The effect of introduction of the earthworms *aporrectodea caliginosa* and *aporrectodea longa* on pasture production in Tasmania.

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Work in New Zealand (I, 2) has shown that earthworms increase pasture production by changing soil fertility. Even 16 years after earthworm introduction, pasture production increases of 29% were recorded (2). This study quantifies the increases in pasture production associated with the introduction of two earthworm species into Tasmanian pasture soils devoid of earthworms.

Methods

In winter 1987, two earthworm species were introduced into perennial pastures at "Woolnorth" in the north-west, and at "Rushy Lagoon" in the north-east of Tasmania. The "Woolnorth" site consisted of a sandy soil, whilst a heavier clay soil occurred at the "Rushy Lagoon" site. Three treatments were arranged in a random block design and replicated nine times at "Woolnorth" and six times at "Rushy Lagoon" on 5x5 m plots. These were: (i) no earthworms; (ii) one species introduced: *Aporrectodea caliginosa (*@ 6 earthworms/m^2, and (iii) two species introduced: *Aporrectodea caliginosa (*@ 6/m^2 and A. *longa (*@ 3/m^2. Pasture cuts were taken from six randomly selected 0.5x0.5 m quadrats from each plot prior to stock grazing.

Results

Pasture responses were detected one and three years after introduction (Table 1). Pasture production increases of up to 75% for two earthworm species and up to 60% for one species were measured at both sites.

Table 1. Effect of introduced earthworms on pasture dry matter production at "Woolnorth" and "Rushy Lagoon".

Treatment	WOOLNORTH Pasture production (kg DM/ha)							
	6/90	8/90	9/90	7/91	8/91	11/91	1/92	2/92
no earthworms	455	406	908	272	229	704	1728	1914
1 species	626	576*	1198*	368a	337*	841*	2059*	2166*
2 species	678*	569*	1023ns	238ns	309*	853*	2022*	2477*

Treatment	RUSHY LAGOON Pasture production (kg DM/ha)								
	7/88	12/88	5/89	11/89	5/90	8/90	11/91	1/92	11/92
no earthworms	832	1897	890	1424	570	2850	318	397	1475
1 species	1086#	2310#	1405#	1688*	754*	3030	439*	467*	2272#
2 species	1324#	2635#	1558#	2021#	995#	3354a	486a	632#	2510#

n.s. not significant; * P<0.05%; a P<0.01%; # P<0.001, 1 spp = *A. caliginosa*; 2 spp = *A. caliginosa* and *A. longa*.

Discussion

To the authors' knowledge these results arc the first in Australia showing positive effects of introduced earthworms on plant production. The findings are similar to NZ results showing pasture production increases of 28 - Ill% (I) and 72 % (2) where only A. *caliginosa* had been introduced and confirm the importance of earthworms in pasture productivity.

Acknowledgements

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