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Worm egg count is not associated with greasy fleece weight in sheep phenotypically different for resistance or resilience to gastrointestinal nematodes

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SUMMARY

Promoting animals with increased immune response against gastrointestinal nematodes (worms) will have epidemiological benefits but may have deleterious consequences on production (Greer 2008). To investigate the effect of phenotypic resistance and resilience to worms on production characteristics in grazing sheep, a 2-year cross-over experiment was conducted.

On six farms, two mobs (yearling or mature age) of 300 or more Merino ewes were chosen at shearing in 2007. Within each mob, animals were randomly allocated to receive either normal management (challenged, $n = 60$) or 'worm-free' treatment ($n = 60$) involving suppressive control using combination long-acting anthelmintics. Faecal worm egg count (WEC) was measured individually every 2 months and greasy fleece weight (GFW) was measured at each shearing. Treatments were swapped at shearing in 2008 and continued until shearing 2009. Sheep were placed into quartiles based on either WEC^(1/3) (resistance) or GFW (resilience) distributions within their treatment groups when challenged. The effect of resistance (WEC quartile) on challenged and worm-free GFW was analysed using an appropriate general linear model followed by Tukey's HSD test; the effect of resilience (GFW quartile) was analysed by intra-quartile comparison of GFW under worm-free and normal management.

Table 1. The effect of worm resistance and resilience quartiles on greasy fleece weight (GFW) and worm egg count (back transformed, WEC) of grazing Merino ewes when challenged or worm-free

Resistance quartile ^A	WEC (epg)	GFW (kg)		Resilience quartile ^B	WEC (epg)	GFW (kg)	
		Challenged	Worm-free			Challenged	Worm-free
1	208	3.33 ^c	3.39 ^{bc}	1	797	3.93	3.94
2	554	3.37 ^c	3.51 ^{abc}	2	759	3.53	3.70 [*]
3	1040	3.34 ^c	3.56 ^{ab}	3	784	3.19	3.42 [*]
4	2101	3.42 ^{bc}	3.65 ^a	4	761	2.82	3.12 [*]

^AResistance quartile 1 is the most resistant (i.e., lowest WEC). Means with different letters differ significantly ($P < 0.05$). ^BResilience quartile 1 is the most resilient (i.e., highest GFW when challenged). ^{*}Significant difference between treatments ($P < 0.05$). epg, eggs per gram.

More resistant sheep have a lower requirement for anthelmintic treatment but do not exhibit higher GFW in a challenged environment (Table 1). When worm-free, the most resistant quartile had a lower GFW than the most susceptible quartile. Increased resilience was not associated with higher WEC. Phenotypic selection for high fleece weight will not increase the need for anthelmintic treatment and improve resilience without adverse effects on worm control.

REFERENCE

Greer AW (2008) Trade-offs and benefits: implications of promoting a strong immunity to gastrointestinal parasites in sheep. *Parasite Immunology* **30**, 123–132.