Supplementary material

Table S1: Standard doses of drugs, based on body mass used for white rhinoceros in Study 1. Animals were weighed by encouraging them to enter a crate, which was then weighed using a crane balance during the 4-6 week habituation period and at the end of each immobilization trial. Rhinoceros weighed on average 1145 ± 75 kg (mean ± standard deviation).

Rhinoceros body mass (kg)	**Etorphine (mg)[a]**	**Butorphanol (mg)[b]**	**Naltrexone (mg)[c]**
1000 - 1250	2.5	25	50
1250 - 1500	3.125	31.25	62.5

[a]Etorphine (0.02 mg/kg)
[b]Butorphanol (10× etorphine dose, mg)
[c]Naltrexone (20× etorphine dose, mg)

Table S2: Standard doses of drugs, based on body mass used for white rhinoceros in Study 2. Rhinoceros weighed on average 1311 ± 115 kg (mean ± standard deviation).

Rhinoceros body mass (kg)	**Etorphine (mg)[a]**	**Azaperone (mg)[b]**	**Midazolam (mg)[c]**	**Medetomidine (mg)[d]**	**Butorphanol (mg)[e]**	**Naltrexone (mg)[f]**
750 -1000	2.0	10.0	10.0	5.0	40	40
1000 -1250	2.5	12.5	12.0	6.25	50	50
1250 – 1500	3.0	15.0	15.0	7.5	60	60

[a]Etorphine (0.002 mg/kg)
[b]Azaperone (0.01 mg/kg)
[c]Midazolam (0.01 mg/kg)
[d]Medetomidine (0.005 mg/kg)
[e]Butorphanol (10×etorphine dose)
[f]Naltrexone (20×etorphine dose)

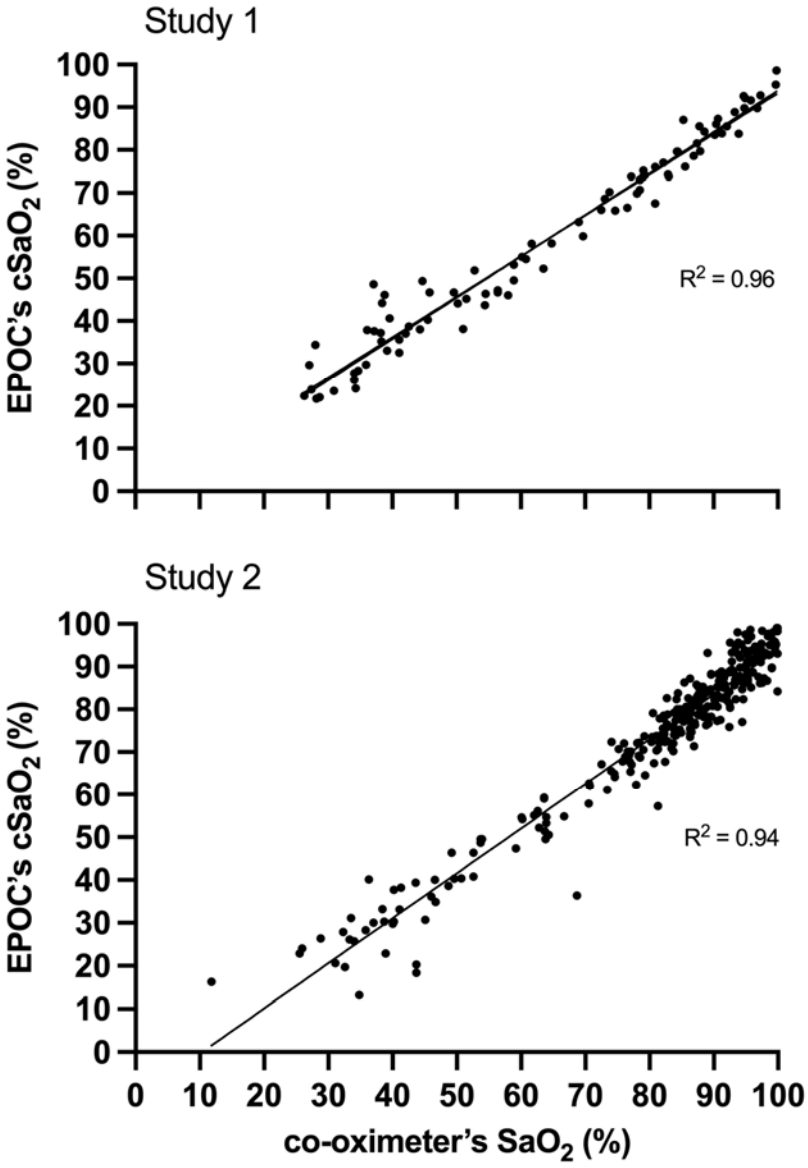

Figure S1: Calculated arterial oxygen-hemoglobin saturations ($cSaO_2$) obtained from the EPOC blood gas analyser plotted against arterial oxygen-hemoglobin saturations (SaO_2) measured by the AVOXimeter 4000 co-oximeter in 8 immobilized white rhinoceros in Study 1 and a further 8 individuals in Study 2. The R^2 values for Study 1 (n =89) and Study 2 (n = 300) are 0.96 and 0.94, respectively.

Table S3: Deming (Model II) Linear Regression between calculated arterial oxygen haemoglobin saturations ($cSaO_2$) obtained from the EPOC blood gas analyser and arterial oxygen haemoglobin saturations (SaO_2) measured by the AVOXimeter 4000 co-oximeter in 8 immobilized white rhinoceros in Study 1 (n = 89) .

Slope	0.9691
Y-intercept	-3.022
X-intercept	3.118
1/slope	1.032
Slope standard error	0.01939
Y-intercept standard error	1.524
Slope 95% CI	0.9305 to 1.008
Y-intercept 95% CI	-6.051 to 0.007066
F statistics	2290
DFn, DFd	1, 87
P value	<0.0001
Deviation from zero?	Significant
Equation	$cSaO_2 = 0.9691*SaO_2 - 3.022$

Table S4: Deming (Model II) Linear Regression between calculated arterial oxygen haemoglobin saturations ($cSaO_2$) obtained from the EPOC blood gas analyser and arterial oxygen haemoglobin saturations (SaO_2) measured by the AVOXimeter 4000 co-oximeter in 8 immobilized white rhinoceros in Study 2 (n= 300).

Slope	1.082
Y-intercept	-13.56
X-intercept	12.54
1/slope	0.9246
Slope standard error	0.02385
Y-intercept standard error	2.070
Slope 95% CI	1.035 to 1.129
Y-intercept 95% CI	-17.64 to -9.491
F statistics	4941
DFn, DFd	1, 298
P value	<0.0001
Deviation from zero?	Significant
Equation	$cSaO_2 = 1.082*SaO_2 - 13.56$

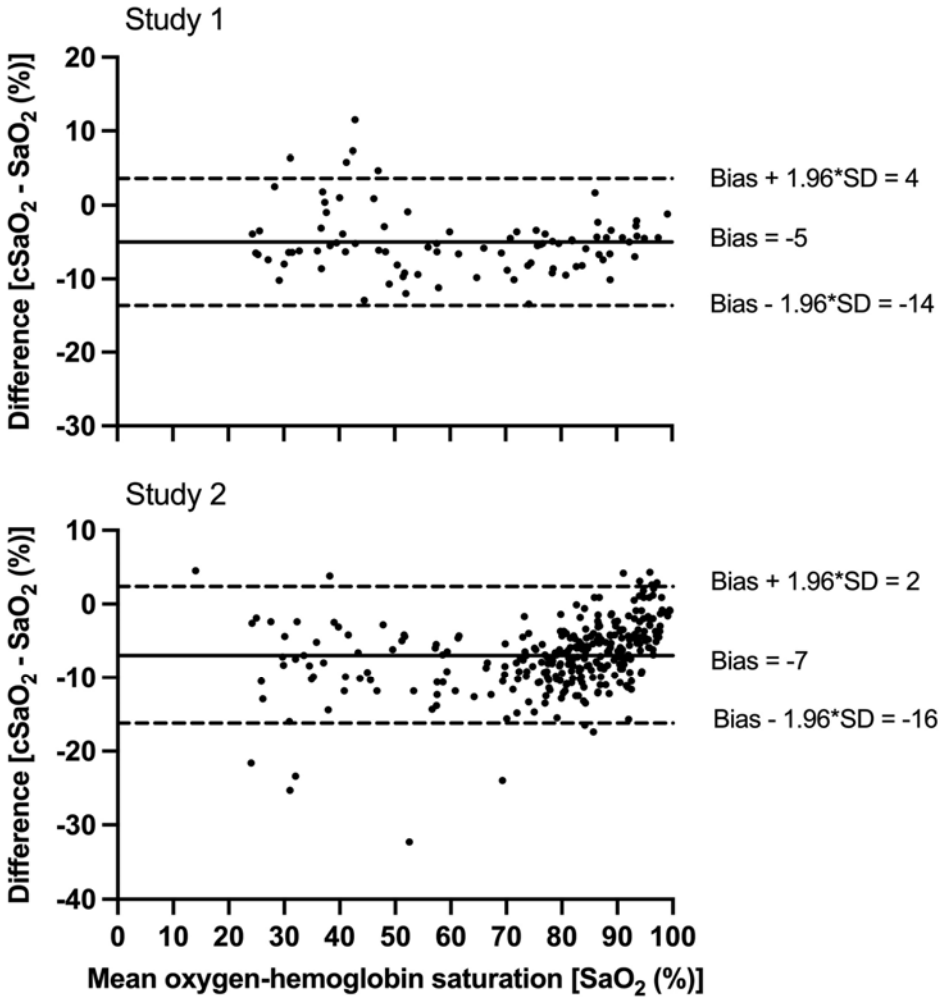

Figure S2: Bland-Altman plots, showing poor agreement between the EPOC's calculated arterial oxygen-hemoglobin saturation ($cSaO_2$) and the co-oximeter's measured arterial oxygen-hemoglobin saturation (SaO_2) in 8 immobilized white rhinoceros used in Study 1 and a further 8 individuals in Study 2. The difference between $cSaO_2$ and SaO_2 is plotted against the mean arterial oxygen-hemoglobin saturation values obtained from the EPOC and the co-oximeter ($cSaO_2$ and SaO_2) along the entire saturation range. The bias is represented by the solid line and the limits of agreement (bias ± 1.96×SD) are represented by the dashed lines. Each datum point represents the difference in the paired $cSaO_2$-SaO_2 measurements taken from the rhinoceros.

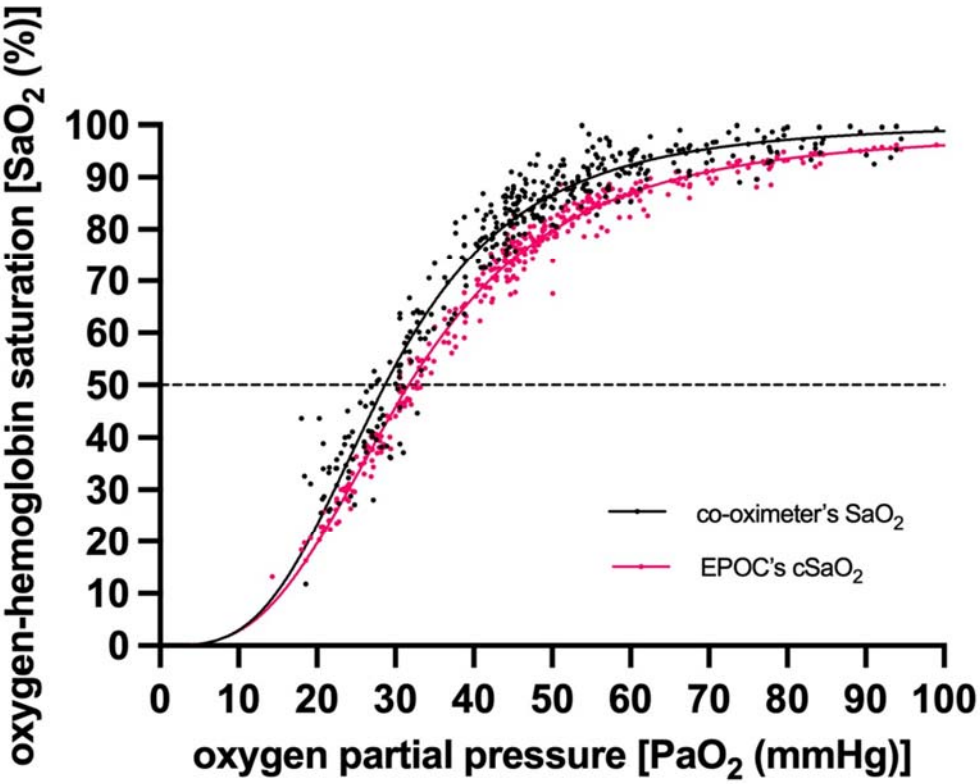

Figure S3: Relationship between arterial oxygen partial pressure (PaO_2) and the EPOC's calculated arterial oxygen-hemoglobin saturation ($cSaO_2$) and co-oximeter's arterial oxygen-hemoglobin saturation (SaO_2) at a pH of 7.3 ± 0.1 (mean ± standard deviation), dissolved arterial CO_2 partial pressure ($PaCO_2$) of 73.7 ± 10.5 mmHg, body temperature of 37.4 ± 1.8°C, bicarbonate ion concentration of 35.5 ± 2.8 mmol/L and chloride ion concentration of 93.0 ± 4.7 mmol/L. The data were plotted and a specific binding with Hill slope model was applied. The dashed line at 50% SaO_2 helps visualize the arterial oxygen partial pressure at which haemoglobin is 50% saturated with oxygen (p50) according to the two curves. Note that a decrease in pH and an increase in $PaCO_2$ leads to a right-shift in both the EPOC's $cSaO_2$ oxygen-hemoglobin dissociation curve (p50 ~ 32 mmHg) and the co-oximeter's SaO_2 oxygen-hemoglobin dissociation curve (p50 ~ 29 mmHg).