



**Table S1.** Effect of dexmedetomidine (D group) or dexmedetomidine–nalbuphine combination (DN group) on red blood cells (RBCs) count, hemoglobin (Hb), and packed cell volume (PCV) variables for Jacks undergoing surgical castration using a linear mixed effects model.

Predictors	RBCs ( $\times 10^6$ cells/ $\mu$ L)			Hb (g/dL)			PCV (%)		
Fixed effects	Odds ratio	95% CI	<i>p</i> -value	Odds ratio	95% CI	<i>p</i> -value	Odds ratio	95% CI	<i>p</i> -value
Intercept	5.47	4.76–6.17	<0.001	9.47	8.67–10.26	<0.001	33.33	28.95–37.71	<0.001
DN	0.00	−1.00–1.00	0.995	0.03	−1.09–1.16	0.952	0.20	−5.99–6.39	0.948
T (pre)	0.15	−0.85–1.15	0.763	0.20	−0.91–1.31	0.718	1.33	−4.69–7.36	0.657
T5	0.10	−0.90–1.10	0.841	−0.05	−1.16–1.06	0.928	1.33	−4.69–7.36	0.657
T15	0.13	−0.87–1.13	0.789	0.07	−1.04–1.18	0.904	2.33	−3.69–8.36	0.439
T30	−0.20	−1.20–0.80	0.683	−0.27	−1.38–0.84	0.631	0.00	−6.02–6.02	1.000
T (recovery)	−0.34	−1.34–0.66	0.500	−0.40	−1.51–0.71	0.472	−0.77	−6.79–5.26	0.799
PR $\frac{1}{2}$	−0.22	−1.22–0.78	0.659	−0.17	−1.28–0.94	0.764	0.00	−6.02–6.02	1.000
PR 1	−0.30	−1.30–0.70	0.543	−0.07	−1.18–1.04	0.904	−0.03	−6.06–5.99	0.991
PR 2	−0.07	−1.07–0.93	0.893	0.23	−0.88–1.34	0.674	0.07	−5.96–6.09	0.982
PR 4	0.18	−0.82–1.18	0.720	0.30	−0.81–1.41	0.589	1.50	−4.52–7.52	0.618
PR 6	−0.07		0.893	0.13	−0.98–1.24	0.810	0.83	−5.19–6.86	0.781
DN $\times$ T (pre)	−0.11	−1.53–1.30	0.872	−0.10	−1.67–1.47	0.898	−0.53	−9.05–7.99	0.900
DN $\times$ T5	0.03	−1.39–1.44	0.970	0.32	−1.25–1.89	0.680	0.63	−7.89–9.15	0.881
DN $\times$ T15	−0.24	−1.65–1.18	0.737	−0.17	−1.74–1.40	0.832	−1.37	−9.89–7.15	0.748
DN $\times$ T30	0.02	−1.39–1.43	0.977	−0.00	−1.57–1.57	1.000	0.90	−7.62–9.42	0.832
DN $\times$ T (recovery)	0.18	−1.23–1.60	0.795	0.23	−1.34–1.80	0.766	1.57	−6.95–10.09	0.712
DN $\times$ PR $\frac{1}{2}$	0.15	−1.26–1.56	0.831	0.13	−1.44–1.70	0.865	1.63	−6.89–10.15	0.701
DN $\times$ PR 1	0.13	−1.28–1.55	0.850	0.23	−1.34–1.80	0.766	1.50	−7.02–10.02	0.724
DN $\times$ PR 2	−0.20	−1.61–1.22	0.780	−0.07	−1.64–1.50	0.932	1.40	−7.12–9.92	0.742
DN $\times$ PR 4	−0.38	−1.79–1.03	0.588	−0.40	−1.97–1.17	0.610	0.30	−8.22–8.82	0.944
DN $\times$ PR 6	−0.09	−1.50–1.32	0.898	0.03	−1.54–1.60	0.966	1.13	−7.39–9.65	0.790
Random Effects									
$\sigma^2$		0.37			0.45			13.36	
$\tau_{00}$ group		0.00			0.00			0.26	
ICC		0.00			0.01			0.02	
Marginal $R^2$ / Conditional $R^2$	0.059/0.060			0.072/0.078			0.052/0.070		

T (pre): 10 minutes following premedication; T5, T15, and T30: 5, 15, and 30 minutes following the induction of general anesthesia, respectively; T (recovery): recovery time; PR $\frac{1}{2}$ :  $\frac{1}{2}$  hour after recovery; PR 1: 1 hour after recovery; PR 2: 2 hours after recovery; PR 4: 4 hours after recovery; PR 6: 6 hours after recovery; CI: confidence intervals, and ICC: intra-class correlation.

**Table S2.** Effect of dexmedetomidine (D group) or dexmedetomidine–nalbuphine combination (DN group) on aspartate aminotransferase (AST) and creatinine variables for Jacks undergoing surgical castration using a linear mixed effects model.

Predictors		AST (U/L)		Creatinine (mg/dL)		
Fixed effects	Odds ratio	95% CI	<i>p</i> -value	Odds ratio	95% CI	<i>p</i> -value
Intercept	219.50	196.33–242.67	<0.001	1.04	0.87–1.21	<0.001
DN	0.50	–32.27–33.27	0.976	0.03	–0.21–0.26	0.824
T (pre)	–11.00	–39.60–17.60	0.447	–0.08	–0.25–0.09	0.342
T5	–0.50	–29.10–28.10	0.972	–0.12	–0.29–0.05	0.155
T15	4.00	–25.87–33.87	0.791	–0.06	–0.23–0.11	0.494
T30	–1.00	–29.60–27.60	0.945	–0.02	–0.18–0.15	0.843
T (recovery)	–1.05	–30.92–28.82	0.944	–0.00	–0.18–0.17	0.955
PR ½	–2.35	–32.22–27.52	0.876	–0.04	–0.22–0.13	0.608
PR 1	–4.05	–33.92–25.82	0.788	–0.12	–0.29–0.05	0.178
PR 2	–4.40	–34.27–25.47	0.771	–0.09	–0.26–0.08	0.306
PR 4	–5.10	–34.97–24.77	0.735	–0.07	–0.24–0.10	0.434
PR 6	–6.15	–36.02–23.72	0.684	–0.06	–0.23–0.11	0.486
DN× T (pre)	14.15	–26.30–54.60	0.489	0.16	–0.08–0.39	0.183
DN× T5	6.00	–34.45–46.45	0.769	0.17	–0.06–0.41	0.146
DN× T15	4.00	–38.24–46.24	0.851	0.12	–0.12–0.37	0.325
DN × T30	3.50	–36.95–43.95	0.864	0.02	–0.21–0.26	0.852
DN× T (recovery)	2.70	–39.54–44.94	0.899	–0.00	–0.25–0.24	0.976
DN × PR ½	3.85	–38.39–46.09	0.857	0.06	–0.19–0.30	0.643
DN× PR 1	4.35	–37.89–46.59	0.838	0.07	–0.17–0.32	0.559
DN× PR 2	2.65	–39.59–44.89	0.901	0.10	–0.15–0.35	0.421
DN× PR 4	1.60	–40.64–43.84	0.940	0.10	–0.15–0.34	0.433
DN× PR 6	4.65	–37.59–46.89	0.827	0.06	–0.19–0.30	0.642
Random Effects						
$\sigma^2$		565.50			0.02	
$\tau_{00}$ group		22.99			0.00	
ICC		0.04			0.14	
Marginal R <sup>2</sup> / Conditional R <sup>2</sup>		0.031/0.069			0.161/0.278	

T (pre): 10 minutes following premedication; T5, T15, and T30: 5, 15, and 30 minutes following the induction of general anesthesia, respectively; T (recovery): recovery time; PR½: ½ hour after recovery; PR 1: 1 hour after recovery; PR 2: 2 hours after recovery; PR 4: 4 hours after recovery; PR 6: 6 hours after recovery; CI: confidence intervals, and ICC: intra–class correlation.