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Towards more sustainable biological hill country sheep and beef farming

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Abstract

This paper describes the research method adopted to identify the constraints to biological (chemical-free) sheep and beef production and to develop management systems that overcome these constraints. The method adopted to meet these objectives has three distinct phases; I A farmlet study, II Component research, and III Farmer survey and on-farm testing.

The objective of the farmlet study was to establish two farmlets, initially as similar as possible in terms of stock numbers and management practices. The only constraint imposed on the biological and not the conventional farmlet, is that the management practices must comply with the production standards of the New Zealand Biological Producers Council. The conventional farmlet acts as a baseline against which the performance of the biological farmlet can be compared, and to identify constraints to biological hill country sheep and beef production. Component research is used to investigate alternative methods of overcoming these constraints. The third phase of the programme is to survey practising biological producers, which number 50 at present, to identify their major constraints to production and to describe the management practices of successful biological producers. The information from this survey could then be used to further develop the biological farmlet and component research programme. Progress to date in the farmlet study and the information system used to manage and evaluate theperformanceof the conventional and biological farmlet is also detailed.

Keywords biological, chemical-free, alternative farming, hill country, research method

Introduction

Of the 168 biological producers registered with the New Zealand Biological Producers Council in 1990/91. 74 were certified for sheep, beef or dairy milk production; 94 wereorchardists andmarket gardeners. Biological farming could be defined simply as a sustainable production system that produces food of optimum quality and quantity and in so doing-avoids or largely excludes the use of synthetically produced compound fertilisers, pesticides, growth regulators, livestock additives or the routine use of remedies.

The reasons for the growing interest in alternative farming methods and the growing demand forbiological produce are as many as they are varied. They include the concerns of consumers about the quality and safety of their food, animal rights groups concerned about animal welfare, environmentalists concerned about the deterioration of our planets ecosystem, through to conservationists concerned about the sustainability of our present production systems. New Zealand, with its legume based, outdoor pastoral farming system, is in an excellent position to take full advantage of the opportunities that these concerns create.

Given this background a research programme was set up in 1987 to meet the following objectives:

(a) To identify the constraints to biological hill country sheep and beef production.
(b) To develop management systems that would overcome these constraints.

Research method

The research method adopted to meet the above-mentioned objectives has three distinct phases; I A farmlet study, II Component research, and III Farmer Survey and On-farm testing (Fig. 1). The paper briefly describes each of these phases and then details progress to date in the farmlet study.

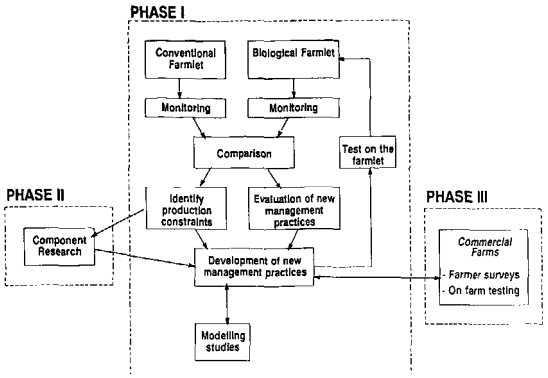

Figure 1 Summary of the fanning system research approach adopted for the study.

Phase I: Farmlet study

The objective was to establish two farmlets, initially as similar as possible in terms of stock numbers, and management practices. The only constraint imposed on the biological, and not the conventional farmlets. is that the management practices must comply with the production standards of the New Zealand Biological Producers Council. The conventional farmlet acts as a baseline against which the performance of the biological farmlet is compared. The two farmlets can be intensively monitored in terms of both physical and financial parameters. These data are then used to identify the production constraints on the biological farmlet. Once identified, management systems can be developed to minimise the impact of these constraints. Thus over time the management practices on the two farmlets would be expected to diverge.

Phase II: Component research

The farmlet study is used to identify the constraints to biological hill country sheep and beef production. Once the constraints have been identified, component research is used to investigate alternative methods of overcoming these constraints. The results of the component research are then tested and evaluated on the biological farmlet (Figure 1).

Phase III: Farmer input

Fifty sheep and beef farmers are registered with the New Zealand Biological Producers Council. These farmers could provide a valuable pool of knowledge and experience on the management of biological sheep and beef production systems. The third phase is to survey these producers to identify their major constraints to production, and describe the management practices of successful biological producers. The information from thii survey would then be used to develop further the farmlet and component research programme (Figure 1). The final step in the programme would be to test the management system developed. through the farmlet study on commercial properties.

Progress to date in farmlet study

(a) Physical resource

An area of 52 ha on Ballantrae. DSIR Grasslands Hill Country Research Station, covering 20 ha of medium (Olsen P 10) and 32 ha of low (Olsen P 8) fertility, moderate to steep summer-moist hill country, was divided into2 areas of 26 ha. Each farmlet was balanced for the areas in low (16 ha) and medium (10 ha) fertility country, topography and for aspect, and subdivided into 38 paddocks.

(b) Livestock system

The livestock system had to meet the following requirements:

(i) Typical of summer-moist hill country.
(ii) Contain a high proportion of young stock to examine the impact of non-chemical animal health remedies on performance.
(iii) Breed own replacements because of the lack of accredited Biogrow stock that could be purchased off-farm.
(iv) A high cattle to sheep ratio to control summer pasture growth and to assist in the control of internal parasites.

A feed budget model was used to determine the final stock numbers and stock mix (cattle to sheep ratio) on each farmlet. Inputs into the model include: the initial pasture cover at 1 January (kg DM/ha), pasture growth rates (kg DM/ha/day), pasture quality (MJME/kg DM), livestock numbers and specified levels of livestock performances (e.g. liveweight gains, lambing and calving %, wool production) and key management dates (e.g. lambing date, shearing date). Monthly pasture growth rates were derived from 6-weekly cage cut data collected from 1978-1988 for a medium and low fertility site at Ballantrae (Lambert, M.G. pers. comm.). The model calculates animal intakes (kg DM/head/day) for the specified levels of animal performance, using sub-models (Brookes, I.M. pers. comm.); estimates total feed demand (kg DM/ha/day); and calculates the final level of pasture cover at the end of each half-monthly period. Pasture cover was constrained within the bounds of 1000-2000 kg DM/ha and the proportion of cattle was specified at 40% of total stock units.

A livestock system wintering 7 Angus breeding cows, 6 rising l-year (Rl-yr) heifers, 4 Rl-yr steers, 4 R2-yr steers, 140 Romney ewes, and 48 ewe hoggets at a stocking rate of 10.5 su/ha was derived for each farmlet using the feed budget. Both farmlets were stocked in March 1991.

(c) Animal health programme

A standard animal health programme was drawn up for the conventional farmlet (Table 1). The animal health programme for the biological unit was based on the production standards for Biogrow certification, set by the New Zealand Biological Producers Council. These are recognised by the International Federation of Agricultural Movements (IFOAM), an organisation recognised by most western trading nations. The routine use of drenches, vaccines, antibiotics, dips and other chemical remedies is prohibited in the standards. Use of chemical remedies is permitted if an individual animal is suffering or shows signs of ill-thrift. The standards emphasise that only healthy animals should be sold for slaughter. Treated animals areclearly marked and placed in a designated quarantine paddock for 3 times the

Table 1 Summary of animal health programme on conventional and biological farmlet.

Conventional	Biological
♦ Accepted animal health practices are followed on the conventional farmlet.	• Health practices follow those set out in the production standards of the NZBPC. These prohibit the routine use of all chemical remedies.
	♦ Use of chemical remedies are permitted if an individual animal is suffering or shows signs of ill-thrift. This is seen as an interim measure.
	♦ The long-term objective is to breed for resistance and develop alternative non-chemical control packages.
Internal Parasite Control	**Internal Parasite Control**
♦ Lambs are drenched at weaning and then twice at 21-day intervals, followed by 28-day drenching. From the end of May drenching is based on faecal egg counts (FEC). The same threshold value is used for the two tooths and mixed aged ewes.	♦ Grazing management is the main strategy being used to control internal parasites on the biological unit.
♦ A drench at docking is the only routine drench for the breeding ewes on the conventional unit.	♦ A cross-over rotation with cattle grazing the regrowth after a sheep grazing, rather than grazing with or immediately behind the sheep, is an integral part of the management strategy for growing out young sheep In the drench-free envlronment on the biological unit.
♦ Calves are drenched with tvomectin at weaning and again In the spring, as are the first calvers. Additional drenches of rlsing 1- and 2-year cattle are used if animals fall to reach target liveweights.	• Lambs or two tooths that lose weight over two successive weighings and or show obvious signs of stress or ill-thrift or have an internal parasite burden in excess of 2000 e.p.g. are removed from the flock and drenched with Levamlsole.
	. Introducing parasite resistance into the flock is the long-term strategy for reducing dependence on anthelmintic drenches on the biological unit.
	♦ Rising l-and P-year cattle that lose weight over two successive monthly weighings and show ill-thrift or stress are drenched with Levamlsole.
External Parasltes	**External Parasites**
• Breeding ewes and ewe hoggets are dipped in autumn for lice, ticks, etc. Dipping for flystrike control as required.	♦ All sheep are dipped in March with a lime/sulphur mixture for lice.
	. Shearing dates have been chosen to ensure minimal fleece length through December/February, the main flystrike period.
	. Stockholm tar and azadirachtin (a natural substance) are used for treating fly struck animals.
Vaccineo	**Vaccines**
♦ All breeding ewes are vaccinated for pulpy kidney, malignant oederia, blackleg, blackdiseaseand tetanus beforelambing.	♦ Use of vaccines is prohibited.

recommended withholding period on the label before slaughter. Animals treated in this way can then be returned to the flock, but lose their transitional Biogrow status for 12 months.

Given the constraints imposed by the New Zealand Biological Producers Council production standards, grazing management was seen as the main strategy in the short term for controlling internal parasites on the biological unit. To keep the management as similar as possible on both farmlets ewe, lambs are weaned on to paddocks that have been grazed through the previous winter and spring by cattle. The ewe lambs remain in this system for 3 months at which time they go on to a block in a cross-over rotation with the rising 1- and 2-year cattle until the following March. The key to the cross-over rotation is that cattle graze the regrowth after a sheep grazing rather than grazing with or immediately behind the sheep.

Management of farmlets

The management process used to run the farmlets is described in Figure 2. A feed budget is used to draw up a plan, which includes specific animal performance targets and fortnightly pasture cover levels for the periodunder consideration. This plan is theninplemented on the farmlet by the farm manager. The performance of the farmletsis monitoredregularly by monthly weighing of all stock and biweekly pasture cover measurements using a falling plate. Actual liveweight and pasture data are then compared with performance targets specified in the plan. If there are significant differences a evaluation process is initiated to determine the reasons for the discrepancy and a new plan is drawn up. If actual performance is not significantly different from the specified performance targets, present management continues with the current plan.

In addition to measuring pasture covers and animal liveweights, detailed information is also collected on animal performance (wool production, lambing and calving%, etc) animal health, internal and external parasitepopulationdynamics, soil fertility, labour input, financial information and climatic data for each farmlet.

Summary

A research method with three distinct phases; I A farmlet study, II Component research, and III Farm survey and on-farm testing, for investigating the constraints to biological (chemical-free) sheep and beef production and for developing management systems that overcome theseconstraintsis described, as is progress to date on Phase I A farmlet study.

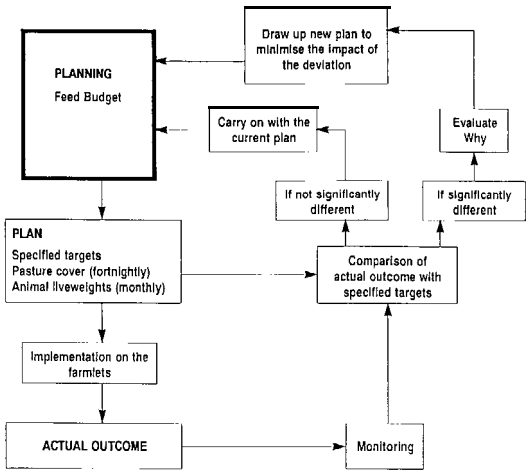

Figure 2 Management process used for running the farmlets.

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