

REFERENCE VALUES

HORSE, DONKEY, ALPACA, LLAMA



Haematology

Blood count	Unit	Horse	Donkey	Alpaca	Llama
Erythrocytes	T/l	6.0 – 12.0	4.4 – 7.1	9.4 – 18.1	9.9 – 17.7
Haematocrit	l/l	0.30 – 0.5	0.27 – 0.42	0.22 – 0.45	0.25 – 0.46
Haemoglobin	g/l	110 – 170	89 – 147	102 – 193	115 – 195
Leukocytes	G/l	5 – 10	6.2 – 15	7.1 – 18.6	8.9 – 22.4
Neutrophils	%	45 – 70	23 – 59	49 – 65	-
Lymphocytes	%	20 – 45	34 – 69	21 – 25	-
Monocytes	%	0 – 5	1 – 8	0 – 5	-
Eosinophils	%	0 – 4	1 – 9	6 – 22	-
Basophils	%	0 – 2	0 – 0.5	0 – 0.5	-
Bands	%	0 – 6	0	0	-
Hypochromasia		neg.	neg.	neg.	neg.
Anisocytosis		neg.	neg.	neg.	neg.
Thrombocytes	G/l	90 – 300	95 – 384	200 – 600	200 – 600

Differential blood count	Unit	Horse	Donkey	Alpaca	Llama
Neutrophils	G/l	3 – 7	2.4 – 6.3	3.5 – 12.1	4.6 – 16
Lymphocytes	G/l	1.5 – 4	2.2 – 9.6	1.5 – 4.7	0.7 – 4.8
Monocytes	G/l	0.04 – 0.4	0 – 0.75	0 – 0.9	0 – 1
Eosinophils	G/l	0.04 – 0.3	0.1 – 0.9	0.4 – 4.0	0 – 3.3
Basophils	G/l	0 – 0.15	0 – 0.07	0 – 0.1	0 – 0.3
Bands	G/l	0 – 0.6	0	0	0 – 0.15

Clinical Chemistry

Enzymes 37 °C	Unit	Horse	Donkey	Alpaca	Llama
ALT (GPT)	U/l	< 43	< 70	< 93	< 93
α-Amylase	U/l	< 50	7.5 – 170	< 161	< 161
α-HBDH	U/l	< 221	86 – 265	< 700	< 700
AP	U/l	< 352	< 252	< 269	< 192
AST (GOT)	U/l	< 568	< 536	< 370	< 330
Cholinesterase	U/l	> 2344	1500 – 3000	78 – 156	78 – 156
CK	U/l	< 452	< 525	< 238	< 238
GLDH	U/l	< 13	< 8	< 50	< 50
γ-GT	U/l	< 44	< 70	< 75	< 45
LDH	U/l	< 455	< 538	< 900	< 700
Lipase	U/l	< 20	< 250	2 – 8	2 – 8

Substrates	Unit	Horse	Donkey	Alpaca	Llama
Albumin	g/l	25 – 54	22 – 32	29 – 43	29 – 50
β-HBS	mmol/l	< 0.6	< 0.6	< 0.6	< 0.6
Total bilirubin	µmol/l	8.6 – 59.9	0.1 – 3.7	0 – 6.8	0 – 8.6
Direct bilirubin	µmol/l	< 49.3	-	0.34 – 3.42	0.34 – 3.42
Cholesterol	mmol/l	1.8 – 4.7	1.4 – 2.9	0.4 – 2.3	0.34 – 2.3
Fructosamine	µmol/l	< 360	< 280 (prelim.)	-	-
Bile acids	µmol/l	< 12	2.6 – 18.6	-	-
Total protein	g/l	55 – 75	58 – 76	57 – 72	47 – 73
Glucose	mmol/l	3.1 – 5.0	3.9 – 4.7	5.7 – 8.3	5.7 – 7.0
Globulins	g/l	< 51	< 37	< 31	< 32
Urea	mmol/l	3.3 – 6.7	1.5 – 5.2	3.6 – 10.1	3.2 – 12.8
Creatinine	µmol/l	71 – 159	53 – 118	88 – 212	80 – 248
Lactate	mmol/l	0.5 – 2.0	0.5 – 2.0	0.5 – 3.0	0.5 – 3.0
NEFA	mmol/l	0.1 – 0.5	0.1 – 0.5 (prelim.)	0.1 – 0.5	0.1 – 0.5
SDMA	µmol/l	< 0.75	-	-	-
Triglycerides	mmol/l	0.97	0.6 – 2.8	< 0.6	< 0.27
SAA ¹	µg/ml	< 7	< 7	< 7	-

¹ Minimal increases (7 – 20 µg/ml) can indicate an initial inflammatory reaction, but may also occur in non-clinically relevant ranges following transportation, great strain, stress, or vaccination. 10 – 1000 fold increases are expected in cases of inflammation.
² The measured values in the last month of donkey pregnancy can sometimes go down to 2 – 5 ng/ml.
³ During the last 30 days before parturition, the oestrone sulphate levels rise considerably to values as high as > 4 ng/ml.

Clinical Chemistry

Electrolytes & Minerals	Unit	Horse	Donkey	Alpaca	Llama
Calcium	mmol/l	2.5 – 3.4	2.2 – 3.4	2.1 – 2.5	1.9 – 2.7
Chloride	mmol/l	95 – 105	96 – 106	109 – 141	105 – 130
Iron	µmol/l	17.9 – 64.5	6.4 – 25.5	18.8 – 37.4	18.6 – 30.8
Potassium (K)	mmol/l	2.8 – 4.5	3.2 – 5.1	4.0 – 5.7	3.6 – 6.2
Copper	µmol/l	7.9 – 21.0	9.4 – 18.4	2.1 – 12.5	6.1 – 7.9
Magnesium	mmol/l	0.5 – 0.9	0.68 – 1.1	0.7 – 1.0	0.8 – 1.1
Manganese	µg/l	1.11 – 2.96	< 20.0	< 20.0	< 20.0
Sodium (Na)	mmol/l	125 – 150	128 – 138	146 – 155	148 – 158
Phosphate	mmol/l	0.7 – 1.5	0.87 – 1.97	1.1 – 2.5	1.5 – 3.6
Selenium	µg/l	100 – 200	50.6 – 179.2	> 99	> 99
Zinc	µmol/l	9.2 – 19.9	3.3 – 14.1	3.0 – 14.6	4.1 – 12.4

Endocrinology

Substrates	Unit	Horse	Donkey	Alpaca	Llama
T4	µg/dl	1.3 – 4.1	3.28 – 3.78	3.4 – 8.2	3.4 – 8.2
ftT4	pmol/l	9.0 – 44.9	9.0 – 44.9	-	-
T3	ng/ml	25 – 180	64.7 – 70.0	-	-
ftT3	pmol/l	1.1 – 7.2	-	-	-
Oestrone sulphate	ng/ml	Pregnancy from day 110: > 100	Pregnancy from day 110: > 100 ²	-	Pregnancy: > 0.4 ³
Oestradiol	pg/ml	Proestrus: 1.2 – 6.2 Oestrus: 7.1 – 13.0 Dioestrus: 3.7 – 5.0	-	-	-
Progesterone	ng/ml	Corpus luteum function ⁴ : >/= 1	-	not pregnant: < 1 questionable ⁵ : 1 – 2 pregnant ⁶ (from 3 weeks after breeding): > 2	not pregnant: < 1 questionable ⁵ : 1 – 2 pregnant ⁶ (from 3 weeks after breeding): > 2
Testosterone	ng/ml	Male: 1 – 5 M-neutered: < 0.04 Female: < 0.04	Male: 1 – 5 M-neutered: < 0.04 Female: < 0.04	-	-
Anti-Müllerian Hormone	ng/ml	Female: physiological: < 4 borderline: 4 – 7 indicative for a granulosa cell tumour: > 7 Male: neutered: < 0.1 borderline: 0.1 – 2 testicular tissue present: > 2	-	-	-
Cortisol	ng/ml	30 – 70	30 – 67	2 – 50	2 – 50
Insulin	µU/ml	< 20	< 20	-	-
ACTH	pg/ml	Mid Nov. until mid July: negative: < 30 borderline: 30 – 50 positive: > 50 Mid July to mid Nov.: negative: < 50 borderline: 50 – 100 positive: > 100	Mid Nov. until mid July: negative: < 30 borderline: 30 – 50 positive: > 50 Mid July to mid Nov.: negative: < 50 borderline: 50 – 100 positive: > 100	-	-

⁴ The test cannot distinguish cycle and pregnancy corpus luteum.
⁵ Inconclusive results should be rechecked after 2 – 3 weeks, since spontaneous ovulation without breeding is possible.
⁶ The progesterone value declines steeply in the last 7 – 10 days before the birth.