final report

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Managing Grass Seeds in Weaner Sheep

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PIRD Supporters & Acknowledgements

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The Project Objective

The 'Central West Sheep Producers' (CWSP) group evolved from the existing Cumnock Wool4Wealth group (established 2006). Additional members joined this core to establish the CWSP group.

Grass seed contamination presents major problems to sheep producers in the central west of NSW. The major problem is the infestation of weaner sheep with Barley, Silver, Spear and Wire grass seeds over their first summer. The majority of weaner sheep in the region are born during the late winter/early spring and graze grass seed contaminated pastures during November to February. This has lead to problems such as reduced weight gains, eye problems, wool, skin and meat contamination. To address the problem most producers have traditionally prematurely shorn weaner sheep to minimise the pickup of grass seeds over their first summer. This has been effective but has incurred severe discounts for short wool from their first shearing and has increased the cost of producing both wool and sheep meat. Alternative management techniques such as preparing grass seed free (or reduced) pastures, using coats to reduce pickup, and using Bioclip shearing (pre pick-up) to remove any chance of grass seed pickup; has been investigated in an adhoc manner. The problem is to identify what management systems provide the most cost effective and profitable method of managing grass seeds in both prime lamb and merino weaner sheep.

This PIRD projects overall aim was to optimise both meat production and life time wool/reproductive performance from merino & XB weaner sheep through the effective and economic management of grass seed problem pastures. Through the control of seed contamination on growing lambs, the CWSP group set out to:

- Increase prime lamb and merino carcass turn off weights from an average of 18kg to 20.7kg carcass weight.
- Reduce the number of lambs contaminated by seeds (% with grass seed penetration) from 25% to less than 10%.
- To increase the net value of wool production (after the cost of harvesting) from an estimated $38 to $44 over their first 28 months of life.
- For all group members to identify to what extent seed contamination is reducing production and profitability on their properties.
- To have all 10 group members develop a cost effective strategy to manage the impact of seed contamination on either their wool or lamb producing enterprises.

The project methodology was developed to address the issues and provide practical solutions to achieve these objectives. The overall project was set-up to be undertaken in two stages. The first stage of the trial investigated the effectiveness of reduced wool length in managing the grass seed problem, as earlier work displayed the benefits of shearing to reduce wool length prior to the main period of grass seed pickup in late spring and summer. Wool removal methods were compared by investigating the biological effectiveness of the Bioclip™ method of wool harvesting to conventional shearing and not shearing, in reducing the impact of grass seed contamination on wool and meat production in weaners. The second stage aimed to collate both field data on the levels of problem seed species contamination of pastures in the Cumnock/Yeoval district, and do co-operator trials to determine benchmarks and thresholds for the pro-active management of problematic species. Using co-operator trials a combination of strategic (preparing seed-safe pastures) and tactical methods (e.g. Bioclip or shearing) were to be tested in order to determine pasture composition benchmarks and economic thresholds. The project methodology is detailed in the following section.

Project Methodology

Stage 1

Objective to test the effect of different treatments to livestock on lamb production, both meat, wool and skin production, over summer under severe challenge from problematic plant species. One group member operates a trial comparing the treatments of leaving lambs unshorn, conventionally shearing them and using the Bioclip wool harvesting method, while grazing a paddock heavily contaminated with seed problem plants. This stage was completed and the methodology used is described below.

Methodology for the major 2007/2008 trial

The experiment was conducted on a commercial property near Yoeval (32°29'S, 148°30'E), about 30 km south-east of Dubbo. The lambs used in the experiment grazed a paddock expected to contain a sufficient challenge through quantities of plant species identified as problematic to lamb production in the central western slopes of NSW (Hancock and Schuster 2004). The 20 ha paddock with a naturalised pasture was level and typical of the area with an average elevation of 362 m and an average annual rainfall of 600 mm.

The naturalised pasture in the challenge paddock was visually estimated on day 0 (5 November 2007) to have contained approximately 35% barley grass (*Hordeum spp.*) at 30cm of height and in early senescence; 5% corkscrew (spear grass; *Austrostipa spp.*) and 30% crow foot (*Erodium spp.*) both at 40cm of height and flowering; 15% silver grass (*Vulpia spp.*) at 15cm of height and in early senescence. The remaining 15% comprised of subclover (*T. subterraneum*), annual ryegrass (*Lolium rigidum*), bare ground and other species.

158 Dohne x Merino mixed sexed lambs (ewes and wethers) being approximately 5 months of age (born June 2007) were randomly allocated into three treatment groups. The treatments tested included the lambs:

i) remaining unshorn over the entire experimental period (US).

ii) conventionally shorn at the start of the experiment (CS).

iii) wool chemically harvested using the Bioclip™ method at the start of the experiment (BC).

Treatments were applied on day 0 with all lambs being crutched prior to treatment. Lambs undergoing the BC treatment where vaccinated and netted on day 1 with nets removed and wool harvested on day 30 (5 December 2007). Post-treatment the lambs were moved into the challenge paddock were they remained until day 154 (7 April 2008), after which they were grazed on lucerne pasture and also offered hay supplements 1 week prior to slaughter (day 185).

All of the lambs used in the experiment were from the same mob of ewes and had remained together from birth through to slaughter. Prior to the experiment the lambs were exposed to paddocks with low levels of problem plant species.

Stage 2

Stage 2 work during 2009/2010 aimed to collate both field data on the levels of problem seed species contamination of pastures in the Cumnock/Yeoval district, and do co-operator trials to determine benchmarks and thresholds for the pro-active management of problematic species. Using co-operator trials a combination of strategic (preparing seed-safe pastures) and tactical methods (e.g. Bioclip or shearing) will be tested in order to determine pasture composition benchmarks and economic thresholds. This stage of the project was not completed due to climatic conditions eliminating the capacity of producers to provide sheep and trial paddocks. This is detailed in the Project Results section of this report. For a complete detailed description of the Stage 2 methodology refer to Appendix III.

Methodology for the main 2009/2010 trial

The proposed methodology intended to use repeated measurements of both pasture composition, quality and quantity, and livestock performance from each treatment group (Bioclip, conventionally shorn and unshorn groups) to compare actual in-paddock performance against expected modelled performance using GrassGro. The information from this modelling was to be used to determine economic thresholds for the control and management of seed problem species in pastures. The co-operator trials were to be run under commercial conditions with multiple on-farm replicates over the seed risk period.

Experimental design was to incorporate a 2 x 3 design (6 treatments) as shown in Table 1, with at least 50 weaner sheep per treatment (300 sheep in total).

Table 1: Treatment Matrix

Livestock Treatments	**Paddock Treatments**	
	Minimal Grass Seed problem plants (Seed Safe prepared paddock)	Normal Grass Seed problem plants (paddock untreated)
Unshorn	X	X
BioClip (shorn November)	X	X
Conventional Shearing (November)	X	X

Animal welfare guidelines will be applied to unshorn treatment groups, i.e. individuals removed from the trial if they are at risk of death, or being less than 20kg live weight & not gaining weight. Lambs selected for the trial were to be within the 25th & 75th percentile for mob live weight, however the acceptable range may have been varied depending on numbers available.

Project Results

Stage 1: Minimising the impact through the reduction of wool length

Interim results from the trial which indicate the differences between treatment groups at the point of the Bioclip harvest on the 5th of December are shown in Appendix I. This also coincides with the Trial Update/BioClip Harvest Field Day.

The final results of the trial are reported here and in Appendix II. These results were presented at the CWSP Field day held on the 27th June 2008.

Skin Contamination

Most seeds within skins were found in the belly and forequarter regions, with the least amount found in the hind and loin regions. Unshorn animals maintained the highest levels of seed contamination with the lowest levels found in Bioclip treated animals (See Figure 1). Overall, unshorn weaners had a significantly 44% higher whole skin mean contamination score than Bioclip treated weaners ($p<0.05$), with conventionally shorn weaners also significantly lower than unshorn weaners ($p<0.05$). However, seed contamination levels appeared to not have a dominate influence upon skin values at the abattoir used, as unshorn skins achieved the highest mean values (Table 2). This result is likely to be due to the fell-mongering capacity of the cooperating abattoir used. The results indicated that reducing wool length during high seed-risk periods effectively reduces skin contamination.

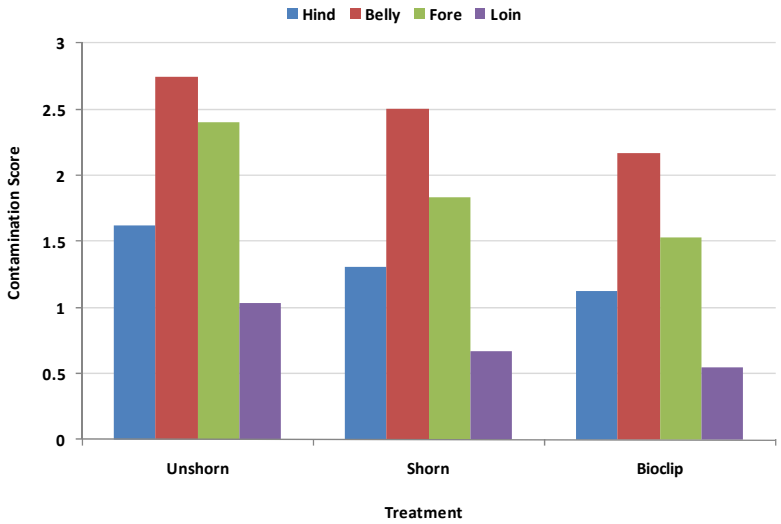


Figure 1: Distribution of seed contamination in skins. Seed contamination scores are based on: none present is a score of 0 (no seeds), score of 1 (light: 1 to 5 seeds), score of 2 (moderate: 6 to 10 seeds) and a score of 3 (heavy: >11 seeds) per region.

Carcass Contamination

Most seeds within carcasses were found in the belly and hindquarter regions, with the least amount found in the forequarter and loin regions. Unshorn animals maintained the highest levels of seed contamination in carcasses with the lowest levels found in conventionally shorn weaners (See Figure 2). Although there was no significant difference between the carcass contamination of conventionally shorn and Bioclip treated weaners, unshorn weaners did maintain a significantly higher level of contamination ($p<0.05$). The same relationship exists with total in-carcass seed counts, with unshorn sheep having an average of 13.8 seeds/carcass, conventionally shorn sheep having 5.9 seeds/carcass and Bioclip treated sheep having 5.6 seeds/carcass (Appendix 1).

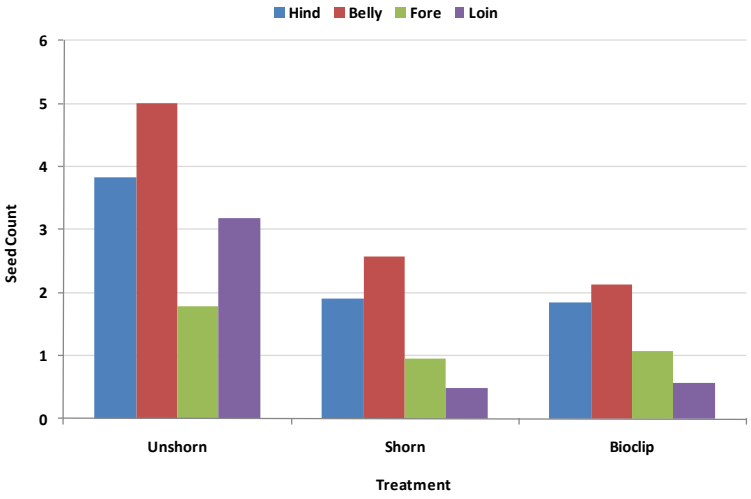


Figure 2: Seed count within carcass regions.

The level of skin and carcass contamination is proposed to have a significant effect on the trimmed cold carcass weight of weaners. Appendix I indicates that carcass weights for Bioclip treated weaners was significantly higher than that achieved by unshorn weaners. Concurrently, GR fat depth was also significantly lower for unshorn sheep than Bioclip treated sheep. The overall result is that Bioclip treated weaners maintain a $5 per head carcass value advantage over unshorn and conventionally shorn weaners (Table 2).

Economic Analysis

The economic analysis of the stage 1 trial results and the assumptions applied to the analysis are shown in Table 2. This analysis calculated the Marginal Profit from the weaners in the trial using the following formula:

Marginal Profit = Trading Margin – Variable costs

where

Trading Margin = Sale Price – Opening Value + Wool Income

with

Sale Price = Cold trimmed Carcass Weight x Price ($/kg) + Skin Value

The results indicate that unshorn weaners generate a significantly lower level of marginal profit when compared to conventionally shorn weaners ($P<0.05$). There was, however, no significant difference between the marginal profit for Bioclip treated weaners and unshorn weaners, and Bioclip weaners and conventionally shorn weaners.

Table 2: Economic analysis of minimising the impact of grass seeds through a reduction in wool length. Different letters indicate means that are significantly different at the 5% level.

Economic Measure ($ per head)	Treatment		
	Unshorn	Shorn	Bioclip
Variable Costs	$0.79	$7.30	$8.45
Wool Income	$0[a]	$10.13[b]	$12.18[c]
Opening Value	$46.19	$44.95	$46.16
Carcass Value	$60.18	$60.67	$65.22
Skin Value	$16.83[a]	$13.43[b]	$9.94[c]
Marginal Profit	$30.62[a]	$33.33[b]	$32.64[ab]

Assumptions

1. Variable costs: $0.79/hd for crutching, $5.29/hd for shearing and $6/hd for Bioclip + wool selling costs
2. Wool Income based on test results and average value over the last 3 years: Wool cut was 0.965kg clean/hd for shorn (FLC 19.1mic, 3.3%VM, 58.3% yield 55mm & 52n/kt; PCS 18.4 mic, 46.4% yield. 33 N/kt, 50mm, 9.4% VM) and 1.08kg clean/hd for Bioclip (19mic, VM 2.9%, 56.5% yield)
3. Opening & Carcass value based on average over last 3 years: Opening @ 2.95/kg cwt & an assumed 44% dressing percentage
4. Carcass value of $3.45/kg for trimmed cold carcass weight (only in this trial as this measure is closest to what you would receive over the hooks).

Two papers were published from the results of the Stage 1 trial, and these have been reproduced and included in Appendix VI.

Stage 2: Determining pasture benchmarks and economic thresholds for proactive management

During the winter and spring of 2009, 3 cooperators were involved in setting up trial paddocks. Basic descriptions are as follows: Producer 1): Focused on lamb production off Lucerne based pastures contaminated with Barley Grass; Producer 2). Merino Weaners for meat production running on improved pastures (i.e. phalaris/sub) and contaminated with Barley Grass and Silver Grass; Producer 3). Merino weaners for wool production running on native pastures contaminated with Barley Grass, Stipa and Silver Grass. Each producer agreed to participate in the trials, pre-trial botanical composition assessments where undertaken and chemicals were used on one of Producer 2's paddocks to further differentiate the two trial paddocks (See Appendix IV; Paddock 1: 14% Barley Grass; Paddock 2: 31% Barley Grass; Paddock 1 treated to reduce Barley grass contamination). The visual results of this treatment are shown in Figure 3.

a) **b)**

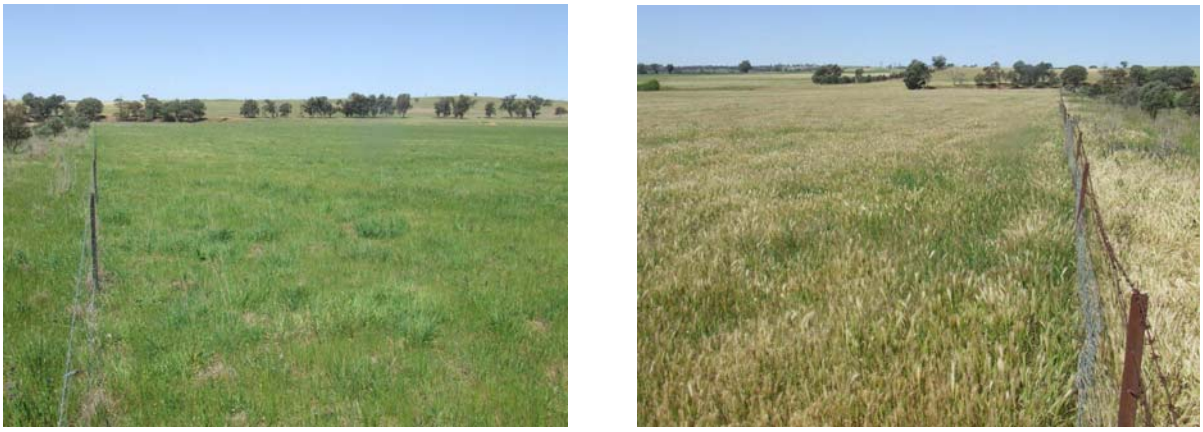


Figure 3: Visual effect of winter cleaning on Homewood trial paddocks on 20th October 2009; a) Paddock 1 on 'Homewood', winter cleaned with an estimated <5% Barley Grass content during spring; b) Paddock 2 with an estimated 30% Barley Grass content and untreated.

During October and November 2009 the region received well below average rainfalls. The trial paddocks were prepared and rested to enable them to carry the trial sheep, however, Producer 2 and Producer 3 now required these prepared trial paddocks as part of their feedbase, which forced their withdrawal from the trial approximately 3 weeks prior to the trial set- up phase. Producer 1 withdrew from the trial due to its perceived complexity. As such no trials were operated over the 2009/2010 summer period, with the additional consequence of no field days or training activities being undertaken during this period.

With this major setback the research team (lead by Karl Behrendt, Producer cooperators, members and supporters such as Jane Mason of NSW DI&I) reassessed the viability of continuing the project. Given a combination of factors, such as, the lack of ongoing support from members, only having two cooperators indicating that they would be prepared to undertake the trial during 2010/2011, and that approximately $31,400 of in-kind had been contributed to the project, it was decided that the group would not re-submit another proposal for continued support from MLA for the trial as previously discussed with Gerald Martin. Other models of funding and providing member support would be investigated by individuals within the group.

Project Learning & Development Outcomes

Project Objectives & Outcomes

Objective	Outcome
Increase prime lamb and merino carcass turn off weights from an average of 18kg to 20.7kg carcass weight.	The objective represents a 15% increase in the average carcass turn-off weight. The stage 1 trial results alone achieved a 7% increase in carcass turn-off weight. It is expected that the integration of preparing seed safe pastures (as part of the Stage 2 trial) may have identified systems to achieve this objective.
Reduce the number of lambs contaminated by seeds (% with grass seed penetration) from 25% to less than 10%.	The results of the stage 1 trial indicated the benefit of managing wool length in weaner sheep. The results indicate that this objective was met indirectly, as it showed there is a potential to reduce skin contamination by 24%, and reduce carcass contamination by 46%.
To increase the net value of wool production (after the cost of harvesting) from an estimated $38 to $44 over their first 28 months of life.	This objective was not met during the project period due to the effect of drought conditions, which led to the Stage 2 trial not being completed. However, results of the Stage 1 trial did suggest there is a potential to achieve a net gain in wool income of 13% by utilising Bioclip technology for weaner sheep over using conventional shearing in their first 5 months of life.
For all group members to identify to what extent seed contamination is reducing production and profitability on their properties.	This objective was achieved for 3 of the 10 members. It was achieved due to their participation as trial co-operators, which enabled them to investigate the impacts of grass seeds on their production and profitability. Other members began to understand the impact on their properties through facilitated discussion.
To have all 10 group members develop a cost effective strategy to manage the impact of seed contamination on either their wool or lamb producing enterprises.	Overall 6 members achieved this objective through their involvement with the project. Through an improved understanding of the role, benefits and costs of strategies, members informally developed strategies to manage the impact of seed contamination on their businesses.

What have participants taken out of being involved with the project

- Understanding about the benefits of managing grass seeds in weaner sheep within their farming systems.
- Develop an improved understanding of how management and strategies can interact within production systems to reduce the impact of grass seeds in sheep production.
- Knowledge about the impact of different livestock treatments and their economic benefit to sheep production systems.
- A desire to further test and investigate methods and technologies to improve the efficiency of sheep production (albeit informally).

Members practice change

From the outcomes of the stage 1 trials and the starting of the stage 2 trials, members, and in particular cooperating members have developed strategies to proactively manage grass seed contamination in weaner sheep. These members have adopted technologies such as:

- preparing seed safe pastures through winter cleaning
- preparing seed safe pastures through grazing management and feed budgeting principles.
- trialling Bioclip to reduce grass seed contamination
- trialling coats to reduce grass seed contamination

Longer term strategies being adopted by members includes developing farm and feedbase plans that provide high quality pastures, as well as seed safe pastures for weaners. Overall, this is perceived as a shift from the reactive management of the problem to pro-active management of the problem. The surprising outcome of this project is that members, even without substantiated results from the Stage 2 trial, have already incorporated intuitively into their management a more integrated approach to managing grass seed problems in weaner sheep.

Economic Gains to members

Based upon the economic analysis of the outcomes of the Stage 1 trial, the net benefit potentially achievable by members is in the vicinity of $2.02 - $2.71 per head (Table 2). For the average group member who produces prime lambs and producing around 1000 lambs per annum, **this increases their net income by $2,020 to $2,710 per annum**, if they are currently adopting a 'do nothing approach' to grass seed management. Given the 12 members that originally participated in the project, this provides **a total annual direct net project benefit to the CWSP group of around $24,000 to $32,500** (excludes benefits to whole sheep production system from increased knowledge and awareness).

This benefit estimate does also exclude the potential benefits to the broader industry from the publications and increased awareness of the costs and benefits of managing grass seeds in weaner sheep that may be attributable to the results of this project (Appendix *V* & *VI*). Although the direct benefit to members is in deficit of the benefits proposed in the original Project Proposal, the results of the Stage 2 trial would have contributed significantly more to answering the question of overall economic benefit and strategy identification.

Field Days and group meetings

When & Where	Description	No. of members in attendance
22/6/07 Yoeval, NSW	Facilitated **CWSP Group Meeting** to review and discuss current management systems adopted to manage the grass seed problem, and review the contribution of MLA's publication 'Winning Against Seeds'.	11
7/8/07 'Homewood' Cumnock NSW	**Preparing Seed Safe Pastures workshop:** Group meeting to identify problem weeds and summer paddocks for weaner sheep & prepare ½ of the area as grass seed free areas. Agronomist David Harbison from DR Agriculture and Karl Behrendt from Agrorum Consulting ran this workshop titled *Preparing Seed Safe Pastures*. Trial paddocks will contain typical concentrations of grass seed problem plants.	12
7/11/07 'Glenwood' Yoeval, NSW	**Trial Set-Up Day:** Set up a small preliminary trial - randomly allocated 165 merino weaners into 3 treatment groups (unshorn, conventionally shorn, Bioclip). Recorded treatment, sex, id. & live weight.	5
5/12/07 'Glenwood' Yoeval, NSW	Ran **Trial Update/BioClip Harvest Field Day** where members & others inspected trial mobs and Jane Mason from NSW DPI fat scored all sheep in the trial, and sheep in the BioClip treatment had their wool harvested.	6
29/04/08 'Glenwood' Yoeval, NSW	**Record liveweight and fat score of Glenwood trial sheep** - the 165 merino x dohne weaners in the 3 treatment groups (unshorn, conventionally shorn, Bioclip), were fat scored and weighed prior to slaughter.	3
08/05/08 Dubbo, NSW	**Glenwood trial slaughter day** - organized for the slaughter and assessment of sheep from the Glenwood trial through an abattoir at Dubbo. For the 3 treatment groups (unshorn, conventionally shorn, Bioclip) the following information was recorded: hot and cold carcass weight, GR fat depth, scored the skins and carcasses for grass seed contamination, received individual skin value assessments from the cooperating abattoir, and measured the amount of trim due to seeds.	2 + assistance from 3 NSW DPI staff & abattoir staff (limited numbers were allowed)
27/6/2008 'Glenwood' Yoeval, NSW	**CWSP Field day -** presented results from Glenwood Stage 1 Trial and discussed the project program for 2008/2009 as well as recap on the *Preparing Seed Safe Pastures* workshop.	9
3/4/2009 Molong, NSW	**Co-operator Protocol meeting -** to present and discuss proposed protocol for 2009/2010. Three co-operators expressed an interest to participate in the Stage 2 trial.	6
15/5/2009	**Paddock inspection of co-operator proposed trial paddocks -** Each	5

Baldry, Cumnock & Yoeval	co-operator maintained suitable paddocks and pastures to host the trials with weaner sheep. Three different pastures systems were available, a native pasture, phalaris pasture and a lucerne based pasture system. Trial protocol was aligned with each co-operators operational calendar.	
29/7/2009 Cumnock	**'Homewood' Cumnock Paddock Survey:** A pre-treatment inspection and botanical composition survey was undertaken on proposed paddocks.	3

PIRD Process & Project Feedback

The following comments, background information and feedback have been accumulated since the trial began in 2007. It has been derived from survey responses, facilitated meetings and from individual member responses.

Background to the group

- 80% of members are lamb & wool producers, 20% are wool.
- 90% of members lamb either during winter or spring (10% in autumn).
- Sheep enterprise income makes up the majority of the business income (74%).
- 80% of members consider managing seed issues to be important to very important to their sheep enterprise and young sheep.
- 78% indicated that seeds can sometimes be important to very important, to the marketing of their sheep.
- 100% of members considered Barley Grass to be the most popular and important problem species contaminating their sheep.
- Grazing management and pasture improvement where the most adopted methods of managing seed problems
- Grazing management, pasture improvement and pasture manipulation where the most important options being considered for the future management of seeds in young sheep.

In regards to the MLA publication 'Winning against seeds'

- It provided 60% of respondents an increased awareness of seed problems in young sheep
- 80% had an increased knowledge of the impact of seeds on their sheep production business
- 63% believed it is influencing how they manage seed problems
- 63% believed it has helped them in developing a plan
- 75% thought that the publication provided valuable information in support of the PIRD trial and project.

Was the Group satisfied with the results of the project?

Overall the group was satisfied with the results of the Stage 1 trial. However, there is a general level of disappointment with the lack of consistency in group membership, and the effect of drought on undertaking the Stage 2 co-operator trials. As detailed previously, the majority of the group either adopted and incorporated management strategies for the reducing of the grass seed problem in weaners sheep, or are in the process of investigating treatments and methods individually within their farming systems.

How could you have done the project better?

A common comment provided by members was the need for project funding to cover expenses not normally undertaken in the business. This includes expenses such as winter cleaning and subsidisation of the expenses regarding to trialling un-familiar technologies (e.g. Bioclip).

Another comment was to remove the need for all members to undertake trials within their own properties. The majority of members did not have the confidence or desire to operate trials within their systems, which may have led to the lack of consistency in group membership. The majority of members also suggested they would be satisfied with just observing the results and outcomes of well-operated and supported co-operator trial.

PIRD process feedback

Is the group interested in doing another project?

At this stage the group is not interested in undertaking another project due to the current lack of consistent membership; financial and physical stressors of drought conditions on the state and management of their businesses; the lack of funds available to pay for non-typical operating expenses.

Would you recommend other Groups run their own trials?

Generally, Yes, if they can maintain a sufficient level of interest from enough group members, as well as have sufficient funds to support all trial costs. The physical and financial stressed being experienced by most members restricted their interest in undertaking trials and eventually caused the cessation of the stage 2 trial.

Comment on the organisation and management of PIRDs, this will assist MLA in better management of future projects:

The reporting of the PIRD to MLA was not regarded as onerous, however, the group believed it was beneficial in having an engaged facilitator to take on the management and reporting responsibilities.

Appendices

Appendix I: Stage 1 Trial: Glenwood - BIOCLIP Harvest & trial inspection 5th December 2007

Key Results Reported

Trial Paddock Description: The paddock that the lambs are grazing is described as containing approximately:

- 35% Barley grass at around 30cm high and gone to head,
- 5% Corkscrew (Spear grass; *Austrostipa spp.*) at around 40cm high and seeding,
- 30% Crow Foot (*Erodium spp.*) at around 40cm high and seeding
- 15% Silver grass (*Vulpia spp.*) at around 15cm high and seeding
- With the remaining 15% comprising of subclover, ryegrass and bare ground.

(Courtesy of Matthew Coddington)

Treatment Groups

All weights are fasted live weights before treatment on the 6th of November 2007. Total sheep in the trial is 165 head with an average live weight of 34.95kg (St.Dev. 5.6kg; Range of 21 to 50.4 kg).

Unshorn	Conventionally Shorn	BIOCLIP Sheep
Total No. in group = 55 Average Weight = 35.2 kg St.Dev. = 5.28kg Range: 23.4 to 48 kg ---------- Ewes: No.: 29, Ave Wt: 34kg Wethers: No.: 24, Ave Wt: 36.2kg Rams: No.: 2, Ave Wt: 41.6kg	Total No. in group = 55 Average Weight = 34.9 kg St.Dev. = 6.66kg Range: 21 to 50.4 kg ---------- Ewes: No.: 28, Ave Wt: 32.1kg Wethers: No.: 23, Ave Wt: 37.1kg Rams: No.: 4, Ave Wt: 41.95kg	Total No. in group = 55 Average Weight = 34.7 kg St.Dev. = 4.8 kg Range: 24.6 to 43 kg ---------- Ewes: No.: 28, Ave Wt: 34.2kg Wethers: No.: 26, Ave Wt: 35.7kg Rams: No.: 1, Ave Wt: 24.6kg

All sheep are to be slaughtered next year. Degree of seed contamination in the carcass, carcass weight, meat and skin value will be recorded. Wool income from shorn and BIOCLIP sheep will also be taken into account, as will be the costs of the treatments at commercial rates.

Appendix II: Stage 1 Slaughter Data for Glenwood Trial

Raw Trial data was analysed using SAS (2005) JMP IN. (Thompson Brooks/Cole: Toronto). Values followed by the same letter are not significantly different (P > 0.05 or P>0.01 levels).

Carcass Measures	Treatment	Mean	Significance (p<0.05)	Significance (p<0.01)
GR Fat depth (mm)	Unshorn	5.14	a	a
	Shorn	6.02	ab	a
	Bioclip	6.53	b	a
Trim due to grass seeds (grams)	Unshorn	65.5	a	a
	Shorn	54.9	ab	a
	Bioclip	39.1	b	a
Cold trimmed carcass weight (kg)	Unshorn	17.467	a	a
	Shorn	17.805	ab	a
	Bioclip	18.698	b	a
Hot carcass weight (kg) *(Note: most unreliable measure due some being trimmed on the killing chain, i.e. some of the first batch were accidently trimmed by abattoir staff)*	Unshorn	18.228	a	a
	Shorn	18.605	a	a
	Bioclip	19.386	a	a
Whole carcass mean contamination score1 *(Note: mean score of the 4 regions assessed and reported below)*	Unshorn	0.957	a	a
	Shorn	0.603	b	b
	Bioclip	0.656	b	b
Hind Quarter carcass Contamination score[1]	Unshorn	1.07	a	a
	Shorn	0.775	b	a
	Bioclip	0.791	b	a
Belly Contamination score[1]	Unshorn	1.302	a	a
	Shorn	0.95	b	b
	Bioclip	0.953	b	b
fore Quarter/brisket Contamination score[1]	Unshorn	0.907	a	a
	Shorn	0.7	b	a
	Bioclip	0.767	ab	a
Loin/Back Contamination score[1]	Unshorn	0.907	a	a
	Shorn	0.341	b	b
	Bioclip	0.419	b	b
Whole carcass total seed count (Seeds/carcass)	Unshorn	13.79	a	a
	Shorn	5.91	b	b
	Bioclip	5.6	b	b
Hind Quarter carcass seed count	Unshorn	3.828	a	a

[1] Seed measurements were made on the carcasses in four regions and converted to a score. Scores given were 0 (no seeds), 1 (light 1 to 5 seeds), 2 (moderate 6 to 10 seeds) and 3 (heavy >11 seeds) per region

(number)				
	Shorn	1.913	ab	a
	Bioclip	1.84	b	a
Belly seed count (number)	Unshorn	5	a	a
	Shorn	2.565	b	b
	Bioclip	2.12	b	b
Fore Quarter/brisket seed count (number)	Unshorn	1.79	a	a
	Shorn	0.957	b	a
	Bioclip	1.08	ab	a
Loin/Back seed count (number)	Unshorn	3.17	a	a
	Shorn	0.478	b	b
	Bioclip	0.56	b	b

On Farm production measures	**Treatment**	**Mean**	**Significance (p<0.05)**	**Significance (p<0.01)**
Fat Score 29/4/08 Note: opposite to GR fat depth	Unshorn	2.965	a	a
	Shorn	2.756	b	a
	Bioclip	2.786	ab	a
Estimated liveweight change (kg)	Unshorn	11.86	a	a
	Shorn	14.184	b	b
	Bioclip	14.668	b	b
Estimated Wool cut per head (kg clean)	Unshorn	0	a	a
	Shorn	0.965	b	b
	Bioclip	1.08	c	c

Skin Measures	**Treatment**	**Mean**	**Significance (p<0.05)**	**Significance (p<0.01)**
Whole Skin mean contamination score1[2]	Unshorn	1.95	a	a
	Shorn	1.58	b	b
	Bioclip	1.35	c	b
Hind Quarter skin Contamination[2]	Unshorn	1.625	a	a
	Shorn	1.31	b	ab
	Bioclip	1.13	b	b
Belly skin Contamination[2]	Unshorn	2.75	a	a
	Shorn	2.5	a	ab
	Bioclip	2.17	b	b
fore Quarter/brisket Contamination[2]	Unshorn	2.4	a	a
	Shorn	1.83	b	b
	Bioclip	1.53	b	b
Loin/Back Contamination[2]	Unshorn	1.03	a	a
	Shorn	0.67	b	b
	Bioclip	0.55	b	b

[2] Seed measurements were made on the skins in four regions and converted to a score. Scores given were 0 (no seeds), 1 (light 1 to 5 seeds), 2 (moderate 6 to 10 seeds) and 3 (heavy >11 seeds) per region.

Skin Values ($/skin)	Unshorn	16.83	a	a
Note: skin values for this processor only	Shorn	13.43	b	b
not representative of whole market	Bioclip	9.94	c	c

Appendix III: Stage 2: Co-operator Trial Design – 2009/2010
Version: 24/4/2009

Objective

To collate and present field experimental data about the interaction between the level of pasture infestation with grass seed problematic species and the productive response of weaner sheep to the individual treatments of Bioclip, mechanical shearing and remaining unshorn.

Collated data and response information may then be used to determine economic thresholds for the control and management of seed problem species in pastures, using combinations of strategic (preparing seed-safe pastures[3]) and tactical methods (e.g. Bioclip or shearing).

It is envisaged that the trial will act as a base for extending useful information to the producers in the CWSP group about various aspects of their sheep enterprises and pasture management. Various guest speakers will be invited to speak at certain times throughout the trial period, all with the aim of providing information so that producers are able to be further skilled, more efficient and sustainable in managing their pastures and sheep enterprises.

Methodology

Trials are proposed to be undertaken co-operators farms under commercial conditions throughout the Central West of NSW. The following describes the process of both the 2009 trial and its extension.

1. Identify a minimum of 3 co-operating farms to operate the 2009/2010 grass seeds trial – investigated during the 2009 survey.

2. Ideally two paddocks per property to be used in which trial sheep are to be set -stocked over the trial period. The greater the number of properties x No. of paddocks, the more rigorous the trial and data becomes. Ideal numbers would be at least 4 properties x 2 paddocks = 8 trial paddocks. Each property and its paddock(s) will act as a replicate. Ideally one paddock per replicate will be winter-cleaned or be relatively free of seed problem species, the other paddock left as normal and sheep from all three treatment groups (Unshorn, Conventionally shorn and Bioclip sheep) will graze on each paddock at each replicate.

3. Paddocks can be anything from native pastures to lucerne, as the aim is to determine a relative response to different levels of seed problem plant contamination. This will partly be achieved by modelling expected performance and comparing this against actual performance.

4. Either merino or cross-bred lambs may be used in the trial. Ideally they must be healthy and actively growing prior to commencement of the trial.

The Trial

5. Mid winter (July/August 2009) – decisions to be made for winter-cleaning of trial paddocks if required. Measurements to be taken at this point will include pasture composition, height, quantity and quality (visual assessment and stick-point method – Prograze Training for co-operators & group members).

6. 2 weeks post-weaning set-up trial sheep and assess levels of paddock contamination, including pasture quality and quantity.
    a. Assess the botanic composition of the trial paddocks
    b. Visually assess the quantity and quality of pasture available in each trial paddock.
    c. Tag, Weigh and fat score trial sheep

[3] Will need to find response data on the expected success and cost of winter cleaning strategies in pastures on the level of contamination of seed-problem plants.

d. Randomly allocate at least 50 weaner sheep per treatment group per paddock; i.e. at least 150 weaners per paddock split between the treatments of unshorn, mechanically shorn and Bioclip harvest.
e. Net and Bioclip vaccinate Bioclip treated sheep
f. Mechanically shear sheep
g. Set-stock paddocks with the treatment groups.
h. 4 weeks post trial set-up, remove bioclip nets and harvest wool
i. Measure wool length (apply dye bands in merino lambs)??

7. Mid trial inspection (December 2009/January 2010)
    a. Assess the quality and quantity of pasture available, develop supplementary feeding strategies if required.
    b. Assess botanic composition of pastures and phonological stage of seed-problem species (visual and stick-point method).
    c. Measure liveweight and fat score of all trial sheep
    d. return trial sheep to set-stocked trial paddocks

8. Trial Finish after the period of main seed fall/contamination (March/April 2010)
    a. Assess quantity and quality of pasture available in trial paddocks
    b. Assess the botanic composition and phonological stage of the pasture (visual and stick-point method).
    c. Measure liveweight and fat score of all trial sheep
    d. Measure wool length of all trial sheep from dyebands ??
    e. Slaughter protocol developed for the 2007-2008 trial can be used here IF co-operators wish to pursue these issues.

Trial Extension

9. **Trial Set-up walk/group meeting (November 2009):** to assess problem weeds and summer paddocks for weaner sheep (On just one of the co-operators properties).

Trial paddocks will contain various concentrations of grass seed problem plants and be assessed for botanical composition. Producers will assist in participating in the following activities during the trial period:

a. Training of group members in pasture assessment to standardise future measurements (Prograze Training).
b. Randomly allocate weaners to treatment groups.
c. Record i.d., live weight, fat score, wool length.
d. Record wool production from shorn & Bioclip sheep.
e. Post treatment stock trial paddocks and assess for feed quantity, quality seed contamination potential.
f. Training of participants in fat scoring and pasture assessment (quantity and quality, pointed-stick method for contamination levels).
g. A 3rd Interim Report will be submitted to MLA post field day

10. Information sessions may occur throughout the trial period. These will potentially cover topics such as: weaner management, selection for flystrike management, managing the ewe for improved lifetime production of progeny (LTW), getting lambs to target weights/market information, pasture management/ managing problem species etc. This will be presented by different visiting speakers from private and government agencies.

11. **Mid-Trial Field day (January 2010):** Open inspection of sheep and paddocks in a trial to enable the group and others to compare contamination levels in pastures and livestock responses to treatments.

12. Final live or Pre-slaughter assessment trial sheep: Record live weight, fat score, wool length and any visual comments.

13. Slaughter Results (if applicable): record & report skin characteristics & value, carcass weights, fat depth & seed contamination of carcasses & skins.

14. 5th Interim Report Submitted to MLA with preliminary outcomes

15. **Trial Results Field Day (June 2010)** to report combined findings of the project to group members and others.

16. **Final report submitted to MLA** after field day (July 2010).

Appendix IV: Stage 2 Data

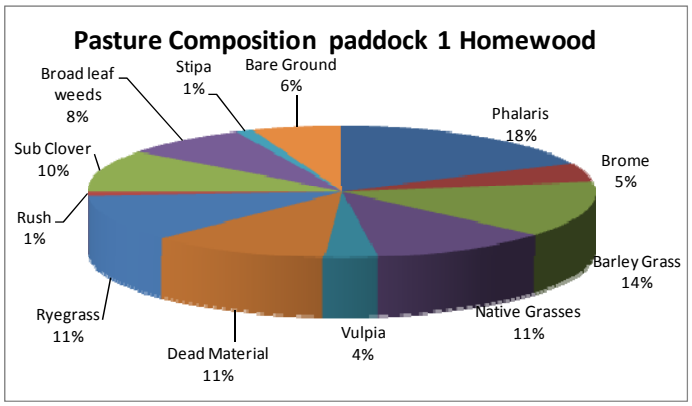
Wednesday 29th July 2009

Initial Paddock Survey - Homewood

Pasture Composition Data

Paddock 1 - Area 8.5 Ha

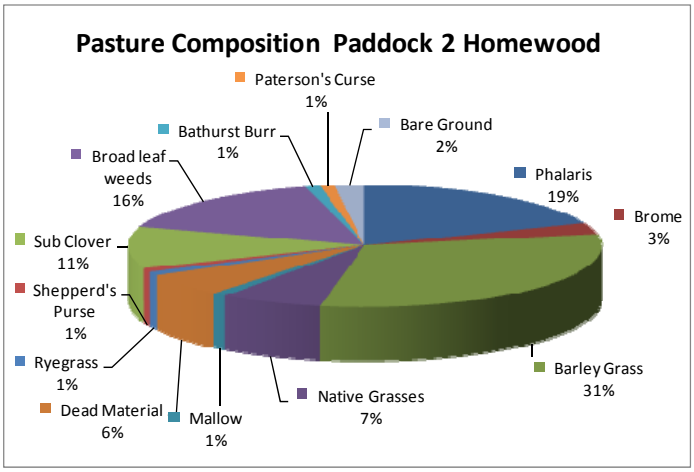
Species	Count	% Composition
Phalaris	16	18%
Brome	4	5%
Barley Grass	12	14%
Native Grasses	10	11%
Vulpia	3	3%
Dead Material	10	11%
Ryegrass	10	11%
Rush	1	1%
Sub Clover	9	10%
Broad leaf weeds	7	8%
Stipa	1	1%
Bare Ground	5	6%
	88	



Proportion Problem Species 18%

Paddock 2 - Area 12 ha

Species	Count	% Composition
Phalaris	19	19%
Brome	3	3%
Barley Grass	31	31%
Native Grasses	7	7%
Mallow	1	1%
Dead Material	6	6%
Ryegrass	1	1%
Shepperd's Purse	1	1%
Sub Clover	11	11%
Broad leaf weeds	16	16%
Bathurst Burr	1	1%
Paterson's Curse	1	1%
Bare Ground	2	2%
	100	



Proportion Problem Species 31%

Appendix V: Media Coverage

August 2008 newspaper feature in Ag Today

LIVESTOCK — Primary Industries

Bioclip vs shearing to reduce grass seeds

IT'S the dreaded grass seed season, which costs the sheep industry greatly each year.

Recent research is backing up previous logic that shows reducing wool length leaves both wool, and the carcases of sheep destined for slaughter far less contaminated than if sheep remain unshorn.

Grass seeds from species such as Barley grass, Spear grass, Silver grass, Wire grass and Erodium wool, cause the problem.

"Processors suffer inefficiency along the slaughter chain, associated with the heavy trimming required on heavily infested lambs," one of the trial operators, Jane Mason, said.

Ms Mason, NSW Department of Primary Industries (DPI) sheep and wool livestock officer for the Central Tablelands, says producers pay the price in downgraded carcases and skins and must also suffer the animal health and production consequences of seed infestation.

These consequences include abscesses, reduced weight gains, increased lamb mortality, reduced market advantage and quality assurance, and food safety.

Ms Mason said a recent trial set up at multiple sites near Yeoval in the Central West aims to explore the most efficient and economic methods for reducing grass seed contamination in weaner sheep in their first summer.

The trial, funded by Meat and Livestock Australia, was initiated by a group of local sheep producers under the direction of Karl Behrendt of Agrorum Consulting in Bathurst.

The trial examines the animal and pasture management systems suggested to reduce the amount of grass seed pick up.

Conventional shearing is one strategy known from previous research to reduce grass seed.

However, no research had ever been done on whether reducing wool length by the Bioclip method of de-fleecing consequently reduced seed contamination.

The Bioclip side of the trial has been performed by Shepherd Operations, Molong, with a major contribution by Anthony Shepherd.

The first part of the current trial, initiated last summer at Roseville Park Merino Stud near Yeoval, explored the biological benefit of using Bioclip to reduce grass seed pickup, compared to conventionally shearing or not shearing at all.

Results have been consistent with previous research, suggesting that reducing wool length, regardless of the harvest method used, reduces seed contamination in weaners in both skin and carcase.

Similar results were recorded for bioclipped or conventionally shorn sheep but leaving sheep unshorn was significantly unfavourable.

Economic comparison between conventional shearing and the Bioclip method is yet to be completed.

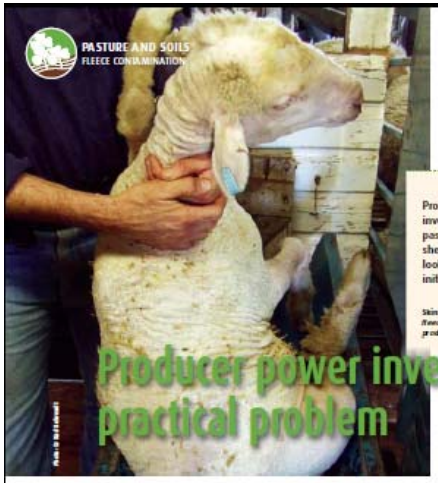
Other NSW DPI staff, livestock officer Ashley White and researcher, Edwina Toohey, have also provided expertise into the meat science side of the trial.

The next stage of development will look at pasture management systems that can be used to reduce grass seed contamination in young sheep.

■ **Contact Karl Behrendt, Bathurst, (02) 6336 3001, or Jane Mason, Orange, (02) 6391 3967.**

RIGHT: Sheep and wool livestock officer, Jane Mason, checking lamb carcases for grass seed contamination.

Kondinin Farming Ahead Magazine: February 2010, No. 217



Producer power investigates practical problem

Jane Mason
Dr Karl Behrendt

Producers are working together to investigate the issues surrounding pasture seed contamination of sheep. *Farming Ahead* takes a look ate the outcomes from the initial investigations.

Skin dags: Pasture seed contamination of fleeces and skins is a significant issue for sheep producers across Australia.

At a glance

- Pasture seed contamination can cause significant livestock health issues and production losses for producers, particularly during spring and early summer.
- A producer-initiated project is investigating a proactive approach to the problem through a two-stage investigation.
- Initial results suggest that bioclip technology can reduce skin contamination and carcase contamination, although skin from unshorn sheep had greater final value than other treatments.

Seed shedding by pastures during spring and early summer can have a significant detrimental impact on livestock, particularly young sheep. The impacts of fleece and carcase contamination and disease result in both production losses on-farm and reduced returns to producers through end product contamination.

Animal health issues of major concern include abscess formation from seed penetration, flystrike and reduced mobility, which impacts upon feed and water intake.

Within the supply chain processors experience reduced efficiency due to the trimming required for heavily seed contaminated carcasses.

Producer initiative

During 2008, the Central West Sheep producers group formed to develop effective networks where information could be distributed and discussed on relevant sheep industry issues. With the supervision of private and government researchers, the group aimed to discover effective ways of managing problematic pasture species in their district.

The group identified two stages to investigate the problem of seed contamination.

Stage 1 of the producer-initiated research identified the biophysical benefits and costs of using wool length reduction strategies to minimise the impact of problematic pasture species causing seed contamination and production losses in lamb production systems.

The second stage of this work aims to provide indicative benchmarks and economic thresholds for the implementation of both pasture and livestock strategies that minimise the impact of problem species.

Earlier investigations have displayed the benefits of shearing to reduce wool length before the main period of grass seed pickup. Producers found the outcomes of this earlier work would be enhanced by comparing the biological effectiveness of the bioclip method of wool harvesting to conventional shearing and not shearing, in reducing the impact of grass seed contamination on wool and meat production in weaners.

Taking the first step

On a commercial property near Yeoval, NSW during 2008, 158 Dohne x Merino weaner lambs of mixed sex were randomly allocated to three treatment groups unshorn (US), conventionally shorn (CS) and bioclip harvested wool (BC).

Lambs were crutched before treatment. Bioclip pens were removed and wool harvested from treatments CS and BC on day 30.

Post-treatment, lambs were moved into a pasture paddock containing problematic species such as barley grass (*Hordeum* spp.), spear grass (*Austrostipa* spp.), crows foot (*Eroblum* spp.) and silver grass (*Vulpia* spp.) where they remained set stocked until day 154. After this they were grazed on lucerne and, for one week before slaughter (day 185), offered supplementary hay.

Fasted lamb liveweights (at days 0 and 176) and fat scores (day 30 and 176) were recorded. The effects of treatments on carcase and skin attributes measured at slaughter are shown in Table 1.

Seed measurements were made on the skins and carcases in four regions and converted to a score — 0 (no seeds), 1 (light 1 to 5 seeds), 2 (moderate 6 to 10 seeds) and 3 (heavy >11 seeds) per region.

Valuable results

Initial results indicate there was no significant difference in carcase contamination between BC and CS lambs, although BC lambs had significantly lower skin contamination scores than either CS or US lambs.

However there were significant differences between all treatments for the skin value, with highest returns from US skins (see Table 1). This was probably due to the greasier staple length of the US skins and the processing system into which the skins were sold, where fellmongering is a processing option.

Carcass weight and fat depth (GR) of the BC lambs was significantly higher than US lambs, although not significantly higher than that of CS lambs.

These results are consistent with previous findings in that reducing wool length reduces seed contamination, boosting lamb production.

The next step

The next stage of investigation will look at determining pasture benchmarks and economic thresholds for proactive management.

The group aims to collate both field data on the levels of contamination in pastures of seed problem species in the Cumnock/Yeoval district and undertake co-operator trials to determine benchmarks and thresholds for the pro-active management of problematic species.

Using co-operator trials a combination of strategic (preparing seed-safe pastures) and tactical methods (for example, bioclip or shearing) will be tested in order to determine pasture composition benchmarks and economic thresholds.

The proposed approach uses repeated measurements of pasture composition, quality and quantity, and livestock performance from each treatment group from stage 1 to compare actual in paddock performance against expected modelled performance using GrassGro.

The information from this modelling will be used to determine economic thresholds for the control and management of seed problem species in pastures.

TABLE 1 Effect of grass seeds on weaner sheep production

Treatment	Skin score (0 to 3)	Skin value ($)	Carcase score (0 to 3)	GR fat depth (mm)	Trimmed cold carcase weight (kg)
US	1.95a	14.83a	0.96a	5.1a	17.5a
CS	1.58b	13.43b	0.60b	6.0ab	17.8ab
BC	1.35c	9.94c	0.66b	6.5b	18.7b

Values followed by the same letter within columns are not significantly different (P = 0.05)

Source: DI NSW

Proactive approach: The next phase of the investigation will look at proactive management to prepare seed-safe pastures or treatment to protect again st contamination.

These activities will be run under commercial conditions with multiple on-farm replicates over the seed risk period.

Positive approach

Such research work is a unique and critical approach to address what is a complex grazing systems issue. An additional focus of these activities is on changing the management of this problem from reactive (for example, shearing lambs during the risk period) to proactive (preparing seed-safe pastures or pre-contamination treatments of livestock).

It is hoped that these trials will also increase producer participation and skills.

ACKNOWLEDGEMENTS ▶ central west sheep producers group, matthew coddington (roseville park merinos), edwina toohey, ashley white and tracey lamb (now DPI), and the assistance of the management and staff of the abattoir involved. this project is partially funded by MLA under the PIRD program.

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Appendix VI: Published Papers

Mason, J.; Behrendt, K.; Toohey, E.; White, A. (2008) Using Bioclip™ to manage the impact of grass seed contamination on lamb production, In: S. Hatcher and J.S. Richards (eds) *NSW DPI Sheep & Beef Conference 2008 – Coping with a changing environment: environmental, technological, social and economic*, 2-4 September, Orange Agricultural Institute. NSW Department of Primary Industries, 237-238.

Using Bioclip™ to Manage the Impact of Grass Seed Contamination on Lamb Production

Jane Mason, District Livestock Officer (Sheep and Wool), NSW DPI, Orange NSW;
Karl Behrendt, Agricultural Consultant, Agrorum Consulting, Bathurst NSW
Edwina Toohey, Research Officer (Meat Science), NSW DPI, Dubbo NSW
Ashley White, District Livestock Officer (Sheep and Wool), NSW DPI, Cowra NSW

Previous research has shown that the seed shed by many common grasses in the Central West, have a substantial negative effect on lamb health and production (Campbell et al. 1972). Previous work has displayed the benefits of shearing to reduce wool length prior to the main period of grass seed pickup (Campbell et al. 1972, Warr & Thompson, 1976). To date no research has examined the effect of using the Bioclip™ method of wool harvesting to reduce grass seed contamination in weaner sheep. This paper reports on a trial which compared the biological effectiveness of the Bioclip™ method to conventional shearing and not shearing in reducing the impact of grass seed contamination on wool and meat production in weaners.

On a commercial property near Yeoval, NSW, 158 Dohne x Merino weaner lambs of mixed sex were randomly allocated to three treatment groups being unshorn (US), conventionally shorn (CS) and Bioclip™ harvested wool (BC). Lambs were crutched prior to treatment on day zero. Bioclip™ nets were removed and wool harvested from treatments CS and BC on day 30. Post treatment, lambs were moved into a naturalised pasture paddock containing problematic species such as barley grass (Hordeum spp.), spear grass (Austrostipa spp.), crow foot (Erodium spp.) and silver grass (Vulpia spp.) where they remained set stocked until day 154. After this they were grazed on Lucerne pasture and, for one week prior to slaughter (day 185), offered hay supplements. Fasted lamb liveweight (at days 0 and 176) and fat score (day 30 and 176) were recorded. The effects of treatments on carcass and skin attributes measured at slaughter are shown in Table 1. Seed measurements were made on the skins and carcasses in four regions and converted to a score. Scores given were 0 (no seeds), 1 (light 1 to 5 seeds), 2 (moderate 6 to 10 seeds) and 3 (heavy >11 seeds) per region.

Table 1. Effect of grass seeds on weaner sheep production under three shearing treatments.
Values followed by the same letter within columns are not significantly different (P > 0.05)

Treatment	Skin score (0 to 3)	Skin value ($)	Carcass score (0 to 3)	GR Fat depth (mm)	Trimmed cold carcass weight (kg)
US	1.95a	16.83a	0.96a	5.1a	17.5a
CS	1.58b	13.43b	0.60b	6.0ab	17.8ab
BC	1.35c	9.94c	0.66b	6.5b	18.7b

Results indicate there was no significant difference in carcass contamination between BC and CS lambs, although BC lambs had significantly lower skin contamination scores than either CS or US lambs. However there were significant differences between all treatments for the skin value, with highest returns from US skins (Table 1). This was likely due to the greater staple length of the US skins and the processing system into which the skins were sold, where fellmongering is a processing option. Carcass weight and GR (fat depth) of the BC lambs was significantly higher than US lambs, although not significantly higher than that of CS lambs. These results are consistent with findings of Campbell et al. (1972) and Warr & Thompson (1976) in that reducing wool length reduces seed contamination, thus boosting lamb production.

Acknowledgements: Central West Sheep Producers group, Matthew Coddington (Roseville Park Merinos), Tracey Lamb (NSW DPI Cowra), the assistance of the management and staff of the abattoir involved. This project was partially funded by MLA under the PIRD program.

Campbell RJ, Robards GE, Saville DG (1972) Proc. Aust. Soc. Anim. Prod. 9, 225-229
Warr GJ, Thompson JM (1976) Proc. Aust. Soc. Anim. Prod. 11, 173-176

Mason, J.; Behrendt, K. (2009) Producers dealing with problem pasture species that cause seed contamination and production losses in lamb production systems, In: D. Brouwer; N. Griffiths and I. Blackwood (eds), *Proceedings of the 24th Annual Conference of the Grassland Society of NSW Inc.*, 5-6 August, The Grassland Society of NSW Inc., 94-96.

Producers dealing with problem pasture species that cause seed contamination and production losses in lamb production systems

J. Mason[A] and K. Behrendt[B]

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[B]Agrorum Consulting, Bathurst NSW 2795

Introduction

Previous research has shown that the seed shed by some prevalent pasture species during spring and early summer in the Central West slopes of NSW, have a substantial negative effect on lamb health and production (Campbell *et al.* 1972). The problem is particularly severe in young sheep and results in production losses on-farm from reduced live weight gain, wool contamination and carcass contamination reducing returns to the producer (Little *et al.* 1993). Animal health and welfare issues that also cause major concerns includes abscess formation from seed penetration, flystrike and reduced mobility which impacts upon feed and water intake. Within the supply chain processors experience reduced efficiency due to the trimming required for heavily seed contaminated carcasses. In 2008, a group of producers came together with the aim of forming effective networks where information could be distributed and discussed on relevant sheep industry issues (titled the Central West Sheep Producers group). With the supervision of private and government researchers, the group aimed to discover effective ways of managing problematic pasture species in their district. The group identified two stages that would be used to investigate the problem. This paper reports the outcomes from the first stage of experimental work and introduces the proposed methodology for the second stage.

Stage 1: Minimising the impact through the reduction of wool length

The first stage of the trial investigates the effectiveness of reduced wool length in managing the grass seed problem, as earlier work has displayed the benefits of shearing to reduce wool length prior to the main period of grass seed pickup in late spring and summer (Campbell *et al.* 1972; Warr and Thompson 1976). Wool removal methods were compared by investigating the biological effectiveness of the Bioclip™ method of wool harvesting to conventional shearing and not shearing, in reducing the impact of grass seed contamination on wool and meat production in weaners.

Method

On a commercial property near Yeoval, Central NSW in 2008, 168 Dohne x Merino weaner lambs of mixed sex were randomly allocated to three treatment groups: unshorn (US), conventionally shorn (CS) and Bioclip™ harvested wool (BC). All lambs were crutched prior to treatment on day zero (5 November 2007). Bioclip™ nets were removed and wool harvested from treatments CS and BC on day 30. Post treatment, lambs were moved into a naturalised pasture paddock visually estimated to have contained approximately 35% barley grass (*Hordeum spp.*) at 30cm of height and in early senescence; 5% corkscrew (spear grass; *Austrostipa spp.*) and 30% crows foot (*Erodium spp.*) both at 40cm of height and flowering; 15% silver grass (*Vulpia spp.*) at 15cm of height and in early senescence. The remaining 15% comprised of subclover (*T. subterraneum*), annual ryegrass (*Lolium rigidum*), bare ground and other species. Lambs remained set stocked until day 154. After this they were grazed on lucerne pasture and, for one week prior to slaughter (day 185), offered hay supplements. Fasted lamb liveweight (at days 0 and 176) and fat score (day 30 and 176) were recorded. The effects of treatments on carcass and skin attributes measured at slaughter are shown in Table 1. Seed measurements were made on the skins and carcasses in four regions and converted to a score. Scores given were 0 (no seeds), 1 (light, 1 to 5 seeds), 2 (moderate, 6 to 10 seeds) and 3 (heavy >11 seeds) per region.

Results and Discussion

BC lambs had significantly lower skin contamination scores than CS which in turn was less contaminated than US lambs. BC and CS lamb carcases did not differ significantly, though they were less contaminated than US lambs. There were significant differences between all treatments for the skin value, with highest returns from US skins and least for BC (Table 1). This was due to the greater staple length of the US skins and the processing system into which the skins were sold, where fellmongering is a processing option. Most lamb skins sold don't have this option and the US skins would usually carry a price penalty. Carcass weight and GR (fat depth) of the BC lambs was significantly higher than US lambs, although not significantly higher than that of CS lambs. These results are consistent with findings of Campbell *et al.* (1972) and Warr and Thompson (1976) in that reducing wool length reduces seed contamination, thus boosting lamb production.

Table 1. Effect of grass seeds on weaner sheep production under three shearing treatments.
Values followed by the same letter within columns are not significantly different (P > 0.05)

Treatment	Skin score (0 to 3)	Skin value ($)	Carcass score (0 to 3)	GR Fat depth (mm)	Trimmed cold carcass weight (kg)
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CS	1.58b	13.43b	0.60b	6.0ab	17.8ab
BC	1.35c	9.94c	0.66b	6.5b	18.7b

Stage 2: Determining pasture benchmarks and economic thresholds for proactive management

Stage 2 work during 2009/2010 aims to collate both field data on the levels of problem seed species contamination of pastures in the Cumnock/Yeoval district, and do co-operator trials to determine benchmarks and thresholds for the pro-active management of problematic species. Using co-operator trials a combination of strategic (preparing seed-safe pastures) and tactical methods (e.g. Bioclip or shearing) will be tested in order to determine pasture composition benchmarks and economic thresholds. The proposed methodology uses repeated measurements of both pasture composition, quality and quantity, and livestock performance from each treatment group (Bioclip, conventionally shorn and unshorn groups) to compare actual in-paddock performance against expected modelled performance using GrassGro (Freer *et al.* 1997). The information from this modelling will be used to determine economic thresholds for the control and management of seed problem species in pastures. These activities will be run under commercial conditions with multiple on-farm replicates over the seed risk period.

Conclusions

Stage 1 of this producer initiated research identified the biophysical benefits and costs of using wool length reduction strategies to minimise the impact of problematic pasture species causing seed contamination and production losses in lamb production systems. The second stage of this work aims to provide indicative benchmarks and economic thresholds for the implementation of both pasture and livestock strategies that minimise the impact of problem species. Such research work is unique and is required to address what is a complex grazing systems issue. An additional focus of these activities are on changing the management of this problem from reactive (e.g. shearing lambs during the risk period) to proactive (preparing seed safe pastures or pre-contamination treatment of livestock). It is hoped that these trials will also increase producer participation and skills.

Acknowledgements

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PRODUCERS DEALING WITH PROBLEM PASTURE SPECIES THAT CAUSE SEED CONTAMINATION AND PRODUCTION LOSSES IN LAMB PRODUCTION SYSTEMS

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THE PROBLEM

Grass seed contamination is a major cause of welfare issues, production losses and economic losses in sheep enterprises in Central NSW.

Barley grass (*Hordeum* spp.), corkscrew (spear grass, *Austrostipa* spp.), crows foot (*Erodium* spp.) and silver grass (*Vulpia* spp.) are the main problem pasture species. Discounts of approx $1/kg have been reported for contaminated carcases which are also trimmed, thereby reducing carcase weight.

Grass seeds are a quality assurance and food safety issue. Reduced wool length has been shown to reduce the problem. No work has been done investigating the use of the Bioclip method of wool harvesting in order to combat this issue.

STAGE 1 – TRIAL 1 (Reactive)

Central NSW – Yeoval, rainfall 500 mm

156 Weaners randomly allocated into three treatment groups after being crutched:

STAGE 1 RESULTS

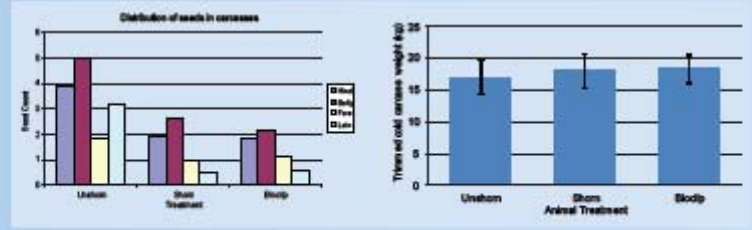
1. Conventionally shorn (CS) – were de-fleeced day 1
2. Bioclip (BC) – were injected and netted on day 1, de-fleeced day 30
3. Unshorn (US) groups.

Animals weighed and fat scored until slaughter.

All animals assessed for grass seed contamination in skins and carcases after slaughter.

Bioclip sheep had significantly lowest skin value, but also lowest grass seed contamination, and highest trimmed cold carcase weight.

The treatment of individual animals is an effective way of managing losses from problematic pasture species. However, pro-active management using the preparation of seed-safe pastures is hypothesised to be more profitable and will be tested in Stage 2 of the trial.



STAGE 2 – TRIAL 2 (Proactive)

Central NSW – Yeoval, rainfall 500 mm

Work during 2009/2010 will occur on three properties in the district. Aim is to collate field data on the levels of problem seed species contamination of pastures in the Cumnock/ Yeoval district, and undertake co-operator trials and modelling to determine benchmarks and economic thresholds for the pro-active management of problematic pasture species.

Focus: changing management from **reactive** (e.g. shearing lambs during the risk period) to **proactive** (preparing seed safe pastures or pre-contamination treatment of livestock).

CONCLUSIONS

Biologically, reducing wool length significantly reduces grass seed contamination, increasing production in weaners, regardless of wool harvest method.

Barley grass and corkscrew infestation at Yeoval

Heavy seed infestation of a weaner in Yeoval trial

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