COSTS OF BARLEY GRASS

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Summary

A brief survey is made of costs resulting from barley grass (*Hordeum* spp.) invasion of pastures.

INTRODUCTION

TO OBTAIN an accurate assessment of the economic importance of any weed is notoriously difficult. Costs may occur at any stage along the production line — lowered quantity or quality of pasture, declines in animal performance through injury, expenditure on control measures, loss of animal products, or devaluation of the marketed article. They may be direct and indirect, real and intangible. Also, annual fluctuations and long-term trends operate on both physical and financial aspects.

For all their limitations, attempts to clarify the picture are worth while. In lieu of accurate information, isolated cases and emotive language may distort the perspective of one problem in relation to others. Furthermore, guidelines are given for rewarding research. This is an interim report on the costs of barley grass invasion, subject to modification as more information becomes available.

The term "barley grass" covers the array of weed species of *Hordeum*. Uncertainty exists as to the precise taxonomic make-up of the genus and the distribution of the species in New Zealand. *Hordeum murinum* is generally regarded as the most widely dispersed, abundant and troublesome type but others are locally significant.

AGRONOMIC COSTS

Whether barley grass invasion causes a rise or fall in the quantity and quality of available forage in that pasture is uncertain.

Claims have been made that, since the initial distribution is markedly confined to areas of stock concentration, barley grass is ousting perennial ryegrass from the potentially more productive sites. Not only is the total dry matter production lowered but replacement of a perennial by an annual causes greater instability and more marked fluctuations from year to year. Both nutritive value and palatability are thought to be low, falling off even further at the onset of flowering.

However, little evidence is available as to whether stock camp areas are indeed of high productivity. The reverse may be the case with perennial species showing a lack of vigour due to a combination of factors. *Poa annua* (*Poa annua*) and *Hordeum murinum* appear to occupy complementary niches according to whether the district has a shorter or longer seasonal moisture deficiency. From an agronomic point of view, then, perhaps the grazing value of barley grass should be compared not with perennial ryegrass but with that other group of species which have an

annual life cycle — winged thistle (*Carduus tenuiflorus*), nodding thistle (*Carduus nutans*), storksbill (*Erodium cicutarium*) and nettle (*Urtica urens*) — all of which have their own obnoxious features.

Barley grass appears to be a vigorous cool season producer. Unpalatability is relative and there is no doubt that hungry animals will consume it up to a late stage of its development. More so than with other grasses, close and continuous defoliation is likely to be needed for barley grass to retain its appeal to livestock. Thus, its value to the animal will be closely tied to the pressure and pattern of grazing.

The penetration of ripened seeds into the bodies of sheep and lambs no doubt has a real effect on the performance of some individuals. Its significance in relation to the effects of parasites, diseases or deficiencies is unmeasurable. But seed-induced injury tends to be more obvious and is likely to provide strong motivation to the farmer to minimize its incidence.

CHEMICAL CONTROL COSTS

These include the costs of materials, of their application, and the resulting loss of pasture production.

Paraquat, 2,2-DPA and TCA are the most widely tested and commonly recommended grass herbicides which show some selectivity in pastures. The type of material, price instability, Government subsidies, the rate and number of applications, may all differ such that annual costs can be \$2 to \$20 for each acre sprayed. If treatment is part of a well-planned control programme which incorporates management and, if it is efficiently done, then costs are likely to fall off in subsequent years.

The loss of dry matter cannot be predicted except roughly for any particular material and rate of application. Whether this loss will be felt by the farmer will depend on the following weather conditions.

Herbicides are a valuable aid but by themselves do nothing to alter the ecological conditions that favour barley grass invasion. To obtain a permanent low cost control will depend also on devising management techniques that, without unduly disrupting the farming system, will swing the balance away from annuals and back to perennials.

PROCESSING COSTS

Loughnan in 1964 drew attention to lamb meat and pelt losses sustained by farmers in the Canterbury district through the effects of barley grass seed. Some lambs were rejected for export while pelts graded seedy had jumped from 0.08% to 21.9% in the period 1953-63.

A survey was made by the writer after the summer of 1968-9 to obtain a more national picture. Returns to a questionnaire were obtained from 22 freezing works. The main points of interest were:

- (1) What classes of stock are adversely affected by barley grass seed and at what times of the year?
- (2) What products are liable to damage and what is their loss of value?
- (3) What is the district wastage?
- (4) What have been the trends over recent years?
- (5) What other plant species are involved?

Works managers list the following products as liable to depreciation: slipe wool — sheep and lambs; meat — lambs; skins — sheep and lambs. No mention was made of damage to any other forms of livestock.

SLIPE WOOL

Wool classed as seedy is devalued about 6c/lb. Contaminants include twigs and foliage as well as seeds from a variety of species. Barley grass, storksbill and piripiri (*Acaena anserinifolia*, *A. novae-zelandiae* and *A. viridior*) were cited as being most often involved but others mentioned included bur medick (*Medicago polymorpha*), horehound (*Marrubium vulgare*), tarweed (*Parentucellia viscosa*), thistles (*Cirsium* and *Carduus* spp.), docks (*Rumex* spp.) and *Bromus* spp.

Six freezing works in Hawke's Bay, Canterbury and Otago produced figures on quantities of seedy wool. Total output from sheep and lambs was 20,217,000 lb of which 1,350,000 lb (6.7%) graded seedy. The greatest level of contamination was given by a Dunedin works which draws a large proportion of its stock from Central Otago.

Seedy lambs wool 1958-9	....	....	....	....	....	11.9%
1960-1	....	....	....	....	....	26.2%
1962-3	....	....	....	....	....	39.5%
1965-6	....	....	....	....	....	40.8%
1967-8	....	....	....	....	....	44.7%
1968-9	....	....	....	....	....	44.8%

Of the seeds present, 85% was estimated barley grass, 10% piripiri, and 5% storksbill.

MEAT

Carcasses of mature sheep are occasionally damaged by seed but the numbers are apparently negligible.

A higher proportion of lambs are rejected but the total is again relatively small. A Hastings works reported wastage as less than 0.006%. A Timaru manager stated that "hardly any rejected due to seeds" and a Dunedin works rejected "small numbers in extreme cases of infestation". No other works made mention of carcass losses.

SKINS AND PELTS

Seed damage of sheep skins is also at a low level. If mention was made of it, then it was mild or negligible in comparison with other types of damage such as shearing cuts, inoculation scars or barbed wire injuries. None of the works carried a "seedy" grade of skins.

A large financial loss is, however, associated with barley grass seed damage to lamb pelts.

Early in the season, seeds quite easily penetrate the short wool and thin skin of the lambs. At this stage seeds generally remain attached to the pelt, and produce festering pin-prick wounds. Later on, scar tissue covers the small holes and makes detection of previous damage difficult. It is not until the dyeing process that this shows up. Some works managers expressed concern at the resulting loss of market confidence.

Grading specifications may vary between works according to numbers of damaged pelts and their market requirements. Seedy grades are not

warranted in some, while others have carried these for up to 15 years. Top grade pelts become grain or suede leather to be used for clothing and shoes. Second and lower grades are more suited to shoe linings. Prices vary considerably within and between seasons, with highs of around \$15 per dozen, down to \$11. Seedy lines can be discounted by \$1.50 to \$5 per dozen.

Different grading standards and fluctuating prices are not the only variables making it difficult to assess an annual cost. The degree of damage is markedly influenced by seasonal weather. Also all works attribute a significant proportion of the damage to storksbill. In fact, one fellmongery processing almost two million pelts from Marlborough and Canterbury considers storksbill the more important of the two. Seeds from other plants which cause concern, but are of limited distribution, include *Bromus* spp. and needle grass (*Stipa* spp.).

New Zealand's total lamb crop is around 26 million. Replies to the circular covered 15½ million or 60% of the total. Of this number, 1,775,000 pelts were graded seedy, giving an overall wastage of 11.5% (see Table 1).

The 10½ million lambs not accounted for were processed mainly at works in Northland, Auckland, Waikato and Taranaki where there is apparently much less concern over the matter. An overall wastage of 11.5% would mean that three million pelts were down-graded. Extrapolation from district figures (i.e., 3%), however, would make two million a more likely total. Assuming that devaluation means a loss of \$3 per doz, the total cost over the country would be \$500,000.

TABLE 1: PELT WASTAGE BY DISTRICTS

District	No. Works	No. Recorded	Pelt Wastage 1968/9(%)	Range (%)
1. Northland, Auckland, Waikato, Bay of Plenty, King Country	6	1	5.4	
2. Taranaki-Wanganui	3	1	0.01	
3. Poverty Bay-East Coast	1	1	3.3	
4. Hawke's Bay	3	2	14.8	13.9-20.5
5. Manawatu-Wellington	4	3	2.1	0.1- 3.7
6. Wairarapa	1	1	3.1	
7. Nelson-Marlborough	2	1	32.3	
8. Canterbury	5	5	14.2	10.9-29.4
9. South Canterbury-Otago ..	5	4	23.9	11.1-29.6
10. Southland	4	3	0.3	0.1- 1.0

Works managers were asked to comment on distribution within districts, but no consistent patterns emerged. On the whole, storksbill was considered more prevalent on the lighter soils of Hawke's Bay and Canterbury, with barley grass more abundant on the heavily stocked downland. It was a common observation that the amount of seed damage varied from farm to farm, rather than between localities, suggesting that farm management methods have a significant influence.

Occasional lines of lambs from Central Otago were 100% affected by seed. Other examples given were:

<i>Total Lambs</i>	<i>No. Seedy Pelts</i>	<i>%</i>
660	618	94
1,187	804	68
5,000	3,138	63

Early in the season, storksbill was invariably the more important with barley grass becoming prominent in mid (December to February) and late (March to April) season lambs. Although seasonal conditions have much influence, peak damage generally occurs in January to February. Later lambs tend to carry more seeds in the wool, but fewer in the pelt.

A Dunedin works produced the seasonal pattern over an eight-year period given in Table 2.

TABLE 2: SEASONAL PATTERN OF PELT DAMAGE
% of monthly pelts processed

			<i>Nov.-Dec.</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May-June</i>	<i>Season</i>
1962-3	....	....	13.7	47.7	58.5	31.2	19.1	11.0	29.8
1966-7	....	....	7.9	21.8	34.6	27.4	7.7	8.4	18.5
8-yr average	....	....	12.8	37.4	47.5	28.4	11.9	10.0	25.4

Freezing works that were able to produce records of pelts losses illustrate trends in various districts as shown in Table 3.

TABLE 3: TRENDS IN PELT DAMAGE

<i>District and Works Location</i>	<i>53-4</i>	<i>56-7</i>	<i>59-60</i>	<i>62-3</i>	<i>65-6</i>	<i>66-7</i>	<i>67-8</i>	<i>68-9</i>
3. Gisborne					4.1	2.8	5.5	3.3
4. Hastings	3.1	4.4	3.7	6.8	11.0			13.9
5. Wellington					0.8	1.9	3.1	3.7
7. Picton				24.3	38.3	34.9	33.8	32.3
8. Christchurch	1.0	4.0	6.0	21.0	32.0			29.4
Christchurch	1.5	10.0	8.0	12.0	29.0			22.0
Christchurch				9.3	17.1	15.1	12.4	11.0
Ashburton				8.0	11.0			13.7
9. Timaru	1.0	5.0	8.0	28.0	37.0			27.4
Dunedin			8.6	29.8	26.1	18.5	31.2	28.4

This table illustrates:

- (1) The rapid build-up of infestation in eastern South Island areas during the early 1960s.
- (2) The subsequent plateauing and fluctuations during the latter part of the decade.
- (3) The slower build-up in the eastern North Island.
- (4) The relatively low wastage in moister western areas.

Explanations for the apparent equilibrium must be largely conjectural. They could include:

- (1) Full occupation of those sites most suitable.
- (2) A succession of seasons less favourable to barley grass.
- (3) More effective control measures being taken by farmers.

CONCLUSIONS

Barley grass invasion is an unwelcome consequence of intensifying livestock farming in summer-dry districts. Its agronomic value has so far been overlooked and outweighed by its obnoxious features.

Herbicides are a valuable part of a control programme but may result in the replacement of one weed by others. To obtain permanent, low-cost control of barley grass and other species of its ilk, the perennial component of the pastures must be strengthened. This could be done by developing new management techniques or introducing alternative species and varieties.

ACKNOWLEDGEMENTS

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REFERENCE

Loughnan, R. J. M., 1964: *Proc. 17th N.Z. Weed & Pest Control Conf.*: 40.