DEVELOPMENT AND CONTROL OF RYEGRASS STAGGERS IN SHEEP

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SUMMARY

Observations and results, from pasture investigations, relevant to the development and control of ryegrass staggers (RGS) in sheep are presented. A common feature of most outbreaks investigated has been some degree of close grazing of pastures especially during or immediately after prolonged dry periods. The causal agent(s) of RGS are shown to be associated with material ingested from the base of pastures and it is suggested they are mainly associated with dead ryegrass sheath. Outbreaks are generally more prevalent on ryegrass dominant pastures and on pastures that have been sprayed with benomyl. Where less than 100% incidence occurs it has been consistently noted that the same individuals are affected during successive outbreaks. Control measures should include avoidance of practices leading to the development of ryegrass dominance during the summer/autumn period. The principal means of control depends on prevention of close or overgrazing, especially during periods when severe outbreaks are likely to occur.

INTRODUCTION

Outbreaks of ryegrass staggers (RGS), as with some other disorders (*e.g.*, facial eczema, hogget ill-thrift and some infertility problems) affecting grazing livestock during summer and autumn, are more prevalent on grass-dominant than on mixed (grass-legume) pastures (Keogh, 1973a, 1975a). Because there was little information available which could help explain this situation investigations were initiated. Information was sought on a number of factors and interactions (plant-animal-soil-environment-management) which could provide some insight into field aspects relevant to the aetiology (and control) of these disorders.

The aim of this paper is to summarize some observations and results pertinent to the development and control of RGS in sheep.

OBSERVATIONS ON FIELD OUTBREAKS OF RGS

Most outbreaks were among animals grazing grass-dominant (> 90%) pastures when severe symptoms were first observed. Growth, compositional and structural features of such pastures have been reported (Keogh, 1973b; 1975a).

In the past five years outbreaks have been recorded on ryegrass-dominant and ryegrass-white clover pastures sprayed with benomyl for facial eczema control. Some of these outbreaks have been more severe in terms of incidence and severity than outbreaks on unsprayed pastures (Keogh and P. H. Whitehead, unpublished). This observation is consistent with results reported by Latch *et al.* (1976).

A common feature of most outbreaks has been some degree of close grazing of pastures, especially during or immediately after prolonged dry periods. Many outbreaks occurred on pastures subjected to heavy grazing pressures such that most accessible herbage was removed, as sometimes happens when mob-stocking is practised. There were, however, instances in which outbreaks occurred when animals were set-stocked at relatively low grazing pressures. In these cases close grazing was noted at relatively few sites within the pastures.

Subsequent defoliation studies on ryegrass-dominant pastures showed that:

(1) Under rotational grazing, sheep ingested little inter-excreta herbage before most available urine-patch herbage was removed (Keogh, 1973c, 1975a).

(2) Under set-stocking, urine-patch herbage was defoliated more frequently and intensively than other herbage (Keogh, 1973b).

FIELD EXPERIMENTS

The first series of experiments were set up to test the hypothesis that the causal factor(s) were associated with material ingested from the base of pastures (below about 2.5 cm). Results have shown that sheep prevented from close grazing do not develop RGS, whereas RGS can be induced in animals forced to ingest basal material (Keogh, 1973a, unpublished). These results were confirmed by pen-feeding material that was harvested above and below 3 cm, from ryegrass pastures: tremors and shaking developed in sheep fed on basal material, but not in those fed on herbage harvested above 3 cm. Dietary samples obtained from oesophageal-fistulated sheep showed that close grazing resulted in the ingestion of quantities of dead ryegrass leaf and sheath (Keogh, 1973a).

Changes in dietary composition and the development of RGS were followed over an 8-day period during defoliation of part of a ryegrass-dominant pasture. Ten ewes and two oesophageal-fistulated wethers were grazed at a rate equivalent to 740 sheep/

ha. Tremors and shaking were evident in wether OF9 on day 5 at which stage dead ryegrass sheath comprised 50% or more of the diet (Table 1). By day 8 this sheep was moderately affected and, if forced to run, would stagger and collapse.

The association of the dietary factors, involved in the development and maintenance of the RGS condition, with basal material was also shown in experiments in which both laxly and hard-grazed treatment groups contained both control sheep and sheep with RGS. RGS did not develop in laxly-grazed control animals but did so in hard-grazed control animals. In sheep with RGS, the condition was maintained in the hard-grazed group, whereas those in the laxly-grazed group gradually recovered (Keogh, unpublished).

RGS, assessed on an incidence × severity basis, was greater in hoggets than in old ewes with badly-worn teeth, when both classes of sheep were grazing together. The mean severity score for the same five individuals per group on eight occasions during a three-week period was 2.5 for the hoggets and 1.4 for the ewes. At no stage were the ewes as severely affected as the hoggets. Differences in the grazing height and the clear preference for urine-patch over inter-excreta herbage are shown in Fig. 1.

TABLE 1: TOTAL HERBAGE PRESENT, AND DEAD RYEGRASS LEAF AND SHEATH IN PASTURE AND DIETARY SAMPLES DURING PROGRESSIVE DEFOLIATION OF A RYEGRASS-DOMINANT PASTURE

Day	*Total Herbage Present* (g DM/m²)	*Total Herbage below 2.5 cm* (g DM/m²)	*% Dead Ryegrass Leaf and Sheath*		*Signs of RGS in Wether OF 9 during Enforced Exercise*
			Pasture	*Diet*	
1	225	180	42.3	17	
2	143	124	46.5	20	
3	131	118	50.6	29	
4	117	117	54	30	
5					Mild tremors and shaking.
6				57[1]	Shaking, ataxic.
7	81	81	66	51[1]	Staggered and collapsed.
8				56[1]	Staggered and collapsed.

[1] Mostly dead ryegrass sheath.

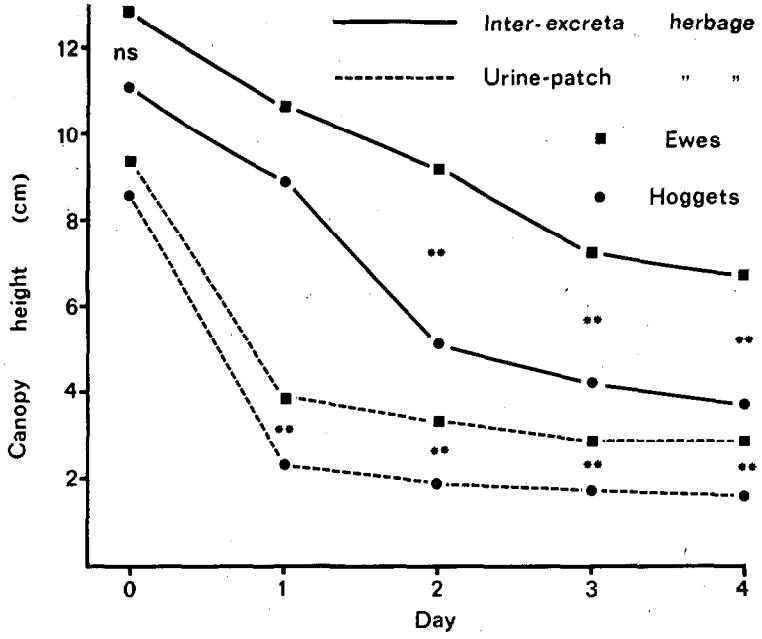

FIG. 1: *Defoliation patterns of hoggets and "gummy" ewes on ryegrass pasture.*

When more than one RGS outbreak has occurred in any group of sheep during summer-autumn periods it has been consistently noted that the same individuals are often affected during each outbreak.

Observations on field outbreaks and results of grazing and feeding experiments all indicate that the causal factor(s) are present in and ingested from the base of pastures in which perennial ryegrass is a major constitutent. An obvious component of basal herbage, and one that is not present at a higher level in pasture, is ryegrass sheath. Dead sheath material can comprise over 50% of the diet of sheep forced to graze the base of ryegrass-dominant pastures (Table 1) but is absent from the diet of sheep grazed on herbage above about 3 cm.

It has been suggested that the causal factor(s) may be present in soil and ingested during close grazing of pastures (di Menna *et al.*, 1976). Observations of RGS outbreaks and results of analyses of soil contents of faeces taken from affected and un-

affected sheep (Keogh, unpublished) show that, although low levels of soil ingestion can occur, this means of acquisition could not apply in all instances. It is more likely that the causal factor(s) are acquired along with dead ryegrass sheath material.

The results also suggest that the causal factor(s) may be acquired during close grazing at urine-patch sites. Tremors and shaking have, in fact, been induced in sheep fed solely on herbage collected from urine-patch sites, indicating that the causal factor(s) are present within the urine patch. There has not, however, been sufficient testing of other classes of material to adequately resolve the situation. But the incidence and severity of RGS were higher in sheep grazing the base of ryegrass-dominant pastures topdressed with urea than in sheep grazing similar pastures which had no artificial nitrogen applied (Keogh, unpublished).

CONTROL OF RGS

Avoidance of practices, such as set-stocking for prolonged periods or heavy grazing during dry conditions, which can result in ryegrass dominance during summer-autumn is an obvious first measure which could help to reduce the chances of RGS outbreaks occurring.

Control of the ingestion of material from the base of ryegrass-dominant pastures can be achieved using a rotational form of grazing management which minimizes the opportunity for stock to regraze recently defoliated sites, especially at urine-patches. The most effective system in this regard involves daily movement of stock in a 3- to 4-week rotation.

Such a system may be inconvenient or not easy to implement, especially where several separate groups of animals are being grazed on a farm. It is still possible to avoid the worst outbreaks provided a close watch is kept on the condition of the sheep and that groups are put on to a rapid rotation at the first signs of the development of an outbreak. Failure to do so may result in unnecessary exposure of stock to the risk of severe RGS and the farmer is then left to contend with disruptions in normal farming routines, an alternative perhaps even less convenient than the extra effort needed to control the disorder.

In very dry periods, when pastures may all be closely grazed and regrowth is very slow or nil, it may be necessary to confine stock and feed supplements, or graze on crops. To leave animals on pastures that have little available herbage present is only

inviting damage to pastures and increasing the risk of stock health problems.

ACKNOWLEDGEMENTS

Assistance was provided by P. H. Whitehead, R. H. Fairhall, M. G. Divehall and I. R. Walker of the Massey University Sheep Farm and M. Whitcombe, P. Faulkner and L. Tilbury of the Grasslands Division, DSIR.

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