ANIMAL

JOHNNY

Breed: Canaan dog x Belgian Malinois

Canine | Male | 3 years | 30 kg

OPTICAL DENSITY (OD)

OD 60

Lab scale: 0 dark - 100 white

Colour correction applied

Calcium (Ca)

Ca

568

µg/g

Below interval

Interval: 700-4000

Magnesium (Mg)

Mg

95.5

µg/g

Below interval

Interval: 100-470

KEY FINDINGS & FOLLOW-UP

Elemental profile

Ca 568 and Mg 95.5 µg/g are below their comparison bounds. These two flags need context; see the explanation below.

Dietary context

Assess the complete daily ration, including treats and supplements, before deciding whether mineral intake needs adjustment.

Quantification

Cd, Pt, Tl and U are <0.006 µg/g; Be is <0.003 µg/g. These are below-quantification results, not zero concentrations.

RESULTS & INTERPRETATION

ELEMENTAL FINDINGS

Ca and Mg fall below their comparison intervals. No reported numeric value exceeds an upper bound. Five results are reported < LOQ.

Elemental comparisons describe the sample; they are not health or organ-function scores.

CONCLUSION & ACTION PLAN

Review the daily ration before adding minerals.

Ca and Mg are below their fur comparison intervals. Dietary assessment can check intake; these values alone do not establish a deficiency.

1 Prepare the diet history

List the food or recipe, daily quantities, treats and all supplements with their doses. [4]

2 Assess mineral supply with the vet

Check calcium and magnesium supply in the full ration. Do not add minerals from these fur results alone.

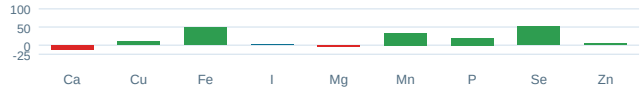
3 Agree a follow-up if needed

If diet or clinical findings raise concern, agree targeted tests with the vet. Repeat fur sampling for a defined question.

SELECTED MINERAL PROFILE

Element	µg/g	Interval (µg/g)	Comparison
Calcium (Ca)	**568**	700 - 4000	Below
Copper (Cu)	**8.06**	7 - 30	Inside
Iron (Fe)	**116**	25 - 600	Inside
Iodine (I)	**0.21**	0.2 - 2	Method note
Magnesium (Mg)	**95.5**	100 - 470	Below
Manganese (Mn)	**2.94**	1 - 25	Inside
Phosphorus (P)	**276**	220 - 700	Inside
Selenium (Se)	**0.808**	0.3 - 2	Inside
Zinc (Zn)	**95.0**	90 - 300	Inside

Log position within the interval (%)



EXPOSURE ELEMENTS

Element	µg/g	Upper (µg/g)	Comparison
Aluminium (Al)	**98.8**	430	Below upper
Arsenic (As)	**0.046**	1	Below upper
Cadmium (Cd)	**<0.006**	0.2	< LOQ
Mercury (Hg)	**0.194**	0.4	Method note
Nickel (Ni)	**2.45**	4	Below upper
Lead (Pb)	**0.150**	5	Below upper

These comparison bounds are not toxicity thresholds. Quantification and mercury notes: page 4.

WHY TWO FLAGS NEED CONTEXT

Calcium 568 | Magnesium 95.5 µg/g

Across 40 comparisons, about **1-2 values would fall outside on average** if each interval covered 95-97.5% of the relevant healthy population. This coverage is not established for our panel. [2]

This does not establish that JOHNNY's two flags are chance findings. Interpret their size, uncertainty, diet and clinical context.

LONGITUDINAL FOLLOW-UP

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Individual baseline

Retain the ration, supplements, OD, sampling site and collection / receipt dates.

Repeat for a defined follow-up question, with comparable collection and preparation. One sample does not establish a trend.

FOLLOW-UP AT A GLANCE

N **Diet history**
Provide food quantities and supplement doses.

V **Dietary assessment**
Have the vet assess calcium and magnesium intake.

M **Mineral supplements**
Only if a nutritional or clinical need is identified.

S **Further assessment**
Target testing to diet review or clinical findings.

ALL ELEMENTS - VALUES AND LIMITS

The green zone represents each elemental interval.

Animal

JOHNNY

Comparison interval · Inside interval · Below / above · < LOQ / note

Silver (Ag)	0.014 µg/g 0 - 2 µg/g		Inside
Aluminium (Al)	98.8 µg/g 0 - 430 µg/g		Inside
Arsenic (As)	0.046 µg/g 0 - 1 µg/g		Inside
Gold (Au)	0.047 µg/g 0 - 2 µg/g		Inside
Boron (B)	1.25 µg/g 0 - 5 µg/g		Inside
Barium (Ba)	0.846 µg/g 0 - 10 µg/g		Inside
Beryllium (Be)	<0.003 µg/g 0 - 0.1 µg/g	< LOQ	< LOQ
Bismuth (Bi)	0.018 µg/g 0 - 0.2 µg/g		Inside
Calcium (Ca)	568 µg/g 700 - 4000 µg/g		Below
Cadmium (Cd)	<0.006 µg/g 0 - 0.2 µg/g	< LOQ	< LOQ
Cerium (Ce)	0.227 µg/g 0 - 1 µg/g		Inside
Cobalt (Co)	0.050 µg/g 0.02 - 1 µg/g		Inside
Chromium (Cr)	0.421 µg/g 0.1 - 2.5 µg/g		Inside
Copper (Cu)	8.06 µg/g 7 - 30 µg/g		Inside
Iron (Fe)	116 µg/g 25 - 600 µg/g		Inside
Gallium (Ga)	0.038 µg/g 0 - 0.25 µg/g		Inside
Germanium (Ge)	0.024 µg/g 0 - 0.25 µg/g		Inside
Mercury (Hg)	0.194 µg/g 0 - 0.4 µg/g		Method note
Iodine (I)	0.21 µg/g 0.2 - 2 µg/g		Method note
Potassium (K)	422 µg/g 100 - 2500 µg/g		Inside

Lanthanum (La)	0.103 µg/g 0 - 2 µg/g		Inside
Lithium (Li)	0.062 µg/g 0 - 1 µg/g		Inside
Magnesium (Mg)	95.5 µg/g 100 - 470 µg/g		Below
Manganese (Mn)	2.94 µg/g 1 - 25 µg/g		Inside
Molybdenum (Mo)	0.031 µg/g 0 - 1 µg/g		Inside
Sodium (Na)	2,210 µg/g 700 - 10000 µg/g		Inside
Nickel (Ni)	2.45 µg/g 0 - 4 µg/g		Inside
Phosphorus (P)	276 µg/g 220 - 700 µg/g		Inside
Lead (Pb)	0.150 µg/g 0 - 5 µg/g		Inside
Platinum (Pt)	<0.006 µg/g 0 - 2 µg/g	< LOQ	< LOQ
Sulfur (S)	36,500 µg/g 25000 - 50000 µg/g		Inside
Antimony (Sb)	0.015 µg/g 0 - 0.5 µg/g		Inside
Selenium (Se)	0.808 µg/g 0.3 - 2 µg/g		Inside
Silicon (Si)	21 µg/g 20 - 600 µg/g		Inside
Tin (Sn)	0.151 µg/g 0 - 1 µg/g		Inside
Strontium (Sr)	1.17 µg/g 0 - 10 µg/g		Inside
Thallium (Tl)	<0.006 µg/g 0 - 0.1 µg/g	< LOQ	< LOQ
Uranium (U)	<0.006 µg/g 0 - 0.1 µg/g	< LOQ	< LOQ
Vanadium (V)	0.153 µg/g 0 - 1.2 µg/g		Inside
Zinc (Zn)	95.0 µg/g 90 - 300 µg/g		Inside

Positions: logarithmic for positive lower limits; linear for zero limits. Green = interval, not a clinical diagnosis.
< LOQ: below quantification; no exact value plotted. Iodine and mercury: analytical and clinical scope on page 4.

Summary

JOHNNY has two results below their comparison intervals: calcium 568 µg/g against 700-4000 and magnesium 95.5 µg/g against 100-470. No reported numeric value exceeds an elemental upper bound. Five results are reported < LOQ. Fe/Cu 14.39 is descriptive, with no clinical classification.

MAIN FINDINGS

Mineral profile | Calcium and magnesium

Ca 568 | Mg 95.5 | P 276 µg/g

Ca and Mg are below their comparison bounds; the Mg departure is small. Interpret these findings with the current ration and clinical picture. Fur concentrations alone do not establish a need for supplementation.

Fe/Cu ratio | Descriptive

Fe/Cu 14.39 | Fe 116 | Cu 8.06 µg/g

The ratio lies close to the comparison upper bound (14.40). Iron and copper are each inside their elemental intervals. This does not establish iron excess or copper deficiency.

FUR ELEMENT RATIOS

Ratio	Value	Numerator / denominator (µg/g)	Comparison interval*
Ca/P	**2.06**	568 / 276	1.17 - 6.79
Na/K	**5.24**	2,210 / 422	0.56 - 20.50
Ca/K	**1.35**	568 / 422	0.66 - 12.90
Zn/Cu	**11.79**	95.0 / 8.06	7.06 - 28.57
Na/Mg	**23.14**	2,210 / 95.5	1.29 - 29.29
Ca/Mg	**5.95**	568 / 95.5	1.50 - 18.43
Fe/Cu	**14.39**	116 / 8.06	1.59 - 14.40

*** Comparison intervals:** external canine comparison guides, not validated biological reference intervals or clinical decision limits for our colour-corrected method. Ratios remain **Descriptive**: dimensionless mass ratios, rounded to two decimals. Serum Na:K limits do not apply to fur. [2]

Log position: 100 × ln(value / lower limit) / ln(upper limit / lower limit). The bounds correspond to 0 and 100%; this position differs from percentage departure from a limit.

RATIO UNCERTAINTY

A ratio inherits both concentrations' uncertainty and their covariance. If Fe and Cu each had 10% relative standard uncertainty and were independent, the ratio would have about 14%. These assumptions are illustrative, not a validated sample estimate; no uncertainty band is assigned. Shared preparation factors may cancel, while element-specific corrections may not. [3]

INTERPRETATION & FOLLOW-UP

Fe/Cu is 14.39, calculated from iron 116 µg/g and copper 8.06 µg/g. Both concentrations are inside their elemental intervals. The displayed ratio range is a comparison guide, not a clinical decision limit. Fe/Cu alone does not justify copper supplementation or iron restriction. Interpret the concentrations alongside the current ration and clinical findings; retain them for comparable follow-up samples.

We interpret colour-corrected fur measurements alongside the daily ration and clinical findings. The notes below explain the scope of individual results and support a proportionate follow-up plan.

OD | Coat colour and correction

OD (optical density) is the label for our normalised coat-colour index: 0 = very dark fur; 100 = white fur. It is not a conventional absorbance unit. JOHNNY: OD 60. We have already applied our element-specific correction to the reported concentrations. We use the sampled coat, not an assumed breed colour. Canine research shows colour effects on hair Ca and Mg. [1]

Iodine | Analytical and clinical scope

Iodine: 0.21 µg/g.
If recovery for our full preparation and measurement procedure has not been validated, this result is indicative only. Even with validated recovery, fur iodine does not establish iodine sufficiency or thyroid function. Its position near 0.2 µg/g is not a secure biological distinction.

Mercury | Analytical and clinical scope

Total mercury: 0.194 µg/g (comparison upper bound 0.4).
If full-method recovery has not been validated, quantitative interpretation is provisional. We measure total Hg, not its chemical forms. Rosendahl et al. report a canine hair/blood Hg association [1]; this does not validate our method or this comparator. The value cannot exclude all exposure.

LOQ | Low-level quantification

Our reporting limits of quantification (LOQ) for this sample are 0.006 µg/g for Cd, Tl, U and Pt, and 0.003 µg/g for Be. All five results are below those limits. We report them as < LOQ, not as zero. They do not provide exact concentrations; small differences below these limits cannot be interpreted.

Sodium, potassium and follow-up

Sodium is 2,210 µg/g and potassium 422 µg/g in fur. These are not serum concentrations and do not diagnose electrolyte balance or adrenal function. Retain the ration, supplements and sampling / preparation record for follow-up. Repeat comparisons need a matched matrix and method; a single sample does not establish a trend.

CONCLUSION & NEXT STEPS

JOHNNY - next step: assess the daily ration before adding minerals. Give the veterinarian the food or recipe, quantities, treats and supplement doses to assess overall balance and calcium / magnesium supply. [4] Adjust the ration if that assessment identifies a need; the fur values alone do not establish deficiency. If nutritional or clinical findings raise concern, agree targeted tests and a follow-up plan.

Reading the comparisons: the first-page note explains why two interval departures need individual interpretation. The comparison intervals are not diagnostic thresholds. Ratios are confined to page 3 and labelled Descriptive; they are not serum ratios or health scores.

[1] Rosendahl et al. (2022), Vet Res Commun. doi:10.1007/s11259-021-09854-8
[2] Cornell University, eClinPath: Reference intervals (consulted 2026-09-24).
[3] Eurachem/CITAC (2012), Quantifying Uncertainty in Analytical Measurement, 3rd ed.
[4] AAHA (2021), Nutrition and Weight Management Guidelines: diet assessment and feeding plans.