

OBSERVATIONS ON THE EFFECTIVENESS OF PREFABRICATED
WIRE FENCES FOR FIBRE GOATS AND SHEEP

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SUMMARY

The effectiveness of nine prefabricated wire fence designs in restraining cashmere goats, Angora goats and Merino sheep subject to various stocking rates and management practices is reported. Cashmere goats, Angora goats and sheep all behaved differently to fences. Goats caused structural damage to wire netting fences. Results indicate that a wider range of prefabricated fences can be used as effectively as currently recommended goat fence designs. Some fences need to be reinforced near camps. Opportunities exist to evaluate alternative fence designs, and to review the use of selvedge and barbed wires for goats. For existing fences the most cost effective modification is reinforcing with electric wires.

INTRODUCTION

Recommended types of prefabricated wire fences for goats (Moylan 1975; Couchman 1981; Mitchell and Kearins 1982) have been based on a large body of anecdotal evidence from graziers in Australia, South Africa and Texas, Shelton et al. (1987) concluded that wire mesh fences are the most effective way to fence goats in extensive conditions. There has been no documentation under standard conditions of the effectiveness of the wide range of prefabricated fences which could be encountered when goats are introduced onto Australian grazing properties. This paper reports on the effectiveness of prefabricated wire fence designs for containing Angora and cashmere goats and Merino sheep, based on observations in the course of five experiments (1980-89).

MATERIALS AND METHODS

Fencing design and construction

The site was level and previously used for cereal cropping. Fences were erected to specifications (James 1980; Anon. 1978). Tension of fences 1-6 has been reported in studies of suspension fence performance (James 1980). Fences 1 to 5 (Table 1) had Waratah steel end assemblies. Fences 6 to 9 had timber box end assemblies (posts driven by hydraulic post driver). Additional high tensile wires, either 2.5 mm plain or 1.57 mm barbed wire, galvanized steel dropper and Steel posts (Table 1) generally comply with manufacturers recommendations, The fences were erected in minimum lengths of 200 m between December 1978 and March 1980 and enclosed a 20 ha site consisting of 20 plots.

Animals and grazing management

For details of stock and management see Table 2. Most observations were undertaken at stocking rates of 7 to 12 animals/ha and in mob sizes of 5 to 12 animals. Animals received preventative treatment for external parasites, Animals of poor temperament were culled prior to grazing the plots. At least monthly, animals were mustered with the assistance of dogs. On eighteen occasions individual sheep and Angora goats were grazed in mobs of goats or sheep respectively for periods of 3 weeks. Animals were either set stocked (1980-89) or rotationally grazed (1981-86). Supplementary feeding of cereal grain was provided during summer in five years to selected plots and no supplement was provided to adjacent plots.

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Observations and analyses

Animals were inspected daily. Sheep, Angora and cashmere goats represented 36%, 41% and 23% of observations respectively. Escape types (ESCTP) based on observed behaviour and immediate inspection of fence were (1) fence damaged by animals and animal escaped through damage (2) animal pushed under fence (3) animal jumped between mesh and top wires of fence (4) animal jumped over entire fence. Misadventure of animals with fences was recorded. The parameter fence years was calculated as the number of netting fences exposed to class of goat x number of years of exposure to class of goat.

Table 1 Fences tested with Angora and cashmere goats and Merino sheep

| Fence | Mesh* design | Extra wires | | Total height (cm) | Comments+ |
|-------|-----------------|-------------|--------------------------|-------------------------|--|
| | | type | above/below mesh (cm) | | |
| 1 | W8/115/30 | Barb | > 0 | 120 | SP 20m |
| 2 | W7/90/30 | Barb | >10 | 120 | 116cm droppers at 6.6m, SP 20m |
| | | Plain | >23 | | |
| 3 | W6/70/30 | Barb | >10 | 120 | SP 20m |
| | | Plains | >30, >43 | | |
| 4 | W5/67/30 | Barb | >10 | 106 | 96cm droppers at 6.6m, SP 20m |
| | | Plain | >23 | | |
| 5 | W5/67/30 | Barb | >16 | 120 | 116cm droppers at 6.6m, SP 20m |
| | | Plains | >36, >49 | | |
| 6 | W6/70/30 | Barb | >13 | 120 | 96cm droppers at 6.6m, SP 20m |
| | | Bottom barb | <14 | | |
| 7a) | C8/90/30 | Plain | >10 | 105 | Selvage plain bottom of mesh, SP 8m |
| 7b) | C8/90/30 | | | 90 | Selvage plain top and bottom of mesh, SP 8m |
| 8a) | N90/4/1.4 | | | 90 | Selvage bottom, 55cm and 90cm, SP 10m |
| 8b) | N90/4/1.4 | Plains | >10, >23 | 115 | as above |
| 9 | N120/4/1.4 | | | 120 | Selvage bottom, 55, 90 and 120cm, SP 10m |

* Code: maker W = Waratah Hinged Joint. C = Cyclone Ringlock. Numbers refer to number of line wires, mesh height (cm) and spacings between vertical wires (cm). N = wire netting and numbers refer to height of netting (cm), mesh size (cm) and wire diameter (mm).

+ SP = 165 cm steel post at the spacing given.

Table 2 Livestock and management during fencing evaluation

| Class of Stock | Farm sources | Number of yr | Stocking rates/ha | Mob size | Age (yr) | Liveweight range (kg) |
|-----------------|-----------------|-----------------|----------------------|-------------|-------------|--------------------------|
| Angora wether | 3 | 8 | 5-50 | 1-100 | 1/3-9 | 15-69 |
| Cashmere wether | 2 | 5 | 3-60 | 3-60 | 1-5 | 18-65 |
| Cashmere buck | 1 | 1 | 12-35 | 4-35 | 1-2 | 20-50 |
| Merino wether | 2 | 8 | 7-50 | 1-100 | 1/3-9 | 25-73 |

RESULTS

A total of 198 escapes were recorded, 0% were Merino sheep, 25% Angora goats and 75% cashmere goats (Table 3). All ESCTP 1 occurred with netting fences, designs 8 and 9. Angoras created 14 holes in 50 fence years and cashmere goats

15 holes in 27 fence years by horn rubbing or fighting. Over 75% of these holes were within 50 m of goat camps. There was no damage on boundary netting fences. Structural damage near camps also occurred in design 7 where middle horizontal and vertical wires were pushed aside at point of attachment. Some rings and vertical wires were broken. Vertical wires were moved at point of attachment in some hinged joint fences. ESCTP 2 occurred with designs 8 and 9, when clips holding the netting to the selvedge wire were dislodged. This occurred when fences and goats were older and when the adjacent pasture was ungrazed. Most goats when approached, returned to their correct plot via the escape route. ESCTP 3 occurred in designs 1, 2 and 3. These escapes were assisted by some movement of end assemblies and by goats standing on the top of the mesh near camps and assisting the mesh to sag, thus widening spaces. With design 1 spaces up to 30 cm were created where initially no space existed between the mesh and the barb. Similar slight damage was caused to design 8 5, 6 and 7 but no escapes were detected.

With ESCTP 4 Angoras, greater than 5 years of age and mean live weight greater than 45 kg, jumped fence designs 7a and 8a when availability of green pasture was greater than 100 kg DM/ha within plots and greater than 500 kg DM/ha in adjacent ungrazed plots. All fence designs were jumped by cashmere goats, in five different circumstances. During mustering sometime 8 one or two goats separated from the mob and occasionally they jumped. On six occasions when goats were moved for rotational grazing, one or two returned to their former paddock. On several occasions goats with mean live weight 8 greater than 40 kg jumped from heavily grazed into ungrazed paddocks. Several goats developed rogue behaviour and had to be removed. Occasionally during droving in laneways, leading goats baulked, jumped fences and were followed by the mob (see footnote Table 3).

Table 3 Frequency of escape type and influence of stocking rate on the escape from wire fenced paddocks by Angora and cashmere goats (per 100 goats per year)

| Breed | Escape type | | | | Stocking rate animals/ha | | |
|----------|-------------|-----|-----|-------|--------------------------|------|-----|
| | 1 | 2 | 3 | 4 | <8 | 8-15 | >15 |
| Angora | 3.5 | 1.7 | 0.1 | 1.9 | 10.2 | 9.0 | 0 |
| Cashmere | 11.8 | 1.7 | 7.2 | 17.2* | 31.5 | 48.5 | 32 |

* During droving an additional 17.4 escapes over laneway fences recorded.

Stocking rate had little effect on frequency of escapes (Table 3). Angora 8 used in observations at stocking rates greater than 15/ha were younger, about 25 kg live weight and had plenty of pasture. Grazing one Angora kid in a mob of sheep and supplementary feeding in an adjacent paddock did not lead to goat or sheep escapes. Three cases of misadventure were observed. Two goats became entrapped by their horns in fence 7 (although this could happen in any of the designs 1 to 7). This occurred where steel posts bisected the 30 cm wide mesh opening "creating" two 15 cm wide mesh openings. Under condition 8 of feed shortage the goats pushed their heads into these narrow spaces and were trapped. One goat was caught by the hind legs in plain wire (design 8b) while trying to jump.

DISCUSSION AND CONCLUSIONS

Clear difference 8 were observed in the effectiveness of the various fence designs (irrespective of fence age or tension) in restraining the different classes of stock, Cashmere goats exerted greatest wear on fences. Internal netting fences suffered considerable damage. Failure of netting fences and selvedge clips, which accounted for 46% of escapes, was related to goats

grazing in adjacent paddocks, location of camp sites and temperament of individual goats. Netting is more likely to be effective for isolated mobs, boundary fences and weaning paddocks, where escape of kids is prevented. Excluding escapes related to damage of netting fences the total frequency of escapes was 2.0 and 24.2 per 100 goats per year for Angora and cashmere goats respectively.

Fence design 1, 2 and 3 were unsatisfactory for cashmere goats as large spaces developed between the mesh and top wires which may have been prevented with a top selvedge wire. Difficulty in obtaining (James 1980) correct tension in top wires of design 1 contributed to sagging. There was no evidence that barbed wire improved the stockworthiness of any fences. Cashmere goats jumped over and under barbs. -The bottom barb in design 6 may have prevented goats from escaping under the fence but the plain wire comparison was not tested. The use of selvedge wires at the bottom of prefabricated mesh (e.g. design 7) does not seem warranted provided the mesh maintains its tension and height above ground is correct. None of the fence designs 1 to 6 had bottom selvedge wires and no cases of goats escaping under these fences were seen. Bottom selvedge wires may be useful on hilly terrain, when end assembly failure occurs, or with goats of poor temperament, but may not be needed if frequent steel dropper are used, The use of steel droppers in designs 2, 4, 5 and 6 probably reduced the possibility of goats escaping by pushing under these fences but goats did not escape under fences 1 and 3. The ability of larger goats to cause structural damage to ringlock fence design 7 is of concern.

The effectiveness of mesh fences in restraining goats can be improved by the addition of an offset electric wire at a height of about 25 cm, provided goats have been trained to respect electric fencing (R. Piesse personal communication).

This paper demonstrates that under intensive management conditions and over a wide range of stocking rates, a wider range of prefabricated fences can be used by graziers as effectively as currently recommended goat fence designs. It appears that cashmere goats have more exacting fence requirements than Angora goats, who in turn have more exacting requirements than Merino sheep. These observations suggest that selvedge and barbed wires are not necessarily required in all prefabricated mesh fences for goats. While there is room to evaluate alternative fence designs for goats, the requirements of other livestock must be considered. The addition of a single electric wire to a prefabricated wire mesh fence in reasonable condition is probably more cost effective than other structural changes. Fence height greater than or about 105 cm is recommended. Goat fences may need to be reinforced near camps if mobs of goats are adjacent.

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