

PART B.

THE AETIOLOGICAL SIGNIFICANCE OF INFECTIOUS VAGINITIS TO STERILITY IN BOVINES IN SOUTH AFRICA.

The question of the aetiological significance of infectious vaginitis to sterility in cattle is one over which there is much controversy between veterinarians. The difference of opinion not only exists between veterinarians of different countries, but between the observers of each country. However, there is a tendency for the observers of each country to lean towards the same view. The great majority of veterinarians in Switzerland and Holland believe that the disease plays an important part in the causation of sterility, while those of Denmark and America believe its economic significance in the breeding of cattle is negligible. Most observers, however, although they support the latter view, admit that the question requires further investigation. They further recommend that under certain circumstances where sterility is present in a herd, in the absence of serological proof of contagious abortion and of pathological lesions in the ovaries, Fallopian tubes, uterus and cervix, where infectious granular vaginitis is definitely diagnosed it should be energetically treated.

The opinions of the highest authorities on obstetrics in countries where the disease has been studied within the last quarter of a century are interesting.

Williams (1), who does not commit himself to a definite opinion, states:—

“It is perfectly clear that the nodular venereal disease has not been proven to be the direct cause of sterility or abortion in cattle or in other domesticated animals, whether it does or does not directly cause sterility or abortion, clinical evidence indicates clearly that it is a disease which merits the respectful attention of investigator, practitioner and breeder.”

Nielson (25) states:—

“I am of opinion that it commonly causes sterility in heifers and that it is possibly the most frequent cause of the failure of heifers to conceive in spite of repeated services. Concerning this sterility in heifers, we are thus standing before an unsolved problem which richly deserves further investigation.”

Albrechtsen (2), who must be considered as one of the leading authorities, states:—

“I have been unable to demonstrate the connection between follicular vaginitis and sterility,” and again, “I look upon follicular vaginitis as a non-malignant disease, which has nothing to do with sterility or at least is seldom associated with it, and the treatment of which is without influence on normal breeding.”

Richter (8) is of the same opinion as Albrechtsen, but he indicates the possibility of the disease having become less virulent since Hess published his opinion. It is rare, he

states, to find an acute purulent infectious vaginitis in middle Germany such as was described by Hess 20 years ago.

Hess (3) who was one of the first observers to draw attention to the disease, states:—

“The disease is in my opinion, and according to my experience and researches, of great significance as the cause of sterility in cattle. It appears as an enzootic or epizootic and in some districts on account of infection of the bull, is very prevalent. It appears in 75 per cent. as a chronic condition and in 25 per cent. as an acute condition.”

Hess further associated the disease with early abortion from the fourth to 12th week of pregnancy. He states:—

“Another interesting fact is that cows 6, 9, 12 to 21 weeks after service, show a purulent discharge from the vagina as a result of death of the foetus followed by maceration and endo-metritis chronica purulenta.”

Zschokke (4) states:—

“It has been proved that the disease may become the cause of sterility. Sometimes the bull loses the desire to copulate, sometimes the cows and heifers will not allow copulation, although they are in normal oestrus, or when conception follows, according to Obrecht, 20 to 60 per cent. of the cows abort.”

Knell (5) states:—

“I recognise the importance of other conditions such as contagious abortion and pathological changes in the genital tract such as have been described by Hess. Often enough these conditions do not receive sufficient consideration. My observations, however, force me to consider the infectious vaginitis as an independent infectious disease. In several cases in the absence of all other causes of sterility it delays conception or causes total sterility associated with repeated or permanent oestrus.”

Martens (6) states:—

“I have not observed infectious catarrh of the vagina as of undoubted aetiological significance in the causes of sterility.”

Webster (16) states that the disease as a cause of sterility has been exaggerated in Holland. He indicates, however, that the exudate in acute inflammation of the vagina is toxic to spermatozoa, even after the acute symptoms have subsided.

Further quotations could be given from several veterinarians of high repute, but those mentioned above from several of the most reliable observers give an idea of the absolute different opinions held.

In South Africa until recent years the disease did not receive any attention from our profession. It was first recognised as being existent in 1912-13 in Natal. In 1920 owing to the prevalence of sterility in some of the pure-bred herds in Natal the attention of the Division of Research was brought to the question and advice sought.

At that time most of the observations were carried out by a Swiss graduate, who perhaps followed the teaching of Hess. In certain herds where investigations were made and vaginitis was present it was inculpated as the cause of a high percentage of cows returning to the bull. In some herds which were treated for acute vaginitis, however, there was no history of sterility. Enquiries later came from veterinarians in the Field Division as to the prevalence of infectious vaginitis and how it should be treated. It is feared that treatment was undertaken in a somewhat promiscuous manner and that sufficient investigation was not given to other possible causes of sterility. It was taken for granted that if vaginitis was diagnosed in a herd, in the absence of serological proof of contagious abortion, that it was the cause of sterility. On this account little value can be placed on the observations made at the time and it is feared that the aetiological significance of the disease to sterility in this country has been very much exaggerated.

In considering the significance of the disease to breeders the following questions must be discussed:—

1. Does infectious vaginitis play an important rôle in the causation of sterility in bovines?
2. Should treatment be adopted to combat the disease?

These questions cannot be entirely discussed and conclusions drawn from the experience of other countries, as the prevailing climatic and other conditions may modify the disease; its virulence may be either exalted or attenuated. The disease must be considered as it occurs in South Africa. Further there is sometimes reason to ask the question whether the purer breeds of cattle may not be more susceptible than the more resistant native and cross-breeds, since it is not uncommon to find pure-bred cattle suffering from sterility while a grade herd on the same farm is entirely unaffected. When this latter question is carefully investigated it is found, however, that the conditions under which both herds are run are not exactly similar. In beef breeds the grade herd is run under ranching conditions while the pure-breds are housed and receive a supply of concentrates so that there is more intimate contact and thereby more danger of spread of infection. In milking herds where contact of the pure-bred and grade cattle occurs daily no such difference in susceptibility appears.

In 1901 von Oestertag (7) pointed out that the swollen follicles in the mucosa were not the characteristic symptoms of the disease, but that the infectious nature of the discharge from the vulva was of a primary importance. Zschokke (4) was of the same opinion. Others, however, regard the swollen lymph follicles as a pathognomonic symptom of the disease.

Systematic clinical examination has shown that the diagnostic symptoms in the case of the acute condition are:—

Marked contagion and acute inflammatory lesions with swelling in the vulvar lips and mucosa, followed by swelling of the lymph follicles, muco-purulent exudate, sensitiveness of the mucosa vaginae, straining after copulation and matting of the vulvar tuft of hairs.

The nodules due to hyperplasia of the normal lymph-follicles are not the chief clinical symptom through which the disease can be

recognised. Several well known observers do not place much importance on the presence of this follicular hyperplasia. They are certainly not of pathognomonic importance since they do occur in non-contagious forms of colpitis.

It is possible to differentiate between a peracute and acute stage, when the exudate is fairly profuse. A chronic stage follows in which there is little or no exudate and the follicles begin to disappear. The mucosa of the vulva and vagina becomes its normal pale pink colour. The transition to the chronic stage is sometimes fairly rapid, only a few weeks, sometimes it is very slow, taking several months. In the chronic stage the disease does not seem to be infectious. Martens (6) says the infection is absent long before the swollen follicles have disappeared.

Infectious vaginitis was at one time thought to be a most fertile cause of abortion; as already explained this was the belief of Hess. At the present time no veterinarian who has carried out careful observations holds this opinion. Williams, Wester, Albrechtsen, and Richter, and others have published observations which are sufficiently convincing to contradict this view. There is no doubt that the *Bacillus of Bang* is the chief cause of sterility in bovines. Further, since the work of Hess (3) and Albrechtsen (2) was published the prevalence of disease of the ovary, Fallopian tubes, uterus and cervix and the part they play in the causation of sterility is known. It may be argued that these diseases are secondary to vaginitis, but the absence of metritis of abortion, cervicitis and metritis due to other organisms, not recognised as infectious, must first be proved before infectious vaginitis can be inculcated. It is not maintained that Bang's bacillus will cause pathological lesions associated with sterility. In fact, a uterus may undergo complete involution and be free from *B. abortus* in three weeks after parturition. It is unusual to find infection by this organism present six weeks post partem. Early abortion and the frequency of placental retention, however, do open the portals for secondary infection, so that contagious abortion must be looked upon as the chief pre-disposing cause to the pathological lesions associated with sterility.

The question arises, if infectious vaginitis does cause sterility or prevention of conception, how is this brought about? The literature on the subject is far from convincing.

Schönhoff (12) believes that it is due to the cramplike closure of the ostium uterinum externum, due to reflex action from irritation of the vagina.

Ellinger (13) believes that the irritation of the vagina causes too early ejaculation of the semen through straining. This would seem unlikely since it would be quite impossible to expel all the spermatozoa from the anterior extremity of the vagina, even assuming that none have entered the orificum externum.

Pfeiler (14) maintains that infectious vaginitis as such is not responsible for sterility but that the endocrine system associated with conception and pregnancy is influenced by the disease.

Wester (16) and Knell (5) maintain that the spermatozoa are destroyed by the unphysiological vaginal secretion of infectious vaginitis before they can reach the Fallopian tube. Wester has shown the presence of spermatoxin in the exudate.

It is well known that spermatozoa die quickly in the normal vaginal secretion *in vitro*. They live longer in physiological saline. Much interesting work has been carried out by Wester (16) on the toxicity of various chemical substances and body liquids on spermatozoa. He indicates that the exudate from the inflamed vaginal mucosa is toxic.

Schlichte (11) took the spermatozoa of a young strong two year old bull, whose fertility could not be questioned, from the vagina of a cow after service. He mixed the spermatozoa with the vaginal secretion of a normal cow, with physiological saline and with the vaginal secretion of a cow suffering from acute infectious vaginitis. The spermatozoa mixed with secretion from a normal cow lived $\frac{3}{4}$ - $1\frac{1}{2}$ hours, that in physiological saline showed movement after three hours, that mixed with the vaginal secretion of the cow with vaginitis lived only $\frac{1}{2}$ an hour. Wester (16) carried out similar experiments with the same result.

Whether the same result takes place *in vivo* would require proof. However, there would appear to be something present in the pathological mucous exudate of infectious vaginitis which is toxic to spermatozoa *in vitro*.

The view held by Wester (16) and Knell (5) is at the present time that universally accepted by those who believe that infectious vaginitis plays an important part in the causation of sterility.

The disease is wide spread throughout South Africa especially in milking herds where the facilities for the spread of disease, such as close housing and intimate contact, are more evident. However, in Natal it does not spare the beef breeds. It is believed by veterinarians and stock owners to be the main cause of sterility in bovines in that province. This view, however, would not appear to be upheld when the cause of sterility is carefully investigated. Many of the herds in Natal, where complaints regarding sterility and cows returning to the bull had been brought to the notice of the Research Division, were visited recently. With few exceptions the sterility could easily be explained in the presence of abortion, or pathological lesions in the genitalia associated with permanent or temporary sterility. These pathological conditions cannot be regarded as secondary to vaginitis but mainly to the metritis of abortion. In some cases where 30 to 40 per cent. of the cows were sterile or returning to the bull the condition could be explained as functional sterility due to errors in feeding, with insufficient exercise, etc. The sufferers were without exception cattle which had been maintained in high condition for show purposes and which got little exercise. It must be understood that a ration too rich in carbohydrates and low in vitamin, protein and phosphates is not associated with high fertility. While such a ration in the presence of insufficient exercise produces obesity, a condition absolutely incompatible with conception. The state of low fertility in such animals is probably associated with upset of the hormone secretion. What endocrines glands are involved is not known. That the hormones secreted in the ovary itself are inabundant appears to be without doubt as proved by the results obtained in these cases by the injection of oestral hormone (Murphy, McNutt, Zupp (18) and Aitken (17), Frank and Goldberger (24), McNutt (19), Murphy (20), Marshall (21), Frank, Kingery, Gustavson (22), [Zupp, Murphy (23)]. It is likely that a combination of

the endocrine glands, not the ovary alone, are hyposecretive. Pathological examination, however, shows that ovary is as a rule inactive. Cattle in low condition as a result of insufficient food also suffer from oestral abeyance and temporary sterility. Richter (8) has recently made interesting observations in this connection. No doubt the explanation of unbalanced hormone secretion also holds good in this case.

There were many cases where irrational treatment had been undertaken; treatment which would be prohibitive to conception in the absence of disease of the genitalia. In some of these instances no evidence of vaginitis in a culpable form could be found. The genitalia of the cows were normal. The drastic treatment which was faithfully continued was the sole cause of sterility. It has been pointed out that spermatozoa do not long survive in the normal vaginal secretion. It is therefore unlikely as Wester (16) demonstrated that they will survive strong irritant disinfectants even for a few minutes. To illustrate the drastic and barbarous method used in the treatment of infectious vaginitis one example can be given. A stockowner maintained a herd of 70 pure-bred and grade Frieslands of a really good type. About two years ago cows began to return to the bull. The condition became alarming in as much as the owner had a milk contract in one of the largest towns in the Union. A qualified practitioner was consulted. He diagnosed infectious vaginitis, as the cause of the trouble, without making a clinical examination of the genitalia above the vulva of a single cow. He advised treatment for the whole herd. Fortunately the owner was too busy to undertake a general treatment of the herd at the time. The cows were divided into two batches. Treatment was carried out carefully by the owner. The cows strained for hours after each irrigation. The milk yield became markedly decreased so that the owner had to purchase milk to fulfil his contract. The treatment seemed so drastic that it was decided not to treat the second batch. The veterinarian who had charge of the herd was informed of the position, but he recommended continuance of the treatment. After six months the owner in desperation applied to the Division of Veterinary Education and Research for advice. A clinical examination of the genitalia of the batch of cows treated showed complete or almost complete stenosis of the vagina as a result of sloughing of the vaginal mucosa and subsequent cicatrisation. The batch of cows left untreated certainly showed lesions associated with the chronic stage of infectious vaginitis. However, most of them were in calf or had calved within the previous six months.

This is not the only case in which irrational treatment has been observed during our investigations into the cause of sterility, but it is the worst case. The question arises if such a state of affairs can follow treatment conducted under supervision of a qualified veterinarian, what is the position in many herds where veterinary advice was not sought? The farmer diagnoses infectious vaginitis himself and treats it with that amount of vigour which is characteristic of farmer's methods. For instance it is quite a common practice amongst farmers to irrigate the vagina of a cow with a disinfectant a short time prior to service. Even when irrigation with light and carefully measured antiseptic fluids is carried out prior to copulation it will prevent conception. Therefore it is reasonable to suppose that

irrigation prior to service has done unlimited harm in the hands of laymen. There is another danger in the practice of irrigation which cannot be overlooked; that is the possibility of transmitting disease from cows suffering from purulent genital affections to healthy individuals.

It is a common belief that acidity of the vaginal secretion is frequently met with in cows. A rough examination with litmus paper would seem to indicate that this may be the case. Such a condition is associated with sterility not only by laymen but also veterinarians [Pusch-Hansen (10)]. As a treatment irrigation of the vagina with a weak solution of sodium-bicarbonate is recommended, and success has been reported in some cases. Recent investigations into the reaction of the vaginal secretion by Kaden (9), Renkert (15), Wester (16), have proved this acidity of the vagina to be of rare occurrence. Richter (8) states that acidity of the vaginal secretion plays no practical rôle in the causation of sterility. He points out that the apparently good results obtained by irrigation with bicarbonate solution are due to mechanical removal of tenacious mucous which prevents the forward passage of spermatozoa through the cervix.

In connection with the promiscuous treatment of infectious vaginitis a quotation from Martens (6), who formerly believed that vaginitis, even in the chronic nodular form, was a fertile cause of sterility and who carried out propaganda for a general treatment, is interesting. He states:—

“ One must often shake one's head over the obstinate, useless, and partly barbaric fight against the mostly harmless nodules in the vulva.”

Herds have, however, been met with in which infectious vaginitis was acute and wide-spread in company with frequent returning to the bull and sterility. This was especially noticeable in heifers and young cows. From these herds contagious abortion was excluded by serological tests. A careful clinical examination failed to reveal any pathological changes in the genital tract or ovaries except vaginitis. The fact that the bull may be an important factor in sterility was not neglected. The ration fed in these herds was well balanced and the condition of the animals could be associated with high fertility. Exercise was sufficient and hygiene good. Rational treatment of the disease soon overcame the prevailing temporary sterility. In such cases acute vaginitis certainly does not play an important part in the causation of sterility. There is no doubt, as indicated by Williams (2) that irrational treatment of the disease and neglect of sex hygiene causes a marked increase in the intensity of the symptoms. Under these circumstances an extension of inflammatory phenomena to the anterior portion of the vagina and the pars vagina of the cervix may occur. In South Africa, in the absence of proper sex hygiene and the presence of irrational methods of treatment, one finds cervicitis so frequently associated with infectious vaginitis in sterile cattle that it would be unreasonable to assume otherwise than that cervicitis is a sequel. In the presence of cervicitis as a sequel to irrational treatment of infectious vaginitis it is not unreasonable to expect a sterile animal since cervicitis caused by other infections is a most frequent cause of sterility. It is admitted that these arguments are circumstantial, but in herds where it was possible to

exclude contagious abortion by serological methods and where infectious vaginitis was intense, no other explanation could be given as to the cause of sterility. To substantiate the seriousness of the disease as a cause of sterility attention may again be drawn to the pathological changes which the acute disease is capable of producing in the mucosa of the vulva and the vagina in cows and the sheath and prepuce in bulls. In many cases great irritation and straining follows copulation. The secretion of the mucosa of the posterior genitals under such circumstances cannot be otherwise than pathological. It is not unreasonable to assume, therefore, that the physiological functions of the copulatory portions of the genitalia are disturbed and temporary sterility results. Contagious vaginitis in the chronic or dormant form, in the absence of secondary lesions, would not appear to be a cause of sterility as its presence is compatible with high fertility and pregnancy.

From a review of the literature from other countries and experiences of the disease in South Africa the following conclusions are justified:—

(1) Infectious vaginitis is a disease which may exist independently of contagious abortion.

(2) Vaginitis as a causative factor in sterility has been greatly exaggerated in South Africa.

(3) Vaginitis in an acute form, which is most usually associated with bad hygiene, carelessness in sex hygiene and irrational treatment may cause temporary sterility and frequent returning to the bull.

(4) That in most herds, where a more or less general (10 per cent. to 80 per cent.) sterility exists, other factors such as contagious abortion, functional sterility, and pathological lesions in the genital tract or ovaries, can be proved.

(5) General treatment is indicated only after a careful clinical and serological examination has been undertaken by a competent veterinarian.

(6) Treatment is indicated when infectious vaginitis is acute, with a muco-purulent discharge from the vulva and when there is difficulty in conception in cows and heifers.

(7) Treatment should be undertaken only in company with the necessary measure of precaution against other diseases causing sterility which may exist concurrently.

(8) Treatment is not indicated in—

(a) The absence of sterility or difficult conception.

(b) Pregnant cows.

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