it is, however, incorporated as a link in the organisational system, and vaccination must only be carried through in the cases where licence is given by the Veterinary Directorate. Such a licence will not be given for longer periods than supposed to be necessary to reach the time for total elimination of the disease - in general one year at a time.

Vaccine is always prepared from strain 19, and vaccination only takes place in the case of calves aged six to nine months.

Experience must decide when the favourable stage - elimination of reactors - is reached, but it is very important to get two or three blood testings of all animals more than 12 months old before any decision is taken. The testings must be carried through at intervals of at least 5-6 months to render it possible to see if spreading still is going on, which is proved by the appearance of new reactors. Only if spreading has ceased or decreased considerably, it is expedient to remove the reactors.

Many details should, of course, be considered during the control work within the individual herds as well as interactions between different herds during the area programme, but at this occasion it will not be possible to go into details.

As examples of things involving great risk of introduction of the disease into free herds may be mentioned: purchase of animals from herds not known to be free of the disease; transportation of animals along public roads and in public vehicles; placing of animals on pastures accessible to animals from other herds as well. Bulls used for artificial insemination must be kept in brucellosis-free premises and be healthy themselves. Such kinds of spreading possibilities are, of course, more easily regulated and finally avoided in the case of an area programme than where individual herds are working without sufficient official support.

It should also be mentioned that when compared to the findings during the tuberculosis eradication programme, many more new infections appeared in clean herds during the development of the brucellosis programme. This has, of course, been an obstacle, but in spite

of all, progress could be demonstrated year after year. Now when the number of infected herds has gradually diminished, a stronger pressure will be put on the last infected herds in a certain area because it is realised that an infected herd may easily be a rather active spreading centre, especially in districts with a dense cattle population.

On looking a little into the statistics of infected herds, it has appeared on the basis of the first diagnostic testing of a big group that about 30 % contained only one reacting animal; 16 % contained only two reactors, and 11 % contained 3 reactors. The remaining 43 % were severely infected. These figures should be looked upon as an expression of the self-limiting nature of the disease, and the importance of elimination of the reactors from the slightly infected herds appears to be very evident. It may, in general, be regarded as a strong support of the spontaneous tendency to self-cleaning.

When, at the same time, the severe-infected herds are brought under rationally conducted control and gradually made able to sooner reach the stage where total elimination of reactors can be carried through, it is understood that the campaign is proceeding in a manner which may be characterised as an effective support of the natural self-limiting tendency of the disease in the individual herds. This support has proved to be strong enough to bring the spontaneously developed balance in our cattle population between occurrence of new infections and the tendency to self-limitation into a position in favour of an increasing number of healthy herds.

**The Diagnostic Methods Used.** The Blood Serum Agglutination Test has from the beginning been the method used to point out infected animals and herds too, of course.

Later the Milk Ring Test has been added as a valuable supplemental and inexpensive method, which is used on a herd basis only. The test may be applied in survey investigations inside a certain area, but it is now also used as a running check-test on all herds submitted to a cooperative programme. To obtain this, all creameries, which have joined the official programme, are obliged to have the milk examined from each herd three times a year. Separate samples are to be taken from each milk can of all the herds when arriving at the creamery and then sent to an authorized laboratory for testing.

In this way it is possible to follow the individual herds and interfere if some reactions turn up.

It is the aim to get all herds officially registered as brucellosis-

free. Even if a herd has passed ever so many negative milk ring tests, it will not receive the registration certificate until blood testing of all animals over 12 months of age has demonstrated total absence of reactors.

Also after registration the milk from such herds is continuously submitted to the Ring Test. In this way it is rendered possible to have a rather reliable check on the situation in the different districts.

If a hitherto negative herd starts to show sign of reaction indicating that infection may have been introduced, a thorough examination and blood testing is going to take place and measures will be taken to ensure elimination of the disease from the herd as soon as possible.

Problems met with in such cases are rather difficult. In general, the owner sells or totally isolates the cow which aborts first; but it will often last a number of months before it is evident how many animals have been infected.

Blood testing of individual animals with one month's interval is a valuable help. If after one month only a single new animal shows reaction, it must be isolated and even slaughtered, and a new blood testing must be awaited for.

If several animals show sign of infection, it is considered advisable to take up the combat for a considerably longer time by means of hygienic measures, isolation, and vaccination.

As previously mentioned, about 25 % of the herds of the country contained reactors at the time when the cooperative work started (about 1939). Since then this figure has gradually decreased and the last figure published this year by the Veterinary Directorate shows that not more than 5 % of all herds is infected.

Many islands are now totally free and important, large breeding districts have diminished the percentage to less than 0,5 %. A further 77 % of all dairy circles in the country has developed the programme to the point where they have been able to pass a regulation according to which they enter the finalising plan with a fixed period of three years until all herds inside the dairy circles in question are totally free of brucellosis. The resolutions are combined with several provisions, i. e. reduction in price of milk etc. applying to such owners who are not making progress as expected.

It should not be denied that the eradication programme in the beginning was regarded with scepticism from different sides. However, when the results from orientating eradication experiments inside

selected areas were published, a remarkable increase in the interest was noted and gradually as the country-wide programme developed and important results were demonstrated, the optimism accumulated.

At present some people are tempted to predict that the goal will be reached in less than 5 years. However, as it is of little importance to fix a certain date, I will restrict myself at this occasion to state that the end of the programme is approaching and it will probably be reached within some years.

## Η ΟΞΕΙΑ ΤΟΞΙΚΗ ΕΓΚΕΦΑΛΟΠΑΘΕΙΑ ΤΩΝ ΙΠΠΩΝ \*

### (CORNSTALK DISEASE)

(ΤΑ ΠΡΩΤΑ ΚΡΟΥΣΜΑΤΑ ΕΝ ΕΛΛΑΔΙ)

Υπὸ

Κ. ΤΑΡΛΑΤΖΗ, Α. ΣΠΑΗ καὶ Ν. ΧΑΡΙΣΙΑΔΗ

Κτηνιάτρων Μικροβιολόγων - Νομοκτηνιάτρου

(Ἐκ τοῦ Κτηνιατρικοῦ Μικροβιολογικοῦ Ἰνστιτούτου Ὑ. Γ.)

### Ι. ΕΙΣΑΓΩΓΗ

Κατὰ τοὺς κλασσικοὺς συγγραφεῖς αἱ ἐγκεφαλοπάθειαι τῶν ζώων διακρίνονται ὡς γνωστόν: 1) Εἰς ἐγκεφαλοπαθείας φύσεως κυκλοφοριακῆς (ἀναιμία, συμφόρησις, αἰμορραγία, ἡλίασις καὶ θερμοπληξία, ἤλεκτροπληξία, διάσεισις καὶ μαλάκυνσις). 2) Εἰς ἐγκεφαλοπαθείας φύσεως φλεγμονώδους, (Μηνιγγίτις, ἐγκεφαλίτις, μηνιγγοεγκεφαλίτις κλπ.) καὶ 3) Εἰς ἐγκεφαλοπαθείας φύσεως ἐκφυλιστικῆς ὀφειλομένης εἰς αἷτια μηχανικά, στερεητικά καὶ τοξικά.

α) Μηχανικά αἷτια εἶναι ἐκεῖνα τὰ ὁποῖα ἐπιφέρουσι τὴν συμπίεσιν τοῦ ἐγκεφάλου ὡς π. χ. ὁ χρόνιος ὑδροκέφαλος, τὰ νεοπλάσματα, οἱ τερατολογικοὶ σχηματισμοί, ὡς καὶ αἱ μικροβιακῆς ἢ παρασιτικῆς φύσεως ἐξεργασίαι, π. χ. φυματίαισις, ἀκτινομυκητιάσις, κυστικέρκωσις, ἐλχινοκοκκίαισις, κοινόυρωσις κλπ.

β) Στερεητικά αἷτια εἶναι τὰ προκαλοῦντα διαταραχὰς διὰ τῆς ἀπουσίας οὐσιωδῶν συστατικῶν τοῦ ὄργανισμοῦ καὶ περιλαμβάνουσι τὰς μεταλλοπενίας καὶ τὰς βιταμινοπενίας.

Ἀπὸ τῆς ἀπόψεως τῶν εἰς μεταλλοπενίας ὀφειλομένων ἐγκεφαλοπαθειῶν ἰδιάζον ἐνδιαφέρον παρουσιάζει ἡ ἔλλειψις χαλκοῦ.

(\*) Ἀνεκοινώθη κατὰ τὴν Συνεδρίασιν τῆς Ἑλλ. Κτηνιατρικῆς Ἑταιρείας τῆς 18.2.53.