

Behavioural and electroencephalographic assessment of captive-bolt stunning in kangaroo pouch young:

Supplementary material

Table S1. Performance characteristics of potentially suitable captive-bolt devices.

	Captive Bolt Model						
	TED	CASH® SAT (or CPK)	CASH® Special	Zephyr EXL	Blitz Schlag	Kleiner Blitz	Blitz Kerner
Manufacturer	Bock Industries	Accles & Shelvoke	Accles & Shelvoke	Bock Industries	turbocut Jopp GmbH	turbocut Jopp GmbH	turbocut Jopp GmbH
Type	Non-penetrating	Non-penetrating	Penetrating	Non-penetrating	Non-penetrating	Penetrating	Penetrating
Energy source	Propane gas	Cartridge	Cartridge	Compressed air	Cartridge	Cartridge	Cartridge
Powerload	N/A	1gr brown .22	1gr brown .22	110psi	Green ^D 9x17mm	Green ^D 9x17mm	Green ^D 9x17mm
Bolt mass (g)	61	179	211	69	248	209	209
Mean Peak Velocity (±SD) (m/s)	30.4 (±0.2)	29.3 (±1.0)	29.8 (±1.2)	26.5 (±0.4)	32.6 (±2.9)	45.3 (±0.5)	47.4 (±0.7)
Mean Kinetic Energy (±SD) (J)	28.4 (±0.4)	77.1 (±5.0)	93.9 (±7.5)	24.2 (±0.7)	131.8 (±1.0)	214.3 (±5.2)	234.8 (±7.2)
Penetration depth or maximum bolt travel distance (±SD) (mm)	11.7 (with adapter #1) ^A	50 ^A	74.0 (±5.1) ^B	27.2 ^A	10 ^A 18.5 ^C	52 ^A	82 ^A 65 ^B

Notes. Highlighted in blue are the captive bolt devices chosen for pilot testing, the other three are shown for comparison

A=supplied by manufacturer, B=tested in ballistic gel, C=tested in modelling clay, D=Nominal powerload unavailable from manufacturers

Table S2 Cartridge weight loss for Blitz Kerner, Blitz Schlag and CASH® SAT.

CBD	Mean (± SD) cartridge weight loss (g)	Weight loss range (g)	n
Blitz Kerner	0.1593 (± 0.0010)	0.15740 - 1616	20
Blitz Schlag	0.1579 (± 0.0012)	0.1566 - 0.1604	13
CASH® SAT	0.1918 (± 0.0043)	0.1854 - 0.1951	5

Table S3 Macroscopic damage observed in brain structures in the seven red kangaroo (*Osphranter rufus*) pouch young shot with a non-penetrating CBD that had signs of *incomplete* concussion.

Damage to	Severity of damage (%)			
	None (n)	Mild (n)	Moderate (n)	Severe (n)
Thalamus	15 (1)	15 (1)	0 (--)	70 (5)
Midbrain	15 (1)	15 (1)	30 (2)	40 (3)
Pons	15 (1)	70 (5)	15 (1)	0 (--)
Medulla	15 (1)	85 (6)	0 (--)	0 (--)
Cerebellum	0 (--)	30 (2)	30 (2)	40 (3)
Frontal lobe	0 (--)	0 (--)	30 (2)	70 (5)
Temporal lobe	55 (4)	15 (1)	30 (2)	0 (--)
Parietal lobe	0 (--)	0 (--)	0 (--)	100 (7)
Occipital lobe	0 (--)	0 (--)	15 (1)	85 (6)

Table S4. Macroscopic damage observed in brain structures in the 22 red kangaroo (*Osphranter rufus*) pouch young successfully *stunned* with a non-penetrating CBD.

Damage to	Severity of damage (%)			
	None (n)	Mild (n)	Moderate (n)	Severe (n)
Thalamus	0 (--)	14 (3)	45 (10)	41 (9)
Midbrain	9 (2)	27 (6)	32 (7)	32 (7)
Pons	36 (8)	23 (5)	27 (6)	14 (3)
Medulla	41 (9)	32 (7)	18 (4)	9 (2)
Cerebellum	0 (--)	5 (1)	23 (5)	73 (16)
Frontal lobe	0 (--)	9 (2)	18 (4)	73 (16)
Temporal lobe	64 (14)	27 (6)	5 (1)	5 (1)
Parietal lobe	0 (--)	0 (--)	18 (4)	82 (18)
Occipital lobe	0 (--)	0 (--)	14 (3)	86 (19)