

THE OCCURRENCE OF AND ORGANISMS CONCERNED WITH BOVINE MYCOTIC ABORTION IN SOME COUNTIES OF IRELAND

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ABSTRACT

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Bovine mycotic abortion in some counties of the Irish provinces of Leinster and Ulster was estimated at 1-2% of all abortions for which a causal agent was identified in the years from 1969 to 1978. The organism most commonly isolated from diseased specimens was *Aspergillus fumigatus*, followed by *Absidia corymbifera*. There was no relationship between the incidence of the disease in any year and the rainfall or number of raindays during the previous summer. The data obtained are discussed in relation to the occurrence of the disease in the United Kingdom.

INTRODUCTION

In the United Kingdom (UK), bovine mycotic abortion is a major cause of foetal mortality. In the years from 1959 to 1966, Hugh-Jones and Austwick (1967) carried out a survey on the incidence of mycotic abortions in cattle in the counties of Hampshire, Surrey and West Sussex by examining placentae from cases of abortion. They estimated that the annual incidence of abortions associated with a mycotic placentitis in that period was between 13.4% and 24.9% (mean, 19.4%). According to Hugh-Jones (1971) the incidence for England and Wales in 1968-69 was 11.92% of all abortions for which a causal agent was diagnosed and, as such, it was second in importance only to *Brucella abortus*. He stated that the condition was most common in Pembrokeshire, Carmarthenshire and the borders of Devon, Somerset and Dorset and in Worcestershire and Herefordshire. A survey

carried out by Williams et al. (1977) in Pembrokeshire and Carmarthenshire between 1969 and 1974, revealed that of 7,886 placentae examined, mycotic abortion due to fungal infection was diagnosed in 898 cases. In Ireland, bovine mycotic abortion was first reported in the literature by White (1964) and available information suggests that it is not as common a condition as in the UK (Sheridan, 1980).

The organism most commonly identified as the causal agent of mycotic abortion in the UK was A. fumigatus (Hugh-Jones and Austwick, 1967; Williams et al., 1977); while Mucor-type infections were much less common. In his investigations, White (1964) found that the organism involved was A. fumigatus.

In the present paper, information is presented on the occurrence and organisms involved in bovine mycotic abortion in some of the counties of Leinster and Ulster. The data are discussed in relation to the occurrence of the disease in the UK, the influence of rainfall in the previous hay and silage making season and the fungi causing the disease.

MATERIALS AND METHODS

The specimens referred to in this study were sent to Oakpark from the Central Veterinary Laboratory (CVL), Abbotstown, Dublin. The material examined was from abortions for which a causal agent had not been identified but which were suspected of being mycotic. In general, the specimens were from placentae but foetal material (skin and stomach wall) and stomach contents were also examined.

Crush preparations of tissues and smears from foetal stomach contents, in 20% (w/v) potassium hydroxide (KOH), were examined microscopically to show directly the presence of fungal hyphae. In an effort to distinguish between Aspergillus and Mucor-type hyphae, the Parker ink test as described by Buckley (1971) was also used. Histological examination of some specimens was carried out using Grocotts fungal stain.

Isolation and identification of the pathogens were carried out on 2% malt extract and potato dextrose agars (Oxoid, London), supplemented with antibiotics (20 units penicillin and 40 units streptomycin per ml). Pieces of tissue about 5 mm in diameter were plated out (five per plate) on these media and incubated at 37°C for 3 - 7 days. Media without antibiotics were also used with tissue that had been surface sterilised for five minutes in a 1% (w/v) solution of sodium hypochlorite (NaOCl) and subsequently washed in five changes of sterile distilled water. Samples consisting of 0.1 ml of stomach contents were spread on the surface of plates containing antibiotics.

The average monthly total rainfall for the counties covered by the CVL in the years from 1970 was estimated from data supplied by the Meteorological Service and was for the period from May to September of the previous summer.

The season for hay making was considered to extend from May to August (Wilson et al., 1968) and that for silage from May to September (J. O'Shea, personal communication, 1982). The number of raindays is the total number of days on which the precipitation was 0.2 mm (0.01 inches) or more (Pollak and Morlay, 1956). From 1970 to 1973, the counties included were Dublin, Wicklow, Meath, Kildare, Monaghan, Cavan, Louth, Kilkenny, Wexford and Carlow; from 1973-74 the first seven of these and from 1975 onwards only the first six.

RESULTS

Based on the Reports of the CVL, the annual occurrence of bovine mycotic abortion in the counties above is about 1-2% of all abortions for which a causal agent was demonstrated each year (Table I). The variation from year to year was not large, with the exception of 1969-70 when it was 3.4%. There was no relationship with the total or monthly rainfall, or the numbers of raindays during the periods of the hay or silage making season and total mycotic abortions in the following year.

Where specimens were cultured for the presence of fungi, the organism most commonly isolated was A. fumigatus (Table II). About one-third of the placental specimens showed the presence of A. corymbifera. Both Aspergillus terreus and Absidia ramosa were each found on one occasion in placental tissue and A. terreus also occurred in foetal stomach contents.

Direct microscopic examination of the above specimens, using crush preparations in 20% KOH, established that Aspergillus-type hyphae were the predominant hyphal form in placental tissues and stomach contents (Table III). What was considered to be a mixture of Aspergillus and Mucor-type hyphae were seen in one specimen, but histopathological examination showed the presence of the latter only, and A. corymbifera was isolated in culture. In one placental specimen, although Aspergillus-type hyphae were observed, A. ramosa was isolated in culture and histopathological examination failed to show the presence of fungal hyphae of either kind.

DISCUSSION

The most outstanding feature of the present research is the very low incidence of mycotic abortion from the Irish counties studied, compared to the results obtained by Hugh-Jones (1971) for England and Wales. This result for the UK is substantiated by the reports of the Veterinary Investigation Diagnosis Analysis II, which show that between 1975 and 1981 the mean annual incidence of mycotic abortion was 11.95% of all abortions for which a causal agent was diagnosed (Anon., 1975-81).

TABLE I

Mycotic abortions as a percentage of the total number of bovine abortions diagnosed in the period from 1969 to 1978 and the relationship to rainfall

Year (Jan. to Dec.)	¹ No. of specimens submitted concerning bovine abortions	No. of bovine abortions for which a causal agent was identified	No. diagnosed as mycotic abortions	² Rainfall (mm)	³ No. of raindays
1969-70	1686	560	19	68.3	15.1
1970-71	1207	416	7	68.3	15.2
1971-72	947	307	2	60.7	13.8
1972-73	1164	342	2	60.8	15.2
1973-74	1390	463	2	76.5	16.2
1974-75				89.7	19.3
and (biennial) 1975-76	1305	288	3	55.4	12.8
1976-77				66.8	14.1
and (biennial) 1977-78	1110	161	1	54.1	13.0
Total	8809	2537	36 (1.42%)		

¹Data from the Annual Reports of the Central Veterinary Laboratory

²Average monthly total rainfall and ³number of raindays from May to September of the previous summer, for the counties submitting specimens to the CVL for diagnosis.

TABLE II

Number and types of fungi isolated from suspected cases of bovine mycotic abortion

Organism isolated	Specimens examined		
	Placenta	Foetal tissue	Stomach contents
<u>Aspergillus fumigatus</u>	9	2	2
<u>Aspergillus terreus</u>	1		1
<u>Absidia corymbifera</u>	6		
<u>Absidia ramosa</u>	1		

TABLE III

Hyphal forms observed on direct microscopic and histopathological examinations of material from suspected cases of bovine mycotic abortion

Hyphal form observed	Specimens examined	
	Placenta	Stomach contents
<u>Aspergillus</u>	7 ^a	1
<u>Mucor</u> -type	4 ^b	

^aAspergillus-type hyphae seen in one instance; A. ramosa isolated in culture

^bIn one case mixed hyphae were observed; A. corymbifera isolated in culture

In the present study, there was no relationship between the total numbers of mycotic abortions and rainfall or raindays in any or all of the months in the previous May to September. Hugh-Jones and Austwick (1967) had established a significant relationship between the total number of abortions and the number of raindays in June of the previous summer but Williams et al. (1977) found no relationship between the total rainfall or the numbers of raindays and the annual incidence of mycotic abortion.

In Britain, it is generally accepted that hay, particularly when baled, is a prime source of the fungi implicated in mycotic abortion (Austwick, 1963; Ainsworth and Austwick, 1973). In Ireland in 1968, hay accounted for about 90% of the grass conserved for winter feed. This proportion has decreased steadily in favour of silage, so that by 1981 in Munster and Leinster respectively, which are the main dairying and cattle producing areas of the country, hay accounted for only 40% and 43% of the conserved grass and silage for 60% and 57% of it (M. Cushion, unpublished data). It was shown by Williams et al. (1977) that cattle fed hay in loose housing have a very much lower incidence of mycotic abortion than those fed in cow sheds. In a loose housing system, cattle are fed hay in an open house, while animals in cow sheds are generally kept within the building and fed in cubicles. The importance of the kind of housing has been noted by Austwick (1963) who demonstrated that when hay or straw was handled in a cow shed the numbers of A. fumigatus, A. ramosa and spores of other fungi in the air increased almost 70 fold. In recent years in Ireland, there has been an increase in the number of pregnant cows kept intensively in sheds in winter. Despite this, the incidence of mycotic abortion has not increased. This may be because of the increased use of silage in these systems. Silage is

not generally considered to harbour the pathogens involved in mycotic abortion in very large numbers but they may be present in the rotten portions (Austwick, 1972).

The predominance of A. fumigatus as the fungus causing mycotic abortion in Ireland is similar to the situation observed in the UK (Ainsworth and Austwick, 1973; Williams et al., 1977). In relation to Mucor-type fungi isolated, it is of interest to note that A. corymbifera was the most common in this country, compared to A. ramosa in the UK (Hugh-Jones and Austwick, 1967).

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