GOATS AND PASTORAL FARMING

MEAT & WOOL NEW ZEALAND

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WEED CONTROL

Goats provide a unique opportunity for farmers to reduce their dependence on chemical weed control, and to reduce the total cost of managing weeds on their farm.

There is a popular image of goats having the capacity to not just survive, but to achieve good production on seemingly low quality feed. There are examples of run out pasture or scrub weeds that have been improved with goats found throughout New Zealand.

The advantage that goats have over sheep and cattle is that they have a preference for a varied diet and a habit of browsing and selecting roughage in their diet. Although they select and graze lower quality feeds, goats do not appear to be able to better digest them. Work by Poppi (1988) indicates that goats and sheep have similar digestion characteristics.

Other characteristics that influence goats grazing habits are that they:

- Are agile, allowing them to graze areas often inaccessible for other livestock.
- Can eat up to 2 metres, through standing and climbing techniques.
- Have a narrow muzzle and mobile upper lip, allowing them to penetrate into the sward and browse, and to selectively graze high quality parts of the forage.
- Have a good ability to detect bitter tastes, and a high tolerance of bitter compounds, which usually deter other livestock from grazing.

It is apparent that goats are able to do well on what appears to be low quality forage because of their browsing habit, not through any advantage in digestion. Consequently, there is little doubt that, like sheep and cattle, goats will perform poorly if they are fed exclusively on low quality feed. High animal performance will only occur when goats achieve high intakes of high quality forage.

Grazing Preference

Goats can be used to control a range of pasture and scrub weeds in conjunction with dairy, sheep, beef and deer livestock systems. In New Zealand and overseas, goats have assisted in the control of a wide range of weed species. These include blackberry, gorse, sweet briar, thistles, broom, manuka, bracken-fern, ragwort, rushes, sedges, tutu, tauhinu, matagouri, and woolly nightshade.

Good weed control depends on more than goats simply eating the plant. At times, they will browse to vary their diet with little effect on the weed population. At the other extreme, plants may only be grazed when goats are forced onto them as a sole diet.

The performance of the goat flock, and the effectiveness of the weed management programme depends on:

- How the plant ranks in order of the goats grazing preference.
- How easily the goats can access the plant or forage.
- Percentage of feed supply as weed species.

The grazing preference is important in influencing how actively goats will graze the plant and the grazing management that will be required for effective weed control.

In a study on alternative sources of forage, the preference of goats in grazing a range of shrubs and forages was evaluated. These results, and farmer experience are summarised in *Table 1.*

Table 1 Grazing Preference of Goats

	High	**Medium**	**Low**
Group 1*			
	Hay	Pasture	Toetoe
	Gorse	Black Locust	Broom
	Tree Medic	Manuka	Tauhinau
	Tagasaste		Pampas
Group 2**			
	Thistle	Sweet Briar	Rush
	Blackberry		Ragwort
			Dock

* from Lambert et al 1989

** additional species based on field observation

What Do You Want To Achieve?

Goats can be an effective biological weed management tool, and as such, need to be seriously considered by farmers. Along with chemicals, mechanical treatment, burning, and other biological agents, goats offer a mix of options that can provide effective affordable weed management that can be sustainably maintained.

When planning a weed management programme there are key issues that need to be determined before any decision can be made on how control will be achieved. They include:

- What is the level of weed control that is expected?
- Which species is to be targeted?
- Different species have different stages of vulnerability and are preferred at different times and need different strategies. It may be total eradication of all plants, elimination of flowering and reseeding, a reduction in plant population, a reduction in plant cover, or simply maintaining the problem at its current low level.
- How long can I wait to achieve results?

  Weed problems generally evolve and expand over several years. Managing them needs to be planned over a similar time frame. The initial phase may concentrate on halting further spread of the problem. Subsequently, the focus may move to reducing plant size and cover, followed by a reduction in plant numbers.
- What will be the impact on other plants?

  It is unrealistic to expect to achieve 100% control of the target plant, with no impact on any other. A compromise may need to be made, and the impact can be minimised by using different options from the range of available control measures.
- What is the cost?

  Goats can provide an affordable option both for initial weed clearance, as well as maintenance programmes. Research trials and case studies have identified the success with which goats have been used to replace expensive hand and chemical control programmes.

Goats Work

Goats can contribute to a high level of control, especially for plants that are highly preferred, such as thistles and blackberry.

The effect of grazing on Scotch thistle has been shown to be a significant and rapid reduction in plant size, flower heads and plant survival, *Table 2.*

Table 2 Effect of Goat Grazing on Scotch Thistle

Stock Units/ha		No of Flowerheads/ 10 Plants	Plant Survival %
Goats	**Sheep**	**Year 1**	**Year 2**
10	0	0	0
7	3	1	0
3	7	3	0
0	10	160	48

Source Lambert 1989

Perennial weeds, especially persistent plants like gorse, require a longer term management programme.

At Ballantrae Research Station, significant control of gorse was achieved in 4 years.

Table 3 **Effect of Goat Grazing on Gorse**

Stock Units/ha		Initial Level		Year 2		Year 4	
Goats	**Sheep**	**Height (cm)**	**Plants/ m^2**	**Height (cm)**	**Plants /m^2**	**Height (cm)**	**Plants/ m^2**
10	0	17	12	6	3	3	1
7	3	17	10	5	3	3	1
3	7	20	6	10	5	7	3
0	10	18	8	73	5	*	*

* By year 4, gorse growth had eliminated sheep grazing.

Source Lambert, 1989

These results were achieved with continuous stocking with up to 33 goats per hectare. Lighter

stocking rates of up to 6 goats per hectare, while taking longer to achieve targets, are likely to be more sustainable because of improved goat productivity and profitability.

One of the drawbacks of goats in an integrated weed management programme is the risk of damage to conservation and forestry plantings. Isolation with effective fencing, removal of "escapers", and a grazing plan to maintain a varied diet are the most effective techniques to minimise the risk of damage to trees.

Management Principles

Making progress will be a lot easier if a few basic principles can be adhered to, especially when implementing a biological weed management programme.

Priorities need to be established to ensure that the greatest economic advantage is achieved. You normally can not do everything, at least not initially. For instance, in gorse control it is preferable to initially control areas of scattered smaller growth before attempting to clear dense "old man" blocks.

The important principles are:

- Select goats that have already achieved their mature liveweight for weed control. Goats younger than 18 months of age are still growing and will be unable to achieve target weights on lower quality feed.
- Use goats whose diet has included target weeds in the past.
- Wethers are preferable for weed control, being more able to buffer variation in feeding and liveweight. They are also less susceptible to misadventure.
- Cashmere and meat goats are more hardy than Angora, and their shorter fibre reduces the risk of entrapment and misadventure.
- Split the programme of work to be undertaken into smaller more manageable units. It makes the task more manageable, concentrating the effort and stock, speeds up initial results, and makes it easier to monitor progress. Importantly, smaller areas provide greater opportunity to offer the goats a range of forage throughout the year.
- Plan a system that allows the goats to graze both on and off the target weeds. This provides a varied diet, will help to ensure good nutrition at critical periods, and provides greater benefit from complementary grazing with other types and class of livestock.
- Start small, building numbers as experience is developed.
- Inexperience, resulting in poor goat management can be expensive with costs far beyond goat losses.
- Goat proof fencing is critical. Apart from being necessary to focus the effort of the goats, it is essential for your own peace of mind and stock management.

Subdivision does not need to be especially intensive. Thistle control on a dairy or beef property may only require good boundary fencing. However, blackberry or sweet briar control will require several separate grazing blocks.

- Handling facilities and skills need to be developed and maintained.
- Good weed management requires good goat management, and like all biological control agents, goats respond to nurturing. Because of their grazing environment, and their physiology, goats are susceptible to misadventure.
- Farmers need to be mindful of the animal welfare codes of practice, and adopt management practices that minimise the risk of animal loss or distress.

Weed Management

Management programmes need to be developed specifically for each farm, reflecting:

- the weeds to be controlled.
- the size of the problem.
- other livestock farmed.
- subdivision.
- availability of supplements or alternative forage.
- affordability and the time frame for control.

The best balance between weed control and goat productivity is achieved when goats are either set stocked or shuffle grazed ahead of other stock.

Dramatic results can be achieved when goats are continuously stocked at high rates on gorse, but there can be a significant cost in goat performance

Rotational grazing of goats has generally resulted in less effective weed control compared to systems involving more continuous grazing at lighter stocking rates.

Gorse can be very successfully managed with subdivision and rotational grazing of goats through these areas. Productivity will be improved by being able to offer goats a mixed diet of both gorse and pasture.

Removing mature plants first, allowing goats access to higher quality regrowth, can greatly assist the control programme. Mature gorse can be prepared by crushing or cutting, followed by burning, allowing easy access by goats to regrowth. Wethers are the most resilient class of stock to use in the management of mature perennial weeds such as gorse and blackberry. Goats can also be encouraged to graze into dense areas by feeding supplements such as hay.

A stocking rate of 6-7 goat equivalents per hectare has been found to be adequate to contain the expansion of scrub weeds. Higher rates are necessary to reduce the weed problem. (The basis for one goat equivalent is a 40kg doe).

Angora goats should only be used for weed control off-shears if fibre quality is to be maintained.

Blackberry can be controlled with both mob grazing and set stocking. Angoras are less suitable because of fibre contamination and the risk of entrapment.

Manuka is readily controlled, but it is necessary to ensure a balanced diet, incorporating pasture if available. Integrating cattle into the programme with goats will enhance results and can result in improved goat performance. **Kanuka** is not readily controlled.

Ragwort appears to be an acquired taste and should be introduced to young goats. Preconditioning can be achieved by grazing does with kids at foot. There appears to be a preference for ragwort at flowering. Plants tend to be browse grazed. Stocking at 1 goat per cow has been effective in controlling ragwort.

Docks are not readily controlled once they have reached the "old man" stage. Seedling docks appear more be readily grazed.

Buttercup control appears to be more effective when goats are reintroduced following a period of preconditioning. Grazing preference appears to be increased around flowering. Summer grazing with 1 goat for every 1 to 2 cows has achieved effective control.

References

Poppi, D.P., G.M. Tan, A.M. Nicol (1988). Production 18th Seminar of Sheep and Beef Society of New Zealand Veterinary Association pp 241-258.

Lambert, M.G., G.A. Jung, H.W. Harpster, J. Lee (1989) N.Z. Journal Agricultural Research 32 pp 499-506.

Code of Animal Welfare: A series published by the Animal Welfare Advisory Committee, Ministry of Agriculture, Wellington.