

Variable	Categories or units	Amitraz					Ivermectin					Alpha-cypermethrin					Multi-resistance				
		T	N cat	R	p-value	OR	T	N cat	R	p-value	OR	T	N cat	R	p-value	OR	T	N cat	R	p-value	OR
Farm description	Large	61	15	10	—	—	61	15	9	—	—	61	15	9	—	—	61	15	9	—	—
	Medium	61	40	28	0.81	1.17	61	40	23	0.87	0.9	61	40	28	0.48	1.56	61	40	28	0.48	1.56
	Small	61	6	3	0.48	0.5	61	6	3	0.68	0.67	61	6	4	0.78	1.33	61	6	4	0.78	1.33
Production purpose	Milk	61	46	31	—	—	61	46	25	—	—	61	46	32	—	—	61	46	31	—	—
	Dual-purpose	61	15	10	0.96	0.97	61	15	10	0.41	1.68	61	15	9	0.49	0.66	61	15	10	0.96	0.97
Management type	Extensive	61	35	23	—	—	61	35	19	—	—	61	35	24	—	—	61	35	22	—	—
	Semi intensive	61	26	18	0.77	1.17	61	26	16	0.57	1.35	61	26	17	0.79	0.87	61	26	19	0.4	1.6
Stocking density	High	61	16	9	—	—	61	16	9	—	—	61	16	11	—	—	61	16	5	—	—
	Low	61	45	32	0.28	1.91	61	45	26	0.92	1.06	61	45	30	0.88	0.91	61	45	11	0.88	0.91
Animal management																					
Bovine breed	<i>B. p. indicus</i>	61	16	12	—	—	61	16	6	—	—	61	16	10	—	—	61	16	9	—	—
	<i>B. p. taurus</i>	61	45	29	0.44	0.6	61	45	29	0.07	3.02	61	45	31	0.64	1.33	61	45	32	0.28	1.91
New animals	No	61	20	12	—	—	61	20	15	—	—	61	20	12	—	—	61	20	13	—	—
	Yes	61	41	29	0.4	1.61	61	41	20	0.06	0.32	61	41	29	0.4	1.61	61	41	28	0.8	1.16
External paddocks	No	61	46	33	—	—	61	46	24	—	—	61	46	31	—	—	61	46	31	—	—
	Yes	61	15	8	0.19	0.45	61	15	11	0.16	2.52	61	15	10	0.96	0.97	61	15	10	0.96	0.97
Tick infestation level*	High	61	32	21	—	—	61	32	15	—	—	61	32	19	—	—	61	32	20	—	—
	Low	61	29	20	0.78	1.16	61	29	20	0.08	2.52	61	29	22	0.17	2.15	61	29	21	0.41	1.58
	No	61	35	24	—	—	61	35	20	—	—	61	35	25	—	—	61	35	25	—	—
Veterinary	Occasional	61	10	9	0.2	4.12	61	10	6	0.87	1.13	61	40	8	0.59	1.6	61	10	9	0.25	3.6
	Regular	61	16	8	0.21	0.46	61	16	9	0.95	0.96	61	16	8	0.14	0.4	61	16	7	0.06	0.31
Tick infestation management																					
Spraying baths	No	61	11	5	—	—	61	11	6	—	—	61	11	7	—	—	61	11	6	—	—
	Yes	61	50	36	0.1	3.09	61	50	29	0.83	1.15	61	50	34	0.78	1.21	61	50	35	0.33	1.94
Preparation of dilution	Owner	61	38	25	—	—	61	38	22	—	—	61	38	27	—	—	61	38	26	—	—
	Veterinary	61	2	0	0.99	<0.01	61	2	1	0.82	0.73	61	2	2	0.99	>100	61	2	1	0.6	0.46
Fumigation equipment calibration	Farm worker	61	21	16	0.41	1.66	61	21	12	0.96	0.97	61	21	12	0.28	0.54	61	21	14	0.89	0.92
	No	54	21	14	—	—	54	21	11	—	—	54	21	12	—	—	54	21	12	—	—
Water used	Yes	54	33	25	0.47	1.56	54	33	20	0.55	1.4	54	33	24	0.24	2	54	33	25	0.16	2.34
	No potable	59	51	35	—	—	59	51	29	—	—	59	51	35	—	—	59	51	35	—	—
Interval between baths application	Potable	59	8	4	0.31	0.46	59	8	5	0.77	1.26	59	8	4	0.31	0.46	59	8	4	0.31	0.46
	Weeks	NA	NA	NA	0.22	1.01	NA	NA	NA	0.86	0.99	NA	NA	NA	0.08	0.97	NA	NA	NA	0.57	0.97
Acaricide rotation	≤4, (No)	61	39	26	—	—	61	39	21	—	—	61	39	27	—	—	61	39	26	—	—
	>5, (Yes)	61	22	15	0.9	1.07	61	22	14	0.46	1.5	61	22	14	0.66	0.78	61	22	15	0.9	1.07

Interval between any acaricide application	Weeks	NA	NA	NA	0.88	0.99	NA	NA	NA	0.84	1	NA	NA	NA	0.8	0.99	NA	NA	NA	0.24	1.11
Use of combined acaricides	No	61	23	15	___	___	61	23	15	___	___	61	23	17	___	___	61	23	18	___	___
	Yes	61	38	26	0.8	1.16	61	38	20	0.34	0.59	61	38	24	0.39	0.61	61	38	23	0.16	0.43
Use of additional methods	No	61	46	32	___	___	61	46	27	___	___	61	46	31	___	___	61	46	32	___	___
	Yes	61	15	9	0.49	0.66	61	15	8	0.72	0.72	61	15	10	0.96	0.97	61	15	9	0.49	0.66
Cloth	No	61	49	33	___	___	61	49	25	___	___	61	49	30	___	___	61	49	30	___	___
	Yes	61	12	8	0.96	0.97	61	12	10	0.06	4.8	61	12	11	0.07	6.97	61	12	11	0.07	6.97
Manual tick removal	No	61	43	29	___	___	61	43	22	___	___	61	43	27	___	___	61	43	27	___	___
	Yes	61	18	12	0.95	0.97	61	18	13	0.14	2.48	61	18	14	0.26	2.07	61	18	14	0.26	2.07
Pour on	No	61	39	25	___	___	61	39	24	___	___	61	39	29	___	___	61	39	27	___	___
	Yes	61	22	16	0.49	1.49	61	22	11	0.38	0.63	61	22	12	0.12	0.41	61	22	14	0.66	0.78
For each acaricide under resistance study																					
Acaricide used	No	61	22	12	___	___	61	17	5	___	___	61	46	28	___	___	NA	NA	NA	NA	NA
	Yes	61	39	29	0.12	2.41	61	44	30	0.01	5.14	61	15	13	0.08	4.18	NA	NA	NA	NA	NA
Animals treated	All	38	24	20	___	___	44	22	14	___	___	15	10	9	___	___	NA	NA	NA	NA	NA
	Groups	38	14	8	0.09	0.27	44	22	16	0.59	1.42	15	5	4	0.6	0.44	NA	NA	NA	NA	NA
Correct Dosage	Correct	39	22	16	___	___	44	25	15	___	___	15	8	7	___	___	NA	NA	NA	NA	NA
	Incorrect	39	17	13	0.79	1.21	44	19	15	0.19	2.5	15	7	6	0.92	0.86	NA	NA	NA	NA	NA
Frequency	High	38	32	24	___	___	44	16	12	___	___	15	12	11	___	___	NA	NA	NA	NA	NA
	Low	38	6	4	0.67	0.67	44	28	18	0.47	0.6	15	3	2	0.29	0.18	NA	NA	NA	NA	NA
Time used	Long time ago	38	13	12	___	___	44	5	5	___	___	15	7	6	___	___	NA	NA	NA	NA	NA
	Recently	38	25	16	0.09	0.15	44	39	25	0.99	<0.01	15	8	7	0.92	1.17	NA	NA	NA	NA	NA
Efficacy observed	High	38	23	15	___	___	44	29	20	___	___	15	8	6	___	___	NA	NA	NA	NA	NA
	Low	38	15	13	0.16	3.47	44	15	10	0.88	0.9	15	7	7	1	>100	NA	NA	NA	NA	NA
For multi-resistance																					
Use1	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	41	33	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	20	8	<0.01	0.16
Use2	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	37	22	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	24	19	0.12	2.59
Use3	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	51	31	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	10	10	0.99	>100

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; T= Total of observations per variable; N cat= Observations per category; R= number of resistant farm per category; NA= data unavailable; ___= used as reference.

Table SM I. Univariable analysis to identify possible associated factors with amitraz, ivermectin and alpha-cypermethrin resistance and multi-resistance in *R. microplus* tick populations in cattle farms in Northwest of Pichincha using Larval package test.

Variable	Categories or units	Amitraz					Ivermectin					Alpha-cypermethrin					Multi-resistance				
		T	N	R	p-value	OR	T	N	R	p-value	OR	T	N	R	p-value	OR	T	N	R	p-value	OR
Farm size	Farm description																				
	Large	65	0	0	NA	NA	65	0	0	NA	NA	65	0	0	NA	NA	65	0	0	NA	NA
	Medium, Small	65	18	12			65	18	8			65	18	10			65	18	11		
Production purpose	Milk	65	44	18			65	44	20			65	44	23			65	44	23		
	Dual-purpose	65	21	7	0.56	1.38	65	21	8	0.58	0.74	65	21	16	0.07	2.92	65	21	14	0.28	1.83
Management type	Extensive	65	46	28			65	46	21			65	46	28			65	46	27		
	Semi intensive	65	19	12	0.86	1.10	65	19	7	0.52	0.69	65	19	11	0.82	0.88	65	19	10	0.65	0.78
Stocking density	High	65	22	12			65	22	6			65	22	12			65	22	9		
	Low	65	43	28	0.41	1.56	65	43	22	0.07	2.79	65	43	27	0.52	1.40	65	43	28	0.07	2.70
Animal management																					
Bovine breed	<i>B. p. indicus</i>	65	5	3			65	5	1			65	5	2			65	5	2		
	<i>B. p. taurus</i>	65	60	37	0.94	1.07	65	65	27	0.30	3.27	65	60	37	0.35	2.41	65	60	35	0.44	2.10
New animals	No	65	38	19			65	38	14			65	38	19			65	38	15		
	Yes	65	27	21	0.03	3.50	65	27	14	0.23	1.84	65	27	20	0.05	2.85	65	27	22	<0.01	6.75
External paddocks	No	65	32	18			65	32	12			65	32	21			65	32	19		
	Yes	65	33	22	0.39	1.55	65	33	16	0.37	1.57	65	33	18	0.36	0.63	65	33	18	0.69	0.82
Tick infestation level*	High	65	35	21			65	35	14			65	35	21			65	35	19		
	Low	65	30	19	0.78	1.15	65	30	14	0.59	1.31	65	30	18	1.00	1.00	65	30	18	0.64	1.26
Veterinary	No	65	6	3			65	6	0			65	6	4			65	6	3		
	Occasional	65	46	28	0.61	1.55	65	46	23	0.99	>100	65	46	25	0.57	0.59	65	46	26	0.76	1.30
	Regular	65	13	9	0.42	2.25	65	13	5	0.99	>100	65	13	10	0.64	1.66	65	13	8	0.64	1.60
Tick infestation management																					
Spraying baths	No	65	3	1			65	3	1			65	3	0			65	3	0		
	Yes	65	62	39	0.33	3.39	65	62	27	0.73	1.54	65	62	39	0.99	>100	65	62	37	0.99	>100
Preparation of dilution	Owner	65	59	35			65	59	26			65	59	35			65	59	33		
	Veterinary	65	2	1	0.79	0.69	65	2	0	0.99	<0.01	65	2	0	1.00	<0.01	65	2	0	1.00	<0.01
	Farm worker	65	4	4	0.99	>100	65	4	2	0.82	1.27	65	4	4	0.99	>100	65	4	4	0.99	>100
Fumigation equipment calibration	No	62	29	18			62	29	10			62	29	19			62	29	15		
	Yes	62	33	21	0.90	1.07	62	33	17	0.18	2.02	62	33	20	0.69	0.80	62	33	22	0.23	1.87
Water used	No potable	65	61	36			65	61	26			65	61	37			65	61	34		
	Potable	65	4	4	0.99	0.27	65	4	2	0.77	1.35	65	4	2	0.68	0.64	65	4	3	0.46	2.38
Interval between baths application	Weeks	NA	NA	NA	0.69	0.98	NA	NA	NA	0.18	0.92	NA	NA	NA	0.58	1.03	NA	NA	NA	0.81	1.01
Acaricide rotation	≤4 , (No)	65	38	22			65	38	17			65	38	22			65	38	21		
	>5, (Yes)	65	27	18	0.48	1.45	65	27	11	0.75	0.84	65	27	17	0.68	1.23	65	27	16	0.75	1.18

Interval between any acaricide application	Weeks	NA	NA	NA	0.59	0.97	NA	NA	NA	0.34	0.95	NA	NA	NA	0.98	1.00	NA	NA	NA	0.77	0.99
Use of combined acaricides	No	65	6	3	___	___	65	9	3	___	___	65	9	4	___	___	65	9	2	___	___
	Yes	65	56	37	0.07	3.89	65	56	25	0.53	1.61	65	56	35	0.31	2.08	65	56	35	0.04	5.83
Use of additional methods	No	65	45	27	___	___	65	45	19	___	___	65	45	31	___	___	65	45	27	___	___
	Yes	65	20	13	0.70	1.24	65	20	9	0.84	1.12	65	20	8	0.03	0.30	65	20	10	0.45	0.67
"Cloth"	No	65	56	35	___	___	65	56	23	___	___	65	56	35	___	___	65	56	33	___	___
	Yes	65	9	5	0.69	0.75	65	9	5	0.42	1.79	65	9	4	0.31	0.48	65	9	4	0.42	0.56
Manual tick removal	No	65	44	27	___	___	65	44	22	___	___	65	44	28	___	___	65	44	28	___	___
	Yes	65	21	13	0.97	1.02	65	21	6	0.11	0.40	65	21	11	0.39	0.63	65	21	9	0.12	0.43
Pour on	No	65	50	31	___	___	65	50	25	___	___	65	50	32	___	___	61	50	32	___	___
	Yes	65	15	9	0.89	0.92	65	15	3	0.05	0.25	65	15	7	0.23	0.49	61	22	14	0.04	0.28
For each acaricide under resistance study																					
Acaricide used	No	65	12	7	___	___	65	25	10	___	___	65	26	15	___	___	NA	NA	NA	NA	NA
	Yes	65	53	33	0.80	1.18	65	40	18	0.69	1.23	65	39	24	0.76	1.17	NA	NA	NA	NA	NA
Animals treated	All	52	43	27	___	___	40	15	8	___	___	35	30	19	___	___	NA	NA	NA	NA	NA
	Groups	52	9	6	0.83	1.18	40	25	10	0.33	0.54	35	5	3	0.89	0.87	NA	NA	NA	NA	NA
Correct Dosage	Correct	52	27	20	___	___	40	18	6	___	___	35	19	13	___	___	NA	NA	NA	NA	NA
	Incorrect	52	25	13	0.10	0.37	40	22	12	0.08	2.88	35	16	9	0.46	0.59	NA	NA	NA	NA	NA
Frequency	High	52	33	24	___	___	40	10	4	___	___	35	20	12	___	___	NA	NA	NA	NA	NA
	Low	52	19	9	0.07	2.96	40	30	14	0.84	1.16	35	15	10	0.69	1.33	NA	NA	NA	NA	NA
Time used	Long time ago	52	24	17	___	___	40	7	3	___	___	35	17	11	___	___	NA	NA	NA	NA	NA
	Recently	52	28	16	0.31	0.55	40	33	15	0.92	0.92	35	18	11	0.83	0.86	NA	NA	NA	NA	NA
Efficacy observed	High	52	26	17	___	___	40	29	11	___	___	35	21	14	___	___	NA	NA	NA	NA	NA
	Low	52	26	6	0.77	0.85	40	11	7	0.12	3.00	35	14	8	0.57	0.67	NA	NA	NA	NA	NA
For multi-resistance																					
Use1	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	50	29	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	15	8	0.75	0.83
Use2	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	39	19	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	26	18	0.11	2.37
Use3	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	43	26	___	___
	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	22	11	0.42	0.65

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; T= Total of observations per variable; N cat= Observations per category; R= number of resistant farm per category; NA= data no available; ___= used as reference.

Table SM II. Univariable analysis to identify possible associated factors with amitraz, ivermectin and alpha-cypermethrin resistance and multi-resistance in *R. microplus* tick populations in cattle farms in Quijos Valley using Larval package test results.

Northwest of Pichincha											
Models	SP	CI inf	CI sup	SEN	CI inf	CI sup	AUC	CI inf	CI sup	AIC	Nagelkerke's R ²
Amitraz	0.80	0.50	1.00	0.86	0.64	1.00	0.85	0.69	1.00	39.79	0.40
Ivermectin	0.81	0.42	0.96	0.60	0.40	0.97	0.77	0.65	0.88	75.89	0.30
Alpha-cypermethrin	0.80	0.55	0.95	0.68	0.49	0.88	0.77	0.65	0.89	73.41	0.32
Multi-resistance	0.71	0.53	0.94	0.78	0.59	0.97	0.81	0.70	0.99	56.71	0.41

SP= specificity, SEN= sensibility, CI inf= lower limit of the confidence interval 95%; CI sup= upper limit of the confidence interval 95%, AUC= area under the curve, AIC= Akaike information criterion

Table SM III. Specificity, sensibility, Area under the curve, Akaike information criterion and Nagelkerke's values obtained to validate the multiple logistic regression models to identify risk factors associated with amitraz, ivermectin and alpha-cypermethrin resistance and multi-resistance in *R. microplus* tick populations in cattle farms in Northwest of Pichincha using Larval package test results.

Quijos valley											
Models	SP	CI inf	CI sup	SEN	CI inf	CI sup	AUC	CI inf	CI sup	AIC	Nagelkerke's R ²
Amitraz	0.79	0.58	0.95	0.73	0.58	0.91	0.79	0.66	0.93	62.86	0.31
Ivermectin	0.75	0.50	0.96	0.65	0.45	0.85	0.74	0.59	0.88	63.83	0.24
Alpha-cypermethrin	0.50	0.31	0.92	0.79	0.36	0.97	0.69	0.56	0.82	83.98	0.18
Multi-resistance	0.73	0.46	0.96	0.56	0.36	0.77	0.66	0.53	0.80	74.89	0.41

Table SM IV. Specificity, sensibility, Area under the curve, Akaike information criterion and Nagelkerke's values obtained to validate the multiple logistic regression models to identify risk factors associated with amitraz, ivermectin and alpha-cypermethrin resistance and multi-resistance in *R. microplus* tick populations in cattle farms in Quijos Valley using Larval package test results.

Resistant to susceptible	Variable	Categories	Amitraz		Ivermectin		Alpha-cypermethrin	
			p-value	OR	p-value	OR	p-value	OR
Acaricide rotation		≤4 (No)	—	—	—	—	—	—
		>5 (Yes)	0.83	0.82	0.32	2.13	0.05	6.25
Addition to water		No	—	—	—	—	—	—
		Yes	0.83	0.82	0.83	1.19	0.23	2.81
Change in tick control		No	—	—	—	—	—	—
		Yes	0.29	0.29	0.82	0.83	0.63	0.64
Dynamic acaricide change		No	—	—	—	—	—	—
		Yes	0.43	0.40	0.82	1.21	0.32	0.31
Expiration date		No	—	—	—	—	—	—
		Yes	1.00	>100	0.78	0.76	0.38	0.42
Genetic changes		No	—	—	—	—	—	—
		Yes	0.76	1.43	0.06	0.18	0.62	1.80
Manual tick removal		No	—	—	—	—	—	—
		Yes	0.42	2.14	0.92	0.92	0.61	0.65
pH water		Unitless	0.32	0.79	0.54	1.26	0.14	4.90
Quarantine		No	—	—	—	—	—	—
		Yes	0.99	0.00	0.99	0.00	0.47	2.60
Change in tick burden		Less	—	—	—	—	—	—
		More	0.09	7.50	0.41	0.35	0.79	1.33
		Same	0.39	0.33	0.19	0.32	0.09	0.13
Tick infestation level*		Low	—	—	—	—	—	—
		High	0.42	1.95	0.75	1.29	0.93	0.93
Record acaricide use		No	—	—	—	—	—	—
		Yes	0.06	6.29	0.91	0.91	0.86	0.84

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; —= category used as reference

Table SM V. Univariable analysis to identify factors associated with the change of status from resistance to susceptible of amitraz, ivermectin and alpha-cypermethrin in *R. microplus* tick populations in cattle farms in Northwest of Pichincha using Larval package test results.

Resistant to susceptible		Amitraz		Ivermectin		Alpha-cypermethrin	
Variable	Categories	p-value	OR	p-value	OR	p-value	OR
Acaricide rotation	≤4 (No)	—	—	—	—	—	—
	>5 (Yes)	0.46	0.57	0.09	0.20	0.07	0.23
Addition to water	No	—	—	—	—	—	—
	Yes	0.84	1.17	0.74	1.33	0.43	0.50
Change in tick control	No	—	—	—	—	—	—
	Yes	0.76	1.28	1.00	<0.01	0.03	6.19
Dynamic acaricide change	No	—	—	—	—	—	—
	Yes	0.18	4.29	0.99	<0.01	0.77	1.43
Expiration date	No	—	—	—	—	—	—
	Yes	0.11	0.23	0.98	0.97	0.90	1.17
Genetic changes	No	—	—	—	—	—	—
	Yes	0.98	1.02	0.47	2.00	0.82	1.24
Manual tick removal	No	—	—	—	—	—	—
	Yes	0.43	2.00	0.11	0.25	0.25	3.65
pH water	Unitless	0.27	0.58	0.23	5.83	0.28	4.86
Quarantine	No	—	—	—	—	—	—
	Yes	0.09	9.14	0.99	<0.01	0.99	<0.01
Change in tick burden	Less	—	—	—	—	—	—
	More	0.82	1.25	0.35	2.83	0.32	0.31
	Same	0.98	1.02	0.74	1.42	0.12	0.17
Tick infestation level*	Low	—	—	—	—	—	—
	High	0.62	1.48	0.89	0.89	0.94	1.07
Record acaricide use	No	—	—	—	—	—	—
	Yes	0.45	1.78	1.00	<0.01	0.72	0.73

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; — = category used as reference.

Table SM VI. Univariable analysis to identify factors associated with the change of status from resistance to susceptible of amitraz, ivermectin and alpha-cypermethrin resistance in *R. microplus* tick populations in cattle farms in Quijos Valley using Larval package test results.

Susceptible to resistant		Amitraz		Ivermectin		Alpha-cypermethrin	
Variable	Categories	p-value	OR	p-value	OR	p-value	OR
Acaricide rotation	≤4 , (No)	—	—	—	—	—	—
	>5, (Yes)	0.58	1.82	0.29	0.39	0.40	2.00
Addition to water	No	—	—	—	—	—	—
	Yes	0.60	0.53	0.78	0.80	0.40	2.00
Change in tick control	No	—	—	—	—	—	—
	Yes	0.62	0.55	0.56	1.60	0.36	2.13
Dynamic acaricide change	No	—	—	—	—	—	—
	Yes	0.81	0.74	0.82	1.21	0.17	3.17
Expiration date	No	—	—	—	—	—	—
	Yes	0.66	0.58	0.15	0.26	0.69	1.59
Genetic changes	No	—	—	—	—	—	—
	Yes	0.84	0.78	0.40	2.67	0.76	6.16
Manual tick removal	No	—	—	—	—	—	—
	Yes	1.00	0.00	0.77	0.25	0.93	0.93
pH water	Unitless	0.99	1.00	0.66	0.90	0.77	1.10
Quarantine	No	—	—	—	—	—	—
	Yes	1.00	0.00	0.14	6.86	0.99	0.00
Change in tick burden	Less	—	—	—	—	—	—
	More	1.00	0.00	0.87	1.25	1.00	0.00
	Same	0.45	2.54	0.23	3.00	0.72	1.36
Tick infestation level*	Low	—	—	—	—	—	—
	High	0.27	3.22	0.61	0.64	0.93	0.93
Record acaricide use	No	—	—	—	—	—	—
	Yes	0.77	0.70	0.49	0.54	0.66	0.67

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; — = used as reference.

Table SM VII. Univariable analysis to identify factors associated with the change of status from susceptible to resistance to amitraz, ivermectin and alpha-cypermethrin in *R. microplus* tick populations in cattle farms in Northwest of Pichincha using Larval package test results.

Susceptible to resistant		Amitraz		Ivermectin		Alpha-cypermethrin	
Variable	Categories	p-value	OR	p	OR	p-value	OR
Acaricide rotation	≤4 , (No)	—	—	—	—	—	—
	>5, (Yes)	0.21	3.00	1.84	>100	1.00	>100
Addition to water	No	—	—	—	—	—	—
	Yes	0.84	1.17	0.28	0.29	0.31	0.41
Change in tick control	No	—	—	—	—	—	—
	Yes	0.55	1.57	0.13	4.50	1.00	0.00
Dynamic acaricide change	No	—	—	—	—	—	—
	Yes	0.99	0.00	0.43	2.75	0.99	0.00
Expiration date	No	—	—	—	—	—	—
	Yes	1.00	>100	0.84	0.78	0.78	1.38
Genetic changes	No	—	—	—	—	—	—
	Yes	0.62	1.50	0.31	2.76	0.59	0.54
Manual tick removal	No	—	—	—	—	—	—
	Yes	0.43	2.00	0.45	2.40	0.07	0.25
pH water	Unitless	0.72	1.21	0.80	1.19	0.75	1.20
Quarantine	No	—	—	—	—	—	—
	Yes	0.99	0.00	0.35	3.40	0.99	0.00
	Less	—	—	—	—	—	—
Change in tick burden	More	0.55	0.57	0.99	0.00	0.06	10.80
	Same	0.16	0.29	0.40	2.32	0.19	4.91
	Low	—	—	—	—	—	—
Tick infestation level*	High	0.40	0.49	0.99	0.00	0.74	0.75
	No	—	—	—	—	—	—
Record acaricide use	No	—	—	—	—	—	—
	Yes	0.14	0.19	0.86	1.18	0.56	0.60

*= Observational variable dividing the bovine into three parts, low= if there are no ticks or one third of the animal has more than 20 ticks, high= if two or three thirds of the animal have more than 20 ticks each; —= used as reference

Table SM VIII. Univariable analysis to identify factors associated with the change of status from susceptible to resistance to amitraz, ivermectin and alpha-cypermethrin in *R. microplus* tick populations in cattle farms in Quijos Valley using Larval package test results.