Barley Grass Economic Significance
Effects, Costs and Farmer Opinion

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Barley grass can affect animal production, as detailed below. However, please note that the values ascribed to wool and meat in this article described conditions in the late 1970s. The values of all sheep products have changed dramatically since then.

Trying to decide whether the presence of a pasture weed such as barley grass is good or bad ecologically, in any particular situation, is very difficult because of the complexity of the system of which it is a part.

Barley grass is useful because of its rapid growth in response to autumn rains and because it contributes to pasture production during autumn, winter and spring. On the other hand, its total annual production is probably lower than that of perennial ryegrass and its ripe seeds do considerable damage to lamb and sheep products. It is not known to what extent barley grass is occupying otherwise vacant space or how much it reduces the growth of other pasture species. Also, little is known about its possible role in keeping out other undesirable weeds such as thistles.

However, there is sufficient evidence to show that, on a national scale, seed damage to sheep and sheep products far outweigh any advantages which barley grass may offer.

Devaluation of animal products

Lamb pelts: Sharply pointed seeds such as those of barley grass, storksbill, *Erodium* spp. and some species of *Bromus* can work their way through wool and penetrate the skin. When animals are slaughtered soon after seed penetration, the holes are obvious. If killing is delayed, the initial seed damage will have healed but scar tissue formed. This is not obvious until the pelts are dyed and shows up in uneven dye absorption. This delay in the detection of flaws is harmful to New Zealand's overseas pelt market because manufacturers have to meet processing costs before blemishes are detected. Lamb pelts are primarily required for fashion garments and any faults in them reduces their value considerably.

Loughnan (1964) was the first to draw attention to the loss in value of lamb pelts due to barley grass seed. He estimated that, in Canterbury, pelts graded 'seedy' increased from 0.8% in 1953 to 21.9% in 1963. Rumball (1970) showed that the proportion of seedy pelts continued to increase during the early 1960s, but both he and Shugg and Vivian (1973) noticed a levelling off in the incidence in the late 1960s. Rumball, and Shugg and Vivian estimated the reduction in export value of lamb pelts attributed to seed damage at over $500,000 a year, representing an overall devaluation of about 1.25%.

These estimates were blamed on barley grass damage, but the seeds of other pasture species- notably storksbill, *Bromus* spp. and vulpia hair grass, *Vulpia* spp.**,** also penetrate pelts. However, Atkinson and Hartley (1972) found that pelt damage was significantly correlated with the barley grass content of a pasture.

Seedy wool: Shugg and Vivian (1973) estimated a loss of $280,000 (1% of total) in the value of slipe wool due to seed contamination. If this estimate were to be extrapolated to clip wool the figure could be over $2 million. However, the New Zealand Wool Board considers burs and dry vegetation to be the major vegetable contaminants of wool and believes barley grass to be of minor overall importance. In Australia barley grass is one of the seeds which are regarded as being important in spoiling wool (Cornish and Beale 1974). Wool containing large amounts of vegetable matter is cleaned by carbonising and acid treatment followed by rolling) which effectively destroys barley grass seed. Cost is high, however, and the quality of the wool is reduced.

Carcasses: Occasionally seeds penetrating right through lambs' skins become embedded in the flesh, resulting in inflammation of the muscle tissue and consequent rejection of the carcass for export. The total loss due to this is small, but 60 - 70% rejections have been recorded for drafts from individual farms (Shugg and Vivian 1973).

Stock health and growth

Mclvor and Smith (1973) measured the nitrogen content and *in vitro* digestibility of barley grass and found it to be similar to the annual Wimmera ryegrass, *Lolium rigidum,* in both respects although the latter produced more vegetative dry matter in winter and spring. There is, therefore, little reason to believe that barley grass, in the vegetative stage, is not as nutritious as other pasture species. There are, however, several reports that it is less acceptable to stock than other grasses. Hartley *et al* (1974) found that herbicide treatment of infested pastures reduced stock production significantly less than it reduced pasture dry matter production, suggesting (perhaps) that voluntary intake of vegetation is lower in the presence of barley grass. Beyond this, there is no evidence that a high barley grass content will reduce stock growth rates until seed heads begin to appear.

The presence of flower and seed heads in the pasture has two effects:
• Green pasture availability is reduced because the proportion of vegetative tillers is lower and these are harder for stock to get at.
• The irritation caused to the stock by the penetration of detached seeds into the pelt, eyes, gums, etc., makes them reluctant to move and feed.

In Australia, Campbell *et al.* (1972) showed there to be a significant correlation between liveweight loss of Merino wethers during spring and the density of barley grass inflorescences. Cornish and Beale (1974) reported that death of young sheep from heavy grass seed infestation was not uncommon in some years.

In New Zealand, Hartley and her co-workers have conducted a series of trials in which they measured the effect of different densities of barley grass seed heads on lamb growth rates. Hartley and Atkinson (1972) used different herbicides to control barley grass and found that although pasture dry-matter production was reduced, lamb growth rates were considerably increased (Fig. 1). The sudden check in lamb growth rates on unsprayed paddocks in mid-January coincided with maximum seed shed and, in the opinion of the authors, was almost certainly attributable to physical damage caused by barley grass seed, especially to the eyes. Wool weight and character were also improved when barley grass was controlled.

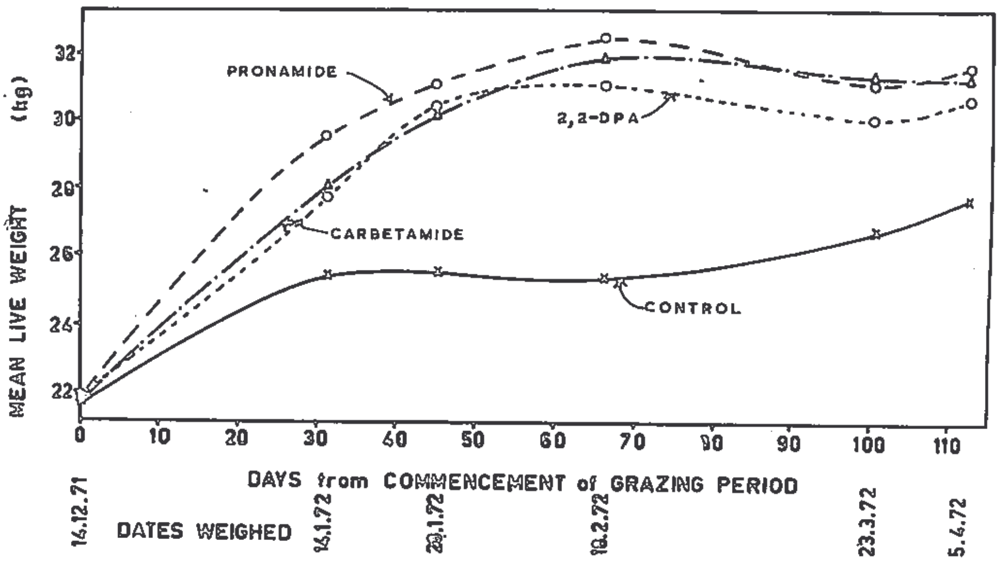

Fig. I: Mean liveweights of lambs on 4 pasture treatments (December to April). Stocking rate 35 lambs/ha (From Hartley and Atkinson 1972).

Note: Pronamide is now called propyzamide, 2,2-DPA is now called dalapon, and carbetamide is no longer registered in New Zealand.

Atkinson and Hartley (1972) used chemical and mechanical methods to achieve different levels of seed head infestation in paddocks. They found that the mean liveweight gains of lambs between December and March showed an inverse relationship to barley grass seed head densities (Fig. 2). Hartley and Bimler (1975) demonstrated a significant correlation between eye damage and lamb weight loss during late December and early January. This suggests that eye damage due to barley grass seed may be a major factor in reducing growth rates although body irritation is probably important also (Hartley and Atkinson 1973).

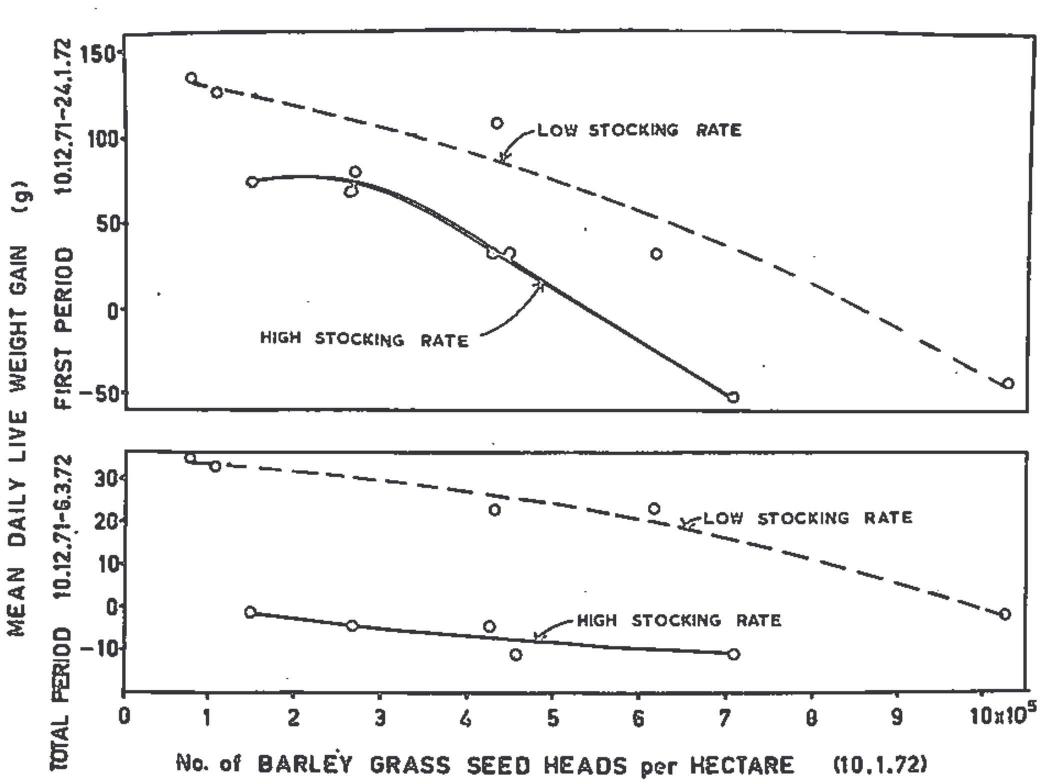

Fig. 2: Mean daily liveweight gain of lambs at different barley grass levels. (From Atkinson and Hartley 1972).

No evidence exists of any detrimental effects of barley grass seed on cattle, although dairy and beef pastures often contain barley grass.
Sheep dogs often suffer from barley grass seed, which works its way into the skin between the toes and causes sores which can result in lameness.

Farmer attitudes and opinions

Two surveys were conducted to assess the national importance of barley grass and how farmers react to it. The first of these, by Wasmuth (1972), investigated 166 randomly selected farms in the Manawatu, Wairarapa and South Island. Only one of these farms did not have any barley grass on it but of those farmers with barley grass. 63% considered it to be a problem. Nearly 75% of these had attempted to control it. Strangely enough, so had 42% of those who did not regard it as a problem. The most commonly used chemical was paraquat, either alone or with simazine. A majority of those who had attempted chemical control were not satisfied with the results.

Atkinson and Hartley (1976) randomly surveyed 1350 farms scattered throughout most of New Zealand. Eighty-eight percent had some barley grass which was restricted to shelter belts and stock camps on 64% of the properties. As in Wasmuth’s survey, approximately equal numbers of farmers were concerned about damage to stock and about reduced pasture productivity. Again a large proportion of farmers took active steps to control it, mostly by spraying. Paraquat was still the most commonly used material, but it was also regarded as being the least successful.

Estimated costs of barley grass damage

Putting monetary value on production, or loss of it, is risky at any time but particularly so in times of inflation. However, some figures may prove useful to put the problem in perspective. Most of the data collected was for 1971 /72 season and, when possible, figures are also given as percentages which are more likely to retain their relevance.

The reduction in export value of lambs' pelts attributed to barley grass seed was estimated at $500,000/annum (Rumball 1970; Shugg and Vivian 1973). Based on a 40 million lamb crop and ruling prices, this represented an overall devaluation of 1.25% or, among affected pelts, 12.5%. Shugg and Vivian (1973) estimated that 10% of our lambs are affected by barley grass.

As already mentioned, Shugg and Vivian put the cost of seed contamination of slipe wool at $280,000. which was 1% of total slipe wool value, If the same proportion of clip wool was spoilt, total loss would be over $2 million. (However, the value of wool has declined considerably since these figures were compiled.)

Hartley and Atkinson (1972) found that lambs exposed to barley grass seed can suffer reduction in liveweight gains which can be as high as 6—8 kg/lamb. It the weight of the 4 million lambs (10% of total) at risk from barley grass was reduced by only 1 kg per lamb, in a 50% killing out rate, the meat loss would be 2,000 t. At 48 c/kg x-farm (1976 price), the loss would be nearly $1 million or, ex-works at 70 c/kg, a $1.4 million loss of export revenue, or 0.09% of total value.

Ten percent of New Zealand's summer flock, perhaps 10 million sheep and lambs, may require attention for barley grass seed problems. If this costs as little as 1 c per sheep, the total bill would be $100,000.

Most herbicides used for barley grass control are also used for other purposes so that it is difficult to establish an accurate figure for the amount of chemicals used on barley grass. However, a composite estimate of expenditure on herbicides for barley grass control, as supplied by the major chemical companies, was, for the year 1971 - 72, of the order of $2 million, including application costs and subsidies. Approximately 40% of the total was applied to lucerne, where satisfactory selective control is possible. More than 30% was used in non-selective situations and the remainder was applied for selective control in pastures. None of the currently available materials are truly selective to barley grass in pasture and their use is often associated with depressed pasture production, which adds further to the cost.

The total cost of barley grass, at early 1970s prices, in terms of lost overseas exchange (devalued animal products plus importation of chemicals) must therefore be at least $3 million dollars a year and could well be a good deal higher.

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