



Financial viability of Peste des Petits Ruminants (PPR) control programme (PPR-CP) implemented in Madhya Pradesh, India

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Supplementary Table 1. PPR incidence, mortality and CFR in sheep and goats during before PPR-CP (2015-16) and after PPR-CP (2018-19) implementation in Madhya Pradesh

Group	Category	No. of animals at risk		No. of PPR affected cases (incidence)		z-value z	No. of death cases (mortality)		z-value z	CFR (%)	
		2015-16	2018-19	2015-16	2018-19		2015-16	2018-19		2015-16	2018-19
Species	Sheep	976	294	268 (27.5)	30(10.2)	6.120***	75 (7.7)	20(6.8)	0.504 ^{NS}	28.0	66.7
	Goats	10237	6553	1920 (18.8)	52(0.8)	35.26***	886 (8.7)	40(0.6)	22.28***	46.1	76.9
	Total	11213	6847	2188 (19.5)	82(1.2)	36.02***	961 (8.6)	60(0.9)	21.79***	43.9	73.2
<i>Sheep</i>											
Age wise	< 6 months	369	88	39 (10.6)	13 (14.8)	1.116 ^{NS}	22 (6.0)	10(11.4)	1.78*	56.4	76.9
	6-12 months	95	14	24 (25.3)	0(0)	-	20 (21.1)	0(0)	-	83.3	0
	> 1 year	512	192	205 (40.0)	17(8.9)	7.93***	33 (6.5)	10(5.2)	0.61 ^{NS}	16.1	58.8
Sex wise	Male	184	69	53 (28.8)	10(14.5)	2.34**	27 (14.7)	7(10.2)	0.94 ^{NS}	50.9	70
	Female	792	225	215 (27.1)	20(8.9)	5.73***	48 (6.1)	13(5.8)	0.16 ^{NS}	22.3	65
<i>Goats</i>											
Age wise	< 6 months	4578	2306	665 (14.5)	18(0.8)	18.00***	338 (7.4)	18(0.8)	11.68***	50.8	100
	6-12 months	921	610	237 (25.7)	7(1.2)	12.867***	114 (12.4)	5(0.8)	8.27***	48.1	71.4
	> 1 year	4738	3637	1018 (21.5)	27(0.7)	28.47***	434(9.2)	17(0.5)	17.47***	42.6	62.9
Sex wise	Male	3065	1563	634 (20.7)	11(0.7)	18.56***	335 (10.9)	11(0.7)	12.51***	52.8	100
	Female	7172	4990	1286 (17.9)	41(0.8)	29.77***	551 (7.7)	29(0.6)	18.08***	42.8	70.7
<i>Pooled (sheep + goats)</i>											
Age wise	< 6 months	4947	2394	704 (14.2)	31(1.3)	17.31***	360 (7.3)	28(1.2)	10.96***	51.1	90.3
	6-12 months	1016	624	261 (25.7)	7(1.12)	13.06***	134 (13.2)	5(0.8)	8.75***	51.3	71.4
	> 1 year	5250	3829	1223 (23.3)	44(1.15)	30.07***	467 (8.9)	27(0.7)	16.99***	38.2	61.4
Sex wise	Male	3249	1632	687 (21.1)	21(1.3)	18.59***	362 (11.1)	18(1.1)	12.35***	52.7	85.7
	Female	7964	5215	1501 (18.8)	61(1.2)	30.70***	599 (7.5)	42(0.8)	17.53***	39.9	68.9

Figures in parentheses represent percentages. CFR, Case Fatality Rate; “***”, indicates significant at 0.001, “**”, indicates significant at 0.01, “*”, indicates significant at 0.05; NS, Non-significant.

Supplementary Table 2. Estimated Incremental Benefit-Cost Ratio (IBCR) under different vaccination coverage scenarios in Madhya Pradesh

Year	Disease incidence with vaccination (%) $\Delta_1 I$	Disease incidence without vaccination (%) $\Delta_2 I$	Incremental disease incidence $\Delta I = (\Delta_2 I - \Delta_1 I)$	Projected population (million)	Total avoided loss (₹ million) [A]	Vaccine effectiveness (%) [B]	Incremental benefits (₹ million) $C=A*B$	Vaccination coverage (%) [D]	Increased vaccination coverage (%) [E]	Incremental animals vaccinated (No. in million) [F]	Incremental vaccination cost (₹ million) $G=(F*K)$	IBCR $[H= C/G]$
<i>Scenario-I (actual vaccination coverage)</i>												
2015-16	19.5	19.5	-	9.52	0	80	-	29	-	-	-	
2016-17	13.4	19.5	6.1	9.96	1071	80	854	80	51	4.57	105	
2017-18	7.3	19.5	12.2	10.41	2303	80	1841	31	2	0.19	7	
2018-19	1.2	19.5	18.3	10.89	6398	80	5117	4.1 [†]	-	-	-	
Total							7812		Total		112	69.8
<i>Scenario-II (as per PPR-CP strategy (100%, 60%, and 60%), assuming zero incidence level)</i>												
2015-16	19.5	19.5	-	9.52	0	-	-	29	-	-	-	
2016-17	0	19.5	19.5	9.96	3465	80	2772	100	71	6.36	147	
2017-18	0	19.5	19.5	10.41	3500	80	2800	60	31	2.91	63	
2018-19	0	19.5	19.5	10.89	6818	80	5453	60	31	3.04	70	
Total							11025		Total		280	39.4

Total loss (A) includes mortality loss, weight loss, distress sale loss, treatment cost, and extra labour cost. Incremental vaccination coverage (E) was calculated for three years (2016-17, 2017-18 and 2018-19) by differencing vaccination coverage of respective year from the base year (2015-16). Less than 4 months old animals are not vaccinated and hence (F) was calculated based on 90% projected sheep and goat population (at a given time 10% of the animals were assumed to be in less than 4 months old category). “†” since vaccination coverage was less during 2018-19, it was not considered for incremental vaccination cost calculation. The incremental vaccination cost (G) per year was calculated based on the vaccinated population in the respective year and vaccination cost per dose (K) (₹ 22.66) estimated at 2018-19 constant price based on Consumer Price Index (CPI) values.