How do sheep and beef farmers manage pasture quality?

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Abstract

Four groups of sheep and beef farmers located throughout New Zealand were asked questions relating to pasture quality management. Answers were grouped into themes. In answer to the question "what do you do to manage pasture quality", themes identified were manipulation of whole-farm feed demand throughout the year to match feed supply; use of specific grazing strategies; topping and mowing; cropping and regrassing; fertiliser application; weed and pest control; conservation and supplementation; monitoring, predicting and planning; irrigation, drainage and aeration; and internal parasite control. In answer to the question "what is pasture quality", themes identified were animal performance; chemical composition of the herbage; botanical and morphological composition of the herbage; factors affecting intake and utilisation; and anti-quality factors. Most management practices were designed to control the spring surplus or provide alternative high quality feed through cropping or regrassing.

Keywords: current practices, farmers, management, pasture quality, sheep and beef

Introduction

The need for farmers to consider pasture quality (PQ) as well as quantity in allocating pasture to livestock has increased in recent years. This is owing to a move towards production to specification, particularly those of carcass weight and timing of supply. As stocking rates have dropped and per animal performance targets have become of greater importance, PQ has become a more important constraint to achievement of potential growth rates. The performance targets for breeding animals have also lifted, and the proportion of "working" animals that can be used for control of surplus low-quality pasture has decreased (Lambert 2000). Management of PQ may now be the biggest opportunity sheep and beef farmers have to improve financial performance.

AgResearch staff are currently developing a "pasture quality package" as part of a Meat New Zealand programme aimed at "improving efficiency of meat production from persistent, high quality pastures". The PQ package will help farmers learn the principles of PQ and its management, and provide tools whereby quality can be rapidly assessed in the field and implications for grazing management decisions interpreted using decision-support software.

An understanding of current industry practices is a pre-requisite to providing advice on cost-effective management practices (Cropper *et al*. 1990). We recruited a number of potential user groups to assist in design, development and testing of the package, and some of the information received from these groups is summarised in this paper.

Methods

We interviewed 4 groups of farmers in the Waikato, southern North Island, Canterbury and Southland, to find out how they managed PQ. A qualitative research design was used, to facilitate discussion within groups and to gain insight into the rationale used for selecting particular management methods (Kelly 1955).

Farmer groups

Farmers in the Waikato were sourced from an existing group already working in the general area of PQ. They farmed sheep and beef cattle predominantly on hill country properties. Farmers in the southern North Island group were clients of two consultancy firms, and located in the Manawatu, southern Hawke's Bay and Wairarapa. Their sheep and beef farms ranged from finishing operations on flat country to store operations on steep hill country. The Canterbury farmers were from an existing group focusing on pasture persistence, farmed mainly sheep finishing properties, and employed a high level of pasture renewal. The Southland group was recently organised by a local consultant to investigate PQ issues in the region. They mainly farmed easy hill country with sheep, and finished most of their lambs.

Interview sessions

During May to July 1999, a meeting was organised in each region. Eight to 17 farmers attended each meeting. Before presentation of any technical information, the farmers were asked several questions relating to PQ. The first question was "what do you do to manage feed quality" and responses are summarised and discussed here. A subsequent question was "what is feed quality". Responses to this question are also presented here, in brief, as they are of value in discussing the management practices identified from the first question.

A cognitive mapping process (Eden *et al.* 1992) was used in the interview sessions. The questions were posed by a facilitator (one of the authors) who recorded individual farmer responses as concise two-to-six-word points. In addition, a scribe (another author) captured as much of the proceedings as possible in a separate written form. The scribe was the same person throughout but a different facilitator was used for each meeting. Interaction amongst the farmers was encouraged. The facilitator and scribe asked for clarification where required, but did not offer their own ideas or interpretation of the farmers' contributions. The group was next asked to condense the numerous individual points into fewer themes. After all the meetings had been held, these points and themes were re-sorted into a common framework by the scribe.

Farmer responses are presented here *verbatim* in many cases, as understanding their perspectives of PQ was thought to be the starting point for development of a user-friendly PQ package. Hence, the farmers' concepts as recorded do not necessarily agree with those held by the authors.

Results

Group methodology

The methodology used in the meetings prompted some interesting reactions. Initially the farmers asked the facilitators and scribe, all of whom had experience in grazing systems research, for their opinions at frequent intervals. Continued refusal by these "experts" to contribute ideas to the forum was followed by an open interchange of ideas among the farmers.

Methods of managing pasture quality

The ways in which PQ was manipulated on-farm were allocated to 10 themes. The number of groups that clearly identified major points in each theme is recorded in brackets.

1. Manipulation of whole-farm feed demand throughout the year to match feed supply (4).
   Relevant farmer comments here included "*managing quantity is the key to managing quality*"; "*the hard part is keeping your PQ and maintaining animal production*"; and "*if summer management is under control winter looks after itself*".

   Keeping pastures short in the spring delayed the decline in quality that occurred as the season progressed. Management to match supply and demand revolved around practices that enabled seasonal feed demand to be manipulated. Practices to increase demand relative to supply included buying stock, selling grazing, increasing lambing percentage, and delaying weaning. Practices to decrease demand included selling stock, grazing stock off-farm or early weaning. Manipulation of mating date was used for increasing or decreasing demand relative to supply.
2. Use of specific grazing strategies (4).
   A relevant farmer comment was "*taking the top off a high quality pasture is not managing quality sustainably, as you are leaving low quality behind for other animals*".

   The points raised in this theme revolved around subdivision, grazing method, and integration of different classes of livestock.

   Benefits of both temporary and permanent subdivision were better ability to clean up rubbish, decreased fertility transfer, pasture control without damaging stock, and allowing separation of different aspects in hill country for more even grazing. The benefits of subdivision involved giving the ability to create high PQ in the future through clean-up grazing now, and to preferentially allocate high quality feed to high-priority stock to meet production targets. Set-stocking over ewe lactation led to better control of pasture cover and increased pasture clover content. High intensity rotational grazing was thought to "muddy-up" pasture, improving its botanical composition under low soil-fertility conditions and removing trash and weeds. It might also lead to soil compaction under high soil-fertility conditions. Longer grazing durations caused pasture soiling, decreased palatability, and encouraged preferential grazing. Fast rotations maximised intake during periods of rapid pasture growth. Deferred grazing increased grazing pressure on the area remaining in grazing.

   Many farmers saw integration of sheep and cattle and of classes within species as a way of managing PQ. For example, cattle were seen as less fussy as opposed to lambs and better at managing rank feed. Management of pasture length was a common theme. Shorter post-grazing pasture lengths led to better PQ and prevented pastures going to seed, and lambs required shorter pasture for optimum performance

than beef weaners. There was general awareness that management to remove lower quality pasture reduced performance of the animals used for that purpose.

3. Topping and mowing (4).
   Mechanical and chemical (application of very low rates of glyphosate herbicide) topping were used to control poor quality pasture components e.g., removal of seedheads or prevention of their occurrence. Some farmers had the view that wilting pasture improved pasture quality.
4. Cropping and regrassing (4).
   Planting specialist crops e.g., chicory or red clover provided high-quality forage. New pastures were seen as being of high quality (including beneficial effects of low endophyte status), later-heading ryegrasses spread the flowering period and made pasture control easier, and new species might be more palatable.

   Forage or cash cropping, and regrassing in the spring reduced pasture area in grazing and hence enabled better grazing control of the remaining pastures.
5. Fertiliser application (4).
   Fertilisers (and lime) "sweetened" pasture, increased content of better species, clovers and ryegrass, and decreased content of poorer species, weeds, fog and browntop.

   Nitrogenous fertilisers increased pasture quantity, which reduced grazing pressure, overgrazing, and soiling effects hence increasing PQ. Autumn-applied N increased frost-tolerance and reduced reliance on silage, which is a lower quality feed than pasture. Pasture growth boosted by spring N application reduced PQ if the extra pasture was not utilised.

   Fertilisers could be a source of trace elements for animal health, hence increasing PQ. Liquid fertilisers might control fungal toxins, increase palatability and decrease weed content.
6. Weed and pest control (4).
   Weeds competed for soil moisture, and prevented clean grazing allowing poor-quality areas to develop. Species mentioned were thistles, fat hen (in crops), ragwort, rushes, tussock and cocksfoot.

   Pests e.g., porina, grass grub and crickets removed desirable plants and left low-quality species behind.
7. Conservation and supplementation (4).
   Making hay and silage reduced the requirement for spring pasture control, and some farmers saw conserved feed as a by-product of PQ management. Superior ensiling techniques increased the quality of silage, and feeding supplements in the winter enabled higher winter stocking rates to be carried for spring pasture control.

   Concentrate supplements directly raised the quality of the grazing animal's diet.
8. Monitoring, prediction and planning (4).
   Relevant farmer quotations were "*timing of opening and shutting of the gates is important*", and "*poor quality grass is better than no grass*".

   Timing of management decisions was important, and reference was frequently made to planning to manage PQ and gathering of relevant information. Information collecting activities included feed budgeting, measuring ME, measuring spring pasture growth rate, use of improved climate prediction capability, testing for herbage nitrate levels, and use of historical records.
9. Irrigation, drainage and aeration (3).
   These practices enhanced PQ in appropriate situations, by improving the plant growth environment, root penetration, and botanical composition, and reducing mat formation.
10. Internal parasite control (2).
    Using parasite control strategies reduced larval challenge, hence increasing PQ.

What is pasture quality?

In all cases, the groups identified a range of factors that comprised the five themes used here:

1. Animal performance.
   Animal performance was the primary criterion of PQ i.e., if animal performance was high, the pastures they were grazing were of high quality.
2. Chemical composition of herbage.
   This included energy, fibre, protein, sugar, vitamin, trace element, mineral, water and tannin concentrations and digestibility.
3. Botanical and morphological composition of herbage.
   Pasture species and weed content, proportions and type of dead and green matter, proportion of reproductive and vegetative parts, and pasture growth rate fell into this category.
4. Factors affecting intake and utilisation.
   These included palatability, ease of harvesting, pasture density and height, potential for selective grazing, manageability, and grazing animal species/class.
5. Anti-quality factors.
   These included fungal toxins, internal parasite contamination, and soil or other contamination.

Discussion

All groups attempted to use the "experts" as a major information resource early in the meetings. This suggests that in forums aimed at eliciting farmer experience and opinion, presence of "experts" will inhibit achievement of this goal unless the roles of the various participants are made clear and acted out.

The general principles espoused were common to all groups, however as would be expected, emphasis on specific PQ practices varied across groups. For example the Waikato farmers had recently experienced unusually severe drought conditions and facial eczema. This tended to colour their opinions on risk of clean-up grazing in the spring (leading to inadequate pasture mass for summer feeding if drought occurred) and the importance of fungal toxins. The Canterbury farmers were particularly well versed in the use of regrassing for provision of high-quality feed for finishing stock in summer-dry conditions, and the Southland farmers were familiar with the use of winter forage crops and supplements. The North Island farmers were more aware of the integration of cattle and sheep for managing PQ presumably because of the much greater importance of cattle in their systems.

Many of the management practices used were designed to maintain pasture control in the spring to ensure PQ was better later in the season. The expected outcomes from this were improved pasture morphological and botanical composition – more clover, and less seedhead and dead material. These desirable PQ characteristics were among those first mentioned by all four groups of farmers in response to the "what is pasture quality" question in the interview sessions.

The other major group of practices was designed to provide high quality feed by planting forage crops or regrassing. These practices also removed pasture area from grazing in the spring, hence effectively increasing stocking rate and assisting in pasture control. This was also seen as one of the major virtues of cash cropping.

Overall, there was a tendency for farmers to look for component solutions to pasture quality problems e.g., seeking a trace element problem, use of tannin-containing plants, regrassing, or growing forage crops. It is possible that focusing on such solutions distracts attention from low cost management tools that maintain PQ over the whole farm. These component solutions to a farm system problem might solve the immediate PQ problem without presenting the opportunity for devising solutions that lead to harvesting of the surplus pasture present on most farms in most springs. Increased conversion of spring pasture that is surplus to requirements of the livestock normally present on the farm at that time into saleable feed or animal product presents an opportunity to significantly lift sheep and beef farm gross income. However, while the farmers widely accepted that pasture control in the spring was important, the inclination was to treat the surplus as a problem rather than an opportunity.

Parasite larval contamination of pastures was identified as a factor influencing PQ by all four farmer groups, however only two of the groups suggested they employed management practices to reduce this problem. This may have resulted from the lack of consensus on whether parasite larval contamination of pasture was a legitimate PQ issue.

There were some interesting debates on pasture quantity/length as it related to PQ. Some inter-relationships were more widely accepted than others. There was general agreement that pastures for optimum cattle performance should be longer than pastures for optimum lamb performance. However, on another issue there was less agreement – some farmers thought that as animal performance was the ultimate indicator of PQ, pastures with high nutritive value but very low mass (so low as to limit intake) could not be of high quality, while others more clearly dissociated quality and quantity.

The farmers in each group were collectively aware of most of the components of PQ. However, individuals generally did not have a have a clear picture regarding what were the most important components and how they inter-related. For example, the greater importance of metabolisable energy as compared to protein intake for sheep and beef cattle (Lambert & Litherland 2000) was not widely recognised. Also, the decline in herbage quality with age, the differential rate of decline for different pasture components, and the interaction with temperature/time of year (Lambert & Litherland 2000) were not well appreciated This knowledge gap constitutes a major limitation to farmers designing an effective PQ management programme. It was obvious that a proportion of the farmers in each group were predominantly present to learn about PQ rather than to get access to the tools the programme will provide them. This demonstrates a need for effective extension of pasture quality concepts to farmers.

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