

Measuring canine skin: pH, water loss and hydration

What each measurement captures, why readings vary and what no single number can prove

EVIDENCE STATUS

Organization-authored structured evidence map. No statistical pooling was performed because the retained evidence units were heterogeneous or non-quantitative. This is not a meta-analysis, systematic review or peer-reviewed paper.

PREPARED BY

Cori Dog (organization author)

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SCOPE BOUNDARY

Educational evidence synthesis only. Not veterinary advice, legal advice, a product recommendation, a safety verdict or a Cori formula disclosure.

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Related Journal guide: <https://coridog.com/journal/canine-skin-barrier>

The short answer

BOTTOM LINE

Canine skin pH, transepidermal water loss and hydration describe different features of the skin surface and barrier. They can be useful research measurements when method, body site and conditions are controlled, but no single reading is a diagnosis, a universal target or proof that a shampoo will suit a dog.

Why this matters

Numbers can look more certain than they are. A pH reading may change with body site, age, breed and measurement conditions. A water-loss reading can respond to deliberate barrier damage yet still vary substantially when repeated in ordinary study settings.

The useful question is therefore not whether one number is good or bad. It is whether the same endpoint was measured in a comparable way, whether uncertainty was reported, and whether the conclusion stays within what that endpoint can show.

Four takeaways

01 There is no single canine skin-pH target

Studies of healthy dogs report variation by age, anatomical site and breed. Their results are observations from particular populations and methods, not a pass-or-fail number for every dog.

Sources 1, 3, 2.

02 The three measurements are not interchangeable

pH describes acidity at the measured surface, TEWL estimates water vapour leaving through the skin, and hydration instruments estimate water-related properties of the outer layer. One cannot substitute for another.

Sources 4, 2, 6.

03 TEWL can be meaningful and still be noisy

Experimental barrier disruption can raise TEWL, showing biological relevance. Separate repeatability studies show that device, observer, site, day and dog can also change the reading. Controlled repeated comparisons are stronger than one isolated value.

Sources 6, 5, 4.

04 Product pH is not a skin-response test

Commercial shampoos can have different measured pH and viscosity, but those measurements do not establish tolerance, barrier response or suitability. The finished formula and intended use still require their own evidence.

Source 7.

Key terms and a worked example

Technical vocabulary is useful only when readers can see what each term adds to the question. These definitions are intentionally narrow.

Surface pH	A measure of acidity or alkalinity at the exact skin surface and moment tested. It is affected by site and method and does not describe the whole skin barrier.
Transepidermal water loss (TEWL)	An estimate of water vapour passing outward through the skin. Higher readings can accompany barrier disruption, but environmental and measurement variation must be controlled.
Stratum-corneum hydration	An instrument-based estimate of water-related properties in the outermost skin layer. It is not the same as whole-body hydration or a visual judgement of dryness.
Repeatability	How similar repeated readings are when the measurement is repeated under defined conditions. A repeatable measurement can still be non-diagnostic.

Example: two readings from one healthy dog

A fictional study measures surface pH at an ear on one day and at the groin after a recent wash on another day. The values differ.

1. The difference does not by itself show deterioration or improvement. Body site, recent washing, timing and measurement conditions all changed.
2. A stronger comparison would repeat the same instrument at the same site after the same acclimatisation, with recent topical products and environmental conditions recorded.

BOUNDARY

Even a well-controlled change would remain a measurement result. It would not diagnose disease or prove that a product caused the change.

Sources 1, 5, 4.

Deeper analysis

This section connects the sources without treating different study designs, standards or regulatory documents as interchangeable.

Each endpoint answers a different question

Surface pH describes hydrogen-ion activity at the measured surface. TEWL estimates outward water-vapour flux. Hydration instruments infer water-related properties of the stratum corneum through a device-specific physical signal. They may move together in some settings and diverge in others because they are not measuring the same thing.

This matters when a study uses one endpoint as shorthand for overall barrier health. A difference in pH does not automatically imply a difference in TEWL, and a hydration reading does not establish itch, comfort or disease severity. The Cobiella pilot illustrates this directly: group differences appeared for pH at two sites, while its TEWL and hydration methods did not distinguish the same groups.

Sources 4, 2.

Biological signal and measurement noise can coexist

Shimada's controlled tape-stripping model showed TEWL increasing as the outer barrier was deliberately removed. That supports a biological connection between the endpoint and barrier disruption.

Lau-Gillard and Cobiella also show why an ordinary single TEWL reading needs caution. Repeat measurements can vary with device, investigator, site, day and dog. These findings are not contradictory: an endpoint can respond to a real biological change and still require careful standardisation to detect that change reliably.

For research, the stronger design repeats measurements under the same conditions, prespecifies how readings will be summarised and reports variability. For an owner, a lone number without this context should not become a diagnosis or buying rule.

Sources 6, 5, 4.

Variation is part of the result, not an inconvenience

Oh mapped differences across 14 body sites in five Beagles. Schlake found age and regional effects in 77 varied dogs. Kwon found age- and breed-related differences in hydration and pH in 149 healthy dogs. These studies used different populations and methods, so their numbers should not be collapsed into one target.

Together they support a narrower and more useful conclusion: body site and population characteristics belong in the interpretation. A reference interval would need a clearly defined population, standardised instrument and protocol, and enough dogs to describe expected variation.

Sources 3, 1, 2.

A shampoo number cannot complete the causal chain

Peña-Corona measured pH, viscosity and other characteristics of twenty commercial shampoos. This shows that finished products can differ in directly measurable ways. It does not show which product is mild, which dog will tolerate it or how skin measurements change after use.

To support a tolerance or barrier-response claim, evidence would need the marketed formula, intended dilution, contact time, rinsing, relevant canine population, prespecified outcomes and transparent adverse-event reporting. Product pH may be one recorded characteristic, but it is not a substitute for that evidence.

Source 7.

Evidence map

Rows keep each source's useful contribution beside the conclusion it cannot support. Citation numbers refer to the source register.

SOURCE	DESIGN / SCOPE	WHAT IT CONTRIBUTES	IMPORTANT LIMIT
Healthy-dog pH study Source 1.	Prospective; 77 client-owned dogs	Puppies younger than 12 weeks had lower readings than older dogs. Among dogs older than 12 weeks, inguinal pH differed by sex and pinna pH by hair colour; neither association appeared at every site.	Observed ranges do not establish one normal value, diagnosis or shampoo target.
Hydration, pH and sebum variation Source 2.	Cross-sectional; 149 healthy dogs	Hydration and pH differed across age and breed groups, adding a larger and more recent population to the variation evidence.	Five reported breed groups and one study setting cannot represent every dog or establish clinical thresholds.
Biophysical body-site map Source 3.	Five healthy male Beagles; 14 sites	Mapped TEWL, hydration and pH across multiple regions and showed that site matters.	Very small, homogeneous sample; useful for method questions, not universal reference values.
Five-method repeatability pilot Source 4.	15 healthy and 15 atopic dogs; three investigators	The pH meter was most repeatable and the VapoMeter most variable. pH differed between groups at two sites, while TEWL and hydration did not.	Pilot sample and device-specific results do not make any endpoint diagnostic.
VapoMeter variability study Source 5.	Healthy dogs; repeated TEWL measurements	Reported substantial repeated-measure variation and effects of site, day, individual dog and side-to-side differences.	Variability estimates apply to the studied protocol and do not invalidate TEWL under every controlled design.
Experimental TEWL model Source 6.	Ten healthy dogs; tape stripping	TEWL rose as the stratum corneum was deliberately disrupted, supporting TEWL as a barrier-related endpoint under controlled conditions.	Experimental damage is not spontaneous disease and does not predict an individual product response.
Commercial dog-shampoo measurements Source 7.	Twenty products marketed in Mexico City	Measured product pH ranged from 5.6 to 8.4 and viscosity also varied.	No canine tolerance or skin-response outcome was tested; product measurements are not skin measurements.

INTERPRETATION RULE

Terminology or mechanism evidence can generate a question. A defined finished-product claim needs evidence from the relevant finished product and conditions of use. None of those evidence units becomes a diagnosis.

Method and review question

REVIEW QUESTION

What do surface pH, transepidermal water loss and hydration measurements represent in canine studies, and which sources of variation limit simple targets?

SEARCH SCOPE

Targeted PubMed discovery of canine biophysical-measurement studies plus veterinary guidance. Healthy and dermatology populations were included when the measurement method or interpretation was directly relevant. A 2025 study was added because it directly examined hydration and pH across age and breed groups.

Recorded discovery routes

- PubMed: (dog OR canine) AND (skin pH OR transepidermal water loss OR hydration)
- PubMed: canine skin barrier AND (repeatability OR anatomical site OR measurement)
- PubMed: canine hydration pH age breed
- Official guidance: [site:wsava.org dermatology skin coat care dog](https://www.wsava.org/dermatology/skin-coat-care-dog)

Search recorded 27 August 2026. The source register reports 8 retained sources. Exact candidate and exclusion counts are not claimed because a public screening log was not maintained.

Exclusion boundary

Treatment-only reports without reusable measurement information, non-canine records and sources that did not define the measured endpoint were excluded. The WSAVA document is retained only for the general care and veterinary-escalation boundary.

Synthesis decision

Structured narrative evidence map. Results were compared by endpoint, population, body site, instrument and directness. No pooled estimate was attempted because those features were not sufficiently comparable, and the purpose was interpretation rather than estimation of one treatment effect.

REPORTING REGIME

This is a targeted, single-organization evidence map. Search routes, retained sources, source links beside each takeaway, the worked example, every evidence row and each deeper-analysis section, and limitations are disclosed. The note does not claim exhaustive searching, duplicate screening or full systematic-review compliance.

Questions for evidence users

Use these questions to test whether a conclusion is proportionate to the product, population, method and endpoint that were actually studied.

1	Which endpoint was measured, and what physical property does that instrument report?
2	At which anatomical site, under what temperature and humidity, and after what acclimatisation?
3	Were clipping, cleaning, anaesthesia, recent washing and topical products controlled?
4	Was the comparison repeated within the same dog and site, or made between different populations?
5	Are variability, uncertainty, missing observations and device limitations reported?
6	Does the conclusion stay within measurement interpretation rather than diagnosis or product suitability?

What stronger claims would need

- A reference interval would need a broad, representative population measured with one standardised protocol and instrument.
- A product-tolerance claim would need canine-appropriate evidence from the finished product under intended conditions of use.
- A clinical claim would need a diagnostic or intervention design with an appropriate population, comparator and veterinary interpretation.

Limitations and sources

Limitations

- This was a targeted evidence map, not an exhaustive systematic review.
- One organization screened and extracted records; no independent second reviewer repeated the work.
- Full text was not available for every record, so numerical detail is limited to information that could be verified from accessible primary records.
- No formal risk-of-bias tool or certainty-grading framework was applied.
- No meta-analysis was appropriate because endpoints, populations, instruments and study purposes were heterogeneous.

Source register

1. Schlake et al. Influence of physiological factors on skin pH in dogs

Veterinary Dermatology. 2022;33(1):3-e2. Prospective study of 77 client-owned dogs. [Open source](#)

2. Kwon et al. Variations in skin biophysical parameters with age, sex and breed in dogs

Veterinary Dermatology. 2025;36(5):689-695. Study of hydration, pH and sebum in 149 healthy dogs. [Open source](#)

3. Oh and Oh. Mapping of the dog skin based on biophysical measurements

Veterinary Dermatology. 2010;21(4):367-372. Fourteen-site map in five healthy male Beagles. [Open source](#)

4. Cobiella et al. Pilot study of five canine skin-barrier methods

Veterinary Dermatology. 2019;30(2):121-e34. Repeatability study in 15 healthy and 15 atopic dogs. [Open source](#)

5. Lau-Gillard et al. VapoMeter evaluation in healthy dogs

Veterinary Dermatology. 2010;21(2):136-145. Evaluation of TEWL variability in healthy dogs. [Open source](#)

6. Shimada et al. TEWL reflects canine skin barrier function

Journal of Veterinary Medical Science. 2008;70(8):841-843. Experimental tape-stripping model in ten healthy dogs. [Open source](#)

7. Peña-Corona et al. Measurements of commercial dog shampoos

Polish Journal of Veterinary Sciences. 2022;25(2):213-221. Descriptive measurements of twenty products. [Open source](#)

8. Supplemental guidance: WSAVA Principles of Wellness - Dermatology

General veterinary care and escalation guidance; not treated as a measurement-study record. Supplemental boundary source. [Open source](#)

CORRECTIONS AND UPDATES

This is version 1.1 of a living research note. Material source additions, corrections or scope changes produce a new version and review date. The accessible HTML page is the canonical source of truth.

Correction policy: [Cori Dog editorial method](#)