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Climate change and broadacre livestock production across southern Australia. 3. Adaptation options via livestock genetic improvement

Andrew D. Moore[A,B] *and Afshin Ghahramani*[A]

[A]CSIRO Climate Adaptation National Research Flagship and Plant Industry, GPO Box 1600, Canberra, ACT 2601, Australia.

[B]Corresponding author. Email: Andrew.Moore@csiro.au

Supplementary Material

Table S1. Attributes of the 5 livestock enterprises that were modelled at each location. Where ranges are specified, values differed between locations.

	Merino ewes	Crossbred ewes	Wethers	Beef cows	Steers
Genotype of main flock or herd	Merino	Border Leicester x Merino	Merino	Angus	Angus
Standard reference weight (kg)	50.0	60.0	50.0	550.0	550.0
Reference fleece weight (kg greasy wool)	5.00	5.00	5.00		5.00
Reference wool fibre diameter (μm)	19.0	23.0	19.0		19.0
Ram or bull genotype	Merino	Border Leicester		Angus	
Standard reference weight (kg)	70.0	84.0		770.0	
Adult mortality rate (/year)	4%	4%	4%	2%	4%
Source of replacement livestock	Self-replacing	Purchase	Purchase	Self-replacing	Purchase
Age at entry (months)	4-15	13-20	5-18	6-14	7-10
Age at which sold (months)	63-78	73-82	54-77	98-107	13-24
Average birth date of lambs or calves	9 Apr-1 Oct	29 May-6 Sep		23 Feb-1 Sep	
Age at sale of lambs or calves (months)	4-17	4-19		8-18	

Table S2. Reference livestock production scenarios: optimal sustainable stocking rates (OSSR), long-term average production of meat (including cast-for-age stock) and wool, and operating profit at the optimal sustainable stocking rate simulated with the GRAZPLAN models for 5 livestock enterprises at each of 25 locations under historical (1970-99) climate. OSSR values are given as animals in the main flock or herd per pasture hectare immediately after entry of replacement animals.

Location	Optimal Sustainable Stocking Rate (animals/ha)					Long-term Average Livestock Sales (kg LW/ha/year)					Long-term Average Wool Production (kg CFW/ha/year)			Long-term Average Operating Profit ($/ha/year)				
	Merino ewes	Crossbred ewes	Wethers	Beef cows	Steers	Merino ewes	Crossbred ewes	Wethers	Beef cows	Steers	Merino ewes	Crossbred ewes	Wethers	Merino ewes	Crossbred ewes	Wethers	Beef cows	Steers
Armidale	4.5	4.0	7.8	0.77	1.10	162	241	81	160	445	34	25	34	274	248	137	85	241
Bakers Hill	13.2	8.5	13.9	1.16	1.38	450	601	162	268	607	64	35	57	405	477	214	80	107
Birchip	4.4	3.0	3.1	0.50	1.23	108	162	34	91	412	20	13	10	109	100	-2	21	184
Colac	16.4	11.1	17.6	2.03	2.37	427	749	223	512	1166	64	57	74	449	756	352	366	379
Condobolin	1.4	1.2	3.2	0.16	0.25	36	61	37	38	93	7	5	14	25	23	58	-7	8
Cootamundra	7.8	5.4	9.9	0.78	2.06	211	377	93	185	793	27	20	39	229	318	155	98	367
Cummins	2.4	1.9	3.3	0.35	1.00	73	125	39	80	375	12	10	14	64	96	43	30	141
Dalwallinu	1.8	1.4	2.5	0.14	0.34	55	92	22	30	136	9	6	10	51	56	31	-14	3
Ellinbank	20.6	13.0	22.6	2.14	3.93	560	943	295	709	1781	85	70	94	855	1132	488	707	978
Esperance	2.4	2.0	3.7	0.47	0.67	92	141	32	108	293	12	7	14	94	104	35	18	39
Goulburn	5.8	5.3	7.4	0.62	1.62	159	277	86	129	589	33	25	29	249	202	102	25	251
Hamilton	11.9	7.4	12.0	1.18	3.38	296	539	261	355	1371	45	40	50	367	499	233	276	1000
Katanning	2.2	1.2	3.1	0.30	0.57	82	110	31	77	273	11	7	14	90	105	44	28	66
Kyancutta	0.9	0.8	1.2	0.12	0.32	25	40	13	23	104	4	3	5	16	19	13	-2	27
Lake Grace	0.8	0.4	1.0	0.06	0.13	26	29	9	11	48	4	2	4	19	16	9	-9	-2
Lameroo	2.1	1.2	1.5	0.16	0.37	53	69	15	47	138	10	6	6	48	41	5	2	35
Launceston	8.3	5.6	13.6	1.18	2.91	298	374	157	347	1138	38	32	55	378	424	277	287	382
Lucindale	6.8	4.9	8.1	0.73	2.00	216	310	102	226	823	36	24	36	302	297	150	160	354
Mansfield	8.1	5.3	9.1	0.80	1.64	232	334	111	190	639	37	26	38	299	311	170	130	271
Mt Barker	10.4	8.0	12.5	1.12	1.98	319	518	130	322	959	48	33	56	407	544	221	177	230
Narrandera	5.8	4.1	7.5	0.67	1.51	201	279	65	183	582	22	22	31	193	230	125	109	180
Stawell	7.5	5.5	8.7	0.89	1.98	202	343	105	238	756	32	29	37	256	321	162	141	329
Swan Hill	3.0	2.4	3.1	0.32	0.88	70	118	32	59	271	13	10	11	64	64	41	8	94
Tatura	6.3	4.9	7.3	0.80	1.55	164	276	87	174	553	26	23	30	226	264	153	129	268
Wellington	4.0	3.9	5.4	0.51	0.95	118	223	64	139	355	21	20	23	163	203	100	95	162