BREEDING FOR RESISTANCE TO RYEGRASS STAGGERS, THE INFLATION-PROOF LONG-TERM SOLUTION?

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THE PROBLEM

Rye grass staggers is by far the most serious animal health problem on our property at Cheviot, where we operate an all-grass system wintering 1500 stock units, almost entirely sheep. In the season just past, stock losses from staggers were about equal to those from all other causes combined including new-born lambs. Direct costs of the disease were calculated at $7 per stock unit, with additional meat and wool production losses amounting to at least $3 per stock unit.

The problem is severe through the North Canterbury district, affecting in particular the more highly developed and intensively stocked farms with high-producing pastures. Moreover, its severity is steadily increasing as the content of weeds and native grasses in the sward decreases on developing farms, a trend of some importance to all involved in improvement of our grasslands.

COURSES OF ACTION

The greatest frustration to me is my current inability to manage the problem in a cost-acceptable manner. Existing options are:

a) Heavy supplementary feeding for 2-4 months at very high cost, and minimal weight-gain towards tupping.

b) Large area of rape or other fodder for late summer grazing with high equipment costs and reduced grass production probably leading to lower stocking rates.

c) Large area of lucerne which is difficult and costly to maintain on clay-based soils, and with lack of winter production again leading to lower stocking rates.

d) Allow reversion of pastures to a low-producing weedy state which is unthinkable.

e) Re-sow with endophyte-free seed at enormous initial cost and likely continuing high cost of Argentine stem weevil control.

f) Specific grazing control practices may assist, but North Canterbury summers impose their own constraints on grazing management, and my efforts so far have been ineffective.

g) A variety of ‘remedies’ have been stated to be successful by others, but I have not found them so in the short-term when administered to badly affected animals. In trial applications the control animals usually tended to recover first, probably because they were not subjected to the stress of daily dosing. However, in a paddock situation over a period of some weeks ‘Nutrimol’ administered via water troughs to slightly-to moderately-affected two-tooths seemed to promote a general improvement and gradual earlier recovery of the mob as compared to mixed-age ewes on similar paddocks nearby. This may
merely indicate the resilience of youth or an earlier reduction in neurotoxin abundance in the two-tooth’s paddocks, but there is at least a hint that some component of ‘Nutrimol’ may be effective.

This year our preparations for the staggers period include a small paddock of rape, retention of a silo of barley and some barley straw, and hopes for a prolific hay season. Controlled paddock trials of Nutrimol will commence with applications from early November. Whilst these are the best options currently available, for our farm I regard them as unsatisfactory and a stop-gap measure only, because each bears a significant cost to the detriment of grassland farming efficiency. They are not acceptable long-term management options in an industry under heavy cost-inflation pressure.

The new vigour apparent in ryegrass staggers research will no doubt provide us with more effective and cost-efficient means of control. These will be very welcome indeed. However, I personally hold the view that the greatest opportunity for effective action exists in the field of animal breeding.

**STUD EXPERIENCE 1982**

In December 1981 our stud flock of 250 ewes weaned 378 lambs by 3 stud sires, each serving 80-90 ewes. After weaning, ewe lambs were run with flock ewe lambs in one mob and ram lambs in a separate mob. Both were offered the same diet of strong ryegrass pasture and meadow hay-paddock regrowth.

As staggers symptoms developed in early January it soon became apparent that the majority of affected lambs were from the one sire, so tags were carefully checked on affected animals through to April when incidence of staggers waned and eventually ceased following autumn regrowth. Results were:

<table>
<thead>
<tr>
<th>Sire</th>
<th>Weaned</th>
<th>Mob Affected</th>
<th>Severely* Affected</th>
<th>Dead</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/78</td>
<td>125</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>2.4</td>
</tr>
<tr>
<td>51/76</td>
<td>114</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>3.5</td>
</tr>
<tr>
<td>143/79</td>
<td>139</td>
<td>42</td>
<td>29</td>
<td>15</td>
<td>86</td>
<td>61.9</td>
</tr>
</tbody>
</table>

*Slightly affected = mob noticeably nervous and unsettled with some erratic behaviour but no animals collapse for more than a few seconds.

Moderately affected = can’t be driven, fall on sight of dog.

Severely affected = prostrate in paddock in absence of stress, cannot rise within 12 hours.

Virtually all animals in both mobs were at least slightly affected. The three stud rams had been bought-in, each from different stud sources. The genetic background of ewes served by 51/76 and 143/79 was identical, but 25/78 served mainly progeny of 51/76.

Apart from this experience with stud lambs, ram flock behaviour last year also appears significant. All 15 rams were run for the summer period in one small paddock with a hay supplement due to the drought. Thirteen rams, including 51/76 and 25/78, were not noticeably affected by ryegrass staggers at any stage. One South-Suffolk ram was moderately affected for about three weeks. Sire 143/79 was moderately affected for about a month and severely affected for a
further week.

Obviously the results from such small one-off experiences can be to some extent fortuitous, and much investigation is needed to firmly establish the degree of heritability and hence the efficacy of selection for resistance. However, the differences in bloodline response are so striking that I am left in no personal doubt that susceptibility has a strong genetic basis. Action has accordingly been taken in our stud flock.

a) Ram 143/79 has been withdrawn from service and sent on request to Dr Neil Clarke at Ruakura for genetic research studies.
b) Ewe and ram progeny of 143/79 have been culled from the breeding flock.
c) All moderately or severely affected ewe and ram lambs have been culled.
d) In future seasons all stud progeny will be subjected to toxic pasture without supplementary feed and any animals more than slightly affected will be culled.

**BREEDING OBJECTIVES - A POINT OF VIEW**

The last 30 years have seen dramatic changes in the environment imposed on our stock, the most important influences being grasslands development and increased stocking rates. All classes of country from flats to improved hills reflect the changes, and farmers with long memories readily appreciate the great contrast between pre-1950 and 1982 stock environments; the transition from native grasses and scrub to predominance of ryegrass and white clover; the four, five or six-fold increases in stocking rates.

The new environment has not only favoured per-hectare production, but also the organisms causing some animal health problems. Among them are:

a) Footrot, due to seasonally lush underfoot conditions and close sheep-to-sheep contact.
b) Internal parasites, for the same reasons.
c) Facial eczema, due to *Sporodesmin* affinity for ryegrass.
d) Ryegrass staggers, due to the predominance of *ryegrass* in modern pastures and, at least in part, to the selection processes by which modern *ryegrass* strains have been developed. It must be assumed that the strains developed along the way were not susceptible to Argentine stem weevil and therefore carried at least their share of *Lolium* endophyte. Even old Canterbury pasture will have been self-selecting for endophyte content.

Whilst all this change has been happening, sheep breeding in general has not kept pace in adapting the animal to the new environment. Some common management practices have even worked against adaptation, e.g.:

(a) Even in 1982 there still exists in many areas a strong pre-occupation with open classes at shows as being the main means of identifying superior sheep, and these are placed at the top of the breeding tree for very large numbers of flock sheep.

Show sheep are carefully protected from the real world in the paddock, and the champion’s ribbon to my mind reflects mainly their elegance and grooming abilities of the exhibitor. It has little to do with production merit and physical wellbeing under the environmental conditions our farming practices impose.

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A second case in point is the practice of farming by remedies without culling or use of terminal sires on offending animals. Such practices as footrot paring and treatment, heavy drenching programmes, and close shepherding for lambing troubles, have the effect of resisting environmental pressures rather than adapting to them. They are necessary stop gap measures but do not offer long-term on-going solutions in a high-cost-pressure industry.

We have had several thousand years of sheep breeding to achieve high wool quality and fleece weight, and good carcase conformation. Our forebears have done an excellent job but, due in fact to their success, we have for many years been in the position of diminishing returns for concentration of breeding to these sole objectives. The small margins offered for superior over inferior wools in the market place illustrate this, especially as most of the margin nowadays expresses quality of growth and preparation of the clip rather than inherent quality.

On the other hand, whilst not accepting any decline in wool and carcase quality, the prolific nature of sheep allows plenty of selection room for a shift in concentration of breeding objectives to other production traits. 'Sheepman' very adequately covers selection for heritable production traits which require comparison of measurements, and is a very effective tool provided those measurements are taken on sheep running under real commercial conditions.

For most of the main animal health problems promoted by our new stock environment, susceptibility has been shown also to be heritable to a significant degree. I know of farms where footrot, previously epidemic, has been virtually bred out by ruthless selection and culling, and where major gains are being made in resistance to internal parasites. Cost savings are very large indeed and animal production has been boosted. The recent exciting work on facial eczema heritability and identification of offending strains of sheep must lead to large cost savings and production increases.

There seems every indication that ryegrass staggers susceptibility is also heritable to a marked degree and that hence it could be bred out in our flocks down to a minimal or at least very manageable level. If so, this could be achieved without prejudicing other qualities in our sheep, without imposing any constraints on grasslands development, and without introducing complications to our stock and pasture management systems. The approach assists and accelerates natural selection rather than resists it, thus sidestepping the emerging problems of mutant resistance of micro-organisms to treatment. Above all the approach is cost-free and labour efficient and hence inflation-proof in an industry under heavy financial pressure.