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Using goats to control weeds

By John Peirce, Research Officer, Weed Science Branch, South Perth

Feral goats are common in the woodland and tall shrubland areas of arid Australia. They survive and reproduce despite regular shooting, capture and droughts.

These goats are considered vermin in Western Australia because of their competition with sheep for forage and their reputation as destroyers of vegetation.

Research elsewhere, however, has indicated that it is only the uncontrolled grazing by large numbers of goats that causes degradation, in the same way that uncontrolled grazing by sheep can cause erosion.

To some people, however, feral goats are a valuable source of income. They have the potential for meat sales, and they form the basis of breeding programmes for mohair and cashmere.

Another potential which is only now being properly studied is the use of goats to eliminate or at least reduce unwanted vegetation.

Research elsewhere

Research in eastern Australia and New Zealand on the use of goats to control weeds has concentrated mainly on thistles, blackberries and briars. Generally, goats have proven to be a practical alternative to chemicals.

In the USA and Africa, goats have helped control thickets of vines and woody shrubs. As a result of burning and heavy grazing by cattle, some areas of Texas that were once open grasslands (savannah) are now dense woody thickets that restrict forage production. These thickets are usually controlled by mechanical means and the application of herbicide, but costs are rising and control is inconsistent. Range conditions have improved markedly as a result of browsing by goats.

The goats prune and stunt bushes, and this encourages the growth of grasses, whereas cattle and sheep avoid the thickets. Goats appear to eat a wider range of vegetation than do sheep, and make better use of the vegetation as a whole.

After five years of grazing, the goats have eaten most of the saffron thistle in this heavily infested paddock near Three Springs. Note the green saffron thistles in the background.

Goats have eaten out virtually all the saffron thistle in this paddock, but the sheep have left many plants behind.
Saffron thistle. Goats prefer to eat the flowering heads, but if feed is scarce they will start eating the plants as the stem emerges from the flat rosette.

Infestations of blackberries in the high rainfall areas of New South Wales cost about $21 million a year in lost production and chemical control. Blackberries are highly palatable to goats. After continuous grazing throughout the year, these thickets are opened up and trampled. They can then be burnt and pasture species established.

Goat enterprises are profitable in the high rainfall areas of New South Wales. Stocking rates of sheep and cattle can be increased, and less herbicide can be used to control unwanted vegetation. In the drier scrubland, however, running goats is not profitable because of the high cost of fencing and buying goats.

In Victoria, goats were useful in removing blackberry infestations in pine and eucalypt plantations in areas inaccessible to machinery used for applying herbicides. Although there was no difference in the returns for timber between grazed and ungrazed areas, the removal of blackberries and other low vegetation reduced the fire hazard considerably.

Gorse (Ulex europaeus), a densely spiny shrub which can grow to more than 3.5 m, is a major problem in New Zealand. Goats will graze gorse seedlings without overgrazing grasses. In most cases, the proportion of clovers, particularly subterranean clovers, in the pasture has increased, making them more productive for sheep and cattle.

In cereal crops, saffron thistle competes for moisture and nutrients. In addition, harvested grain contaminated with seed incurs a financial dockage on delivery. Saffron thistle, however, is not considered a major problem in cereals because there is a range of herbicides to control it and other broad-leaved weeds.

Infestations of saffron thistle in pasture are more difficult to control because of lack of suitable herbicides. Where saffron thistle grows on land inaccessible to boomsprays, aerial spraying is necessary. Both 2,4-D amine and 2,4-D ester are the recommended herbicides for use on pasture, but there are problems. The timing of application usually coincides with flower or burr production in medic and subterranean clovers, so the spraying causes considerable damage.

In addition, the use of 2,4-D ester, which is applied mainly through misters or by air, is restricted around Geraldton, where there are some large infestations of saffron thistle inaccessible to boomsprays.

More recently, Gramoxone® and Spray.Seed 200® have been shown to give good control of seed formation in saffron thistle. These chemicals are applied around flowering of the saffron thistle, a time when most annual pasture species have set seed and dried off and hence are not damaged. The recommended application of these chemicals is only through boomsprays, so inaccessible areas still can not be treated.

Saffron thistle cannot be eradicated in one year because of the carry-over of dormant seed. Follow-up applications are needed in subsequent years. Where 2,4-D is used this causes severe pasture damage and can even eliminate subterranean clovers in pasture after several years of treatment.

Research in Western Australia

The use of goats to control weeds such as saffron thistle, native sarsaparilla and blackberries, has been tested in several trials in Western Australia’s agricultural areas. The role of goats in the pastoral industry was examined in a long-term grazing trial at Yerilla Station near Kalgoorlie.

Saffron thistle

Saffron thistle (Carthamus lanatus) is a widespread weed infesting some 380,000 ha in the cereal and pastoral districts of the south-west.

Cereal crops and pasture

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Spray-graze technique

The spray-grazing technique, in which a sublethal dose of 2,4-D amine is applied followed by heaving grazing, gives only moderate success. The timing of the application to give best control of saffron thistle damages the subterranean clover and kills medics. Careful management of the grazing pressure is necessary. High numbers of animals are also needed, making this technique effective only in small paddocks.

Grazing experiments

Experiments involving different stocking rates of goats or sheep on saffron thistle started at Geraldton and Three Springs in 1985. Animals were put into paddocks of saffron thistle at Three Springs between July and October each year, depending on the availability of feed.

Goats showed little interest in saffron thistle until the plants started to flower in November, and then they ate only the flowering heads (Figure 1). When feed was scarce, the goats started eating the plants as the stem emerged from the flat rosette. They continued to eat the heads even when they were dry, and between late December and early February all the heads were eaten.

Sheep also eat saffron thistle seed heads at flowering, but once the plant dries out they avoid them because of the sharp spines.

Numbers of saffron thistle plants in 64 fixed square-metre quadrats were recorded soon after the break of each season. After five years the goats had greatly reduced the density of saffron thistle (Figure 2). The slow change in the saffron thistle population was due to the presence of dormant seed produced before the experiment started.

Saffron thistle seed from any one season will spread most of the germinations over the next two to three years, although some will survive for eight to ten years (Figure 3).

Little viable saffron thistle seed passes through a goat's digestive system. In feeding experiments, sheep and goats were fed a mixture of medic, subterranean clover and saffron thistle seed.

The smaller medic and subterranean clover seeds were recovered in large numbers, but only 1 per cent of the original saffron thistle seeds passed through the sheep and less than 0.5 per cent passed through the goats. Tests on this seed indicated it would not germinate, so there was little risk of spreading the weed by movement of stock.

During the four years of the grazing trials, the average bodyweight of goats grazing saffron thistle increased from September (Figure 4) and remained above this weight over the summer. Sheep gained only a little weight until December and after that began to lose weight. By March, sheep were 10 per cent lighter than they were at the beginning of September.

The ability of sheep or goats to eat saffron thistles may be partly influenced by their previous conditioning to the weed. Sheep used...
A dense ungrazed blackberry thicket growing along a creekline near Kirup. Goats, over time, can eat out such thickets.

John Silcock, from the Department's Bunbury office, amongst blackberry canes that were heavily grazed by goats.

in the first year of the experiment at Three Springs were raised on saffron thistle infestations and ate about 54 per cent of the saffron thistle flower heads.

New sheep from an area of perennial grass pastures, where no thistles were growing, were introduced during the second year of the experiment. In their first year they only ate some 10 per cent of the flowering heads. Over the next two years they gradually became accustomed to the weed, eating more saffron thistle heads each year.

Native sarsaparilla

Native sarsaparilla (Muehlenbeckia adpressa) is a woody perennial shrub. It has caused problems on the sandier soils in cereal growing areas because its stems interfere with seeding and harvesting machinery.

Chemical control has not been successful. The only effective products, Tordon 50D® and Grazon®, are expensive, and can prevent the regeneration of legume pastures or the establishment of lupin crops in the year following application. Sheep do not appear to eat the plant.

At Koorda, goats grazing on a dense infestation of sarsaparilla removed all the above-ground portions. Twelve months after the goats were removed, sarsaparilla plants resprouted from underground fragments. However, the goats removed the hard woody stems so that a crop could be sown. For effective weed control goats would probably need to graze sarsaparilla infestations continuously for more than one season.

Blackberry

Blackberry (Rubus fruticosus) is becoming established in pine plantations in the high rainfall areas of the south-west. Self-sown seedling pines also compete with productive pines and restrict vehicle access. Chemical control of blackberry is difficult because of the topography and thick vegetation.

The Department of Conservation and Land Management, the Agriculture Protection Board and the Department of Agriculture have started joint projects near Nannup and Kirup to examine the feasibility of using goats to control blackberry and other weeds.

Goats were grazed at eight and nine animals per hectare, but in terms of available blackberry this amounted to 33 and 54 animals per hectare of blackberry on the two sites. Within 12 months the goats had eaten out the blackberry and had eaten variegated thistles down to a few centimetres high and prevented flowering. Outside the grazed area the thistles were about two metres high and flowering. The goats also ate bracken that was encroaching into the site. The self-sown pines died after goats had removed the bark.

Observations from these grazing treatments on blackberries indicated that similar results to those obtained in eastern Australia are possible.

Pastoral areas

The Department of Agriculture, with funding from the Australian Meat and Livestock Research and Development Corporation, started a goat grazing trial at Yerilla Station, 160 km north of Kalgoorlie in 1986. The aims were to:

• Determine the influence of stocking rate on pasture use, on plant performance, and on the long-term stability of one pasture type.
• Obtain some estimates of goat production in these semi-arid shrublands, and to relate this to known production standards for sheep.
Weeds preferred by goats

<table>
<thead>
<tr>
<th>Common name</th>
<th>Botanical name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual ryegrass†</td>
<td>Lolium rigidum</td>
</tr>
<tr>
<td>Barley grass†</td>
<td>Hordeum spp.</td>
</tr>
<tr>
<td>Blackberry</td>
<td>Rubus fruticosus</td>
</tr>
<tr>
<td>Brome grasses</td>
<td>Bromus spp.</td>
</tr>
<tr>
<td>Dock</td>
<td>Rumex spp.</td>
</tr>
<tr>
<td>Doublegees</td>
<td>Emex australis</td>
</tr>
<tr>
<td>Horehound</td>
<td>Marrubium vulgare</td>
</tr>
<tr>
<td>Native sarsaparilla</td>
<td>Muehlenbeckia adpressa</td>
</tr>
<tr>
<td>Paddy and Afghan melons</td>
<td>Cucumis myriocarpus and</td>
</tr>
<tr>
<td>Paterson’s curse††</td>
<td>Echium plantagineum</td>
</tr>
<tr>
<td>Saffron thistle††</td>
<td>Carthamus lanatus</td>
</tr>
<tr>
<td>Skeleton weed††</td>
<td>Chondrilla junccea</td>
</tr>
<tr>
<td>Storksbill††</td>
<td>Erodium spp.</td>
</tr>
<tr>
<td>Wild mustard††</td>
<td>Sinapis arvensis</td>
</tr>
<tr>
<td>Wild turnip†</td>
<td>Brassica spp.</td>
</tr>
<tr>
<td>Variegated thistle</td>
<td>Silybum marianum</td>
</tr>
<tr>
<td>Yellow-burr weed</td>
<td>Amsinckia spp.</td>
</tr>
</tbody>
</table>

† Highly palatable.
†† Mainly at flowering.

- Explore the potential for using a mixture of sheep and goats to increase rangeland productivity.

Initial results indicated that palatable species declined under high stocking rates of sheep or goats, because both preferred these to lesser attractive species. At the high stocking rates goats did less damage than sheep to these palatable species. Goats were more productive than sheep. They maintained body weights under the harsher conditions, while sheep tended to lose weight.

However, goats are unlikely to be useful in controlling weeds in the pastoral industry. Department of Agriculture rangeland adviser, Wayne Fletcher, suggests this is because:

- Goats would graze the least palatable species last, and so their impact on other palatable vegetation would be severe.
- Very high stocking rates would be needed to remove undesirable species quickly with grazing. This would cause problems with animal production, and would require more expensive good quality fencing to retain the stock.

Potential for the use of goats

- Most weeds have a staggered or delayed germination so grazing by goats can provide continuous control. Some of the weeds goats prefer to eat are listed in the table.
- Goats prefer not to eat clovers. While other weed species are being grazed the clovers can build up to provide feed for sheep and cattle.
- Goats can be used to graze over difficult terrain where vehicular or boomspray access is impossible or limited. Fencing must be adequate.
- The use of goats to control weeds is a more environmentally acceptable form of weed control than some other methods.
- Goats can be run with sheep and cattle.
- There may be some economic return to the property owner from running goats.

Further reading


