Barking Up the Right Tree with OraCMU™: An Oral Probiotic for Fresher Dog Breath

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A Deep Dive into Dog Breath

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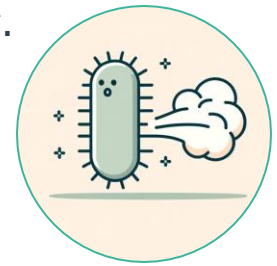
What causes bad dog breath?

- At the core of most halitosis cases in canines, is the presence of undesirable bacteria on the teeth and tongue.
- These bacteria produce gases called “volatile sulphur compounds” or **VSCs** which are what we all recognize as bad dog breath.
- The most notorious **VSCs** are hydrogen sulfide (H_2S), methyl mercaptan (CH_3SH), and dimethyl sulfide ($(CH_3)_2S$)
- The leading bacteria responsible for producing **VSCs** are gram-negative anaerobes, which include *Fusobacterium* sp (i.e. *F. nucleatum*), *Porphyromonas* sp (i.e. *P. gulae, prominent in dogs, and the closely related P. gingivalis, prominent in humans*), *Treponema* sp, and *Bacterioides*.



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Stop “dog breath” before it becomes a problem

- VSCs are cytotoxic to oral tissues and are associated with progress of serious dental issues[3]
  - VSCs can even be transported via the blood to other organs, contributing to development of problematic systemic issues. [3]
- **Halitosis is the first chance for dog owners to notice the presence of serious oral health issues**[3]
- Serious dental issues have a prevalence of at least 80% in dogs over 3 years of age.[1]
  - Prevalence of serious dental issues increases with age but is also predominant in toy breeds at earlier life stages.

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Current Treatments

- **Brushing**
  - In a Swedish study, 1 in 4 owners experience difficulties when inspecting dog's teeth, mostly due to their dog being uncooperative[1]
  - In a second Swedish study, researchers found owners of dogs *with* serious dental issues tend to follow dental care recommendations better than the general dog owner population…(but) preventative care is inadequate for more than half the dogs[2]
  - There is a need for resources to address infrequent tooth brushing
- **Many owners rely on alternatives**
  - Dental chews
  - Chew toys
  - Specialized diet
  - Probiotics (mainly focused on digestive issues that can cause breath odor)
- **Dental scaling requiring anesthesia when build-up is severe (*average* cost $300)**
- **Anti-bacterial toothpastes and disinfectants take out good bacteria with the bad**

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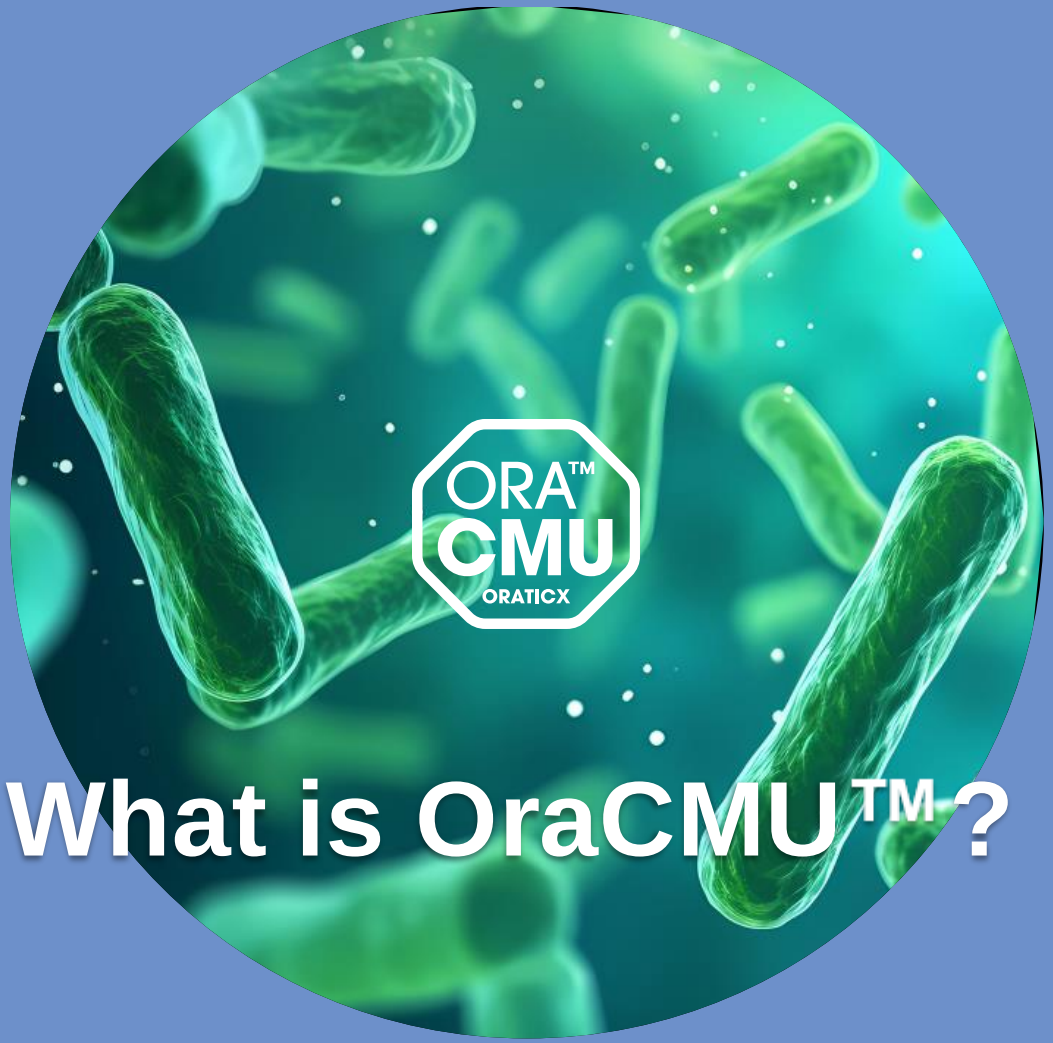

What is OraCMU™?

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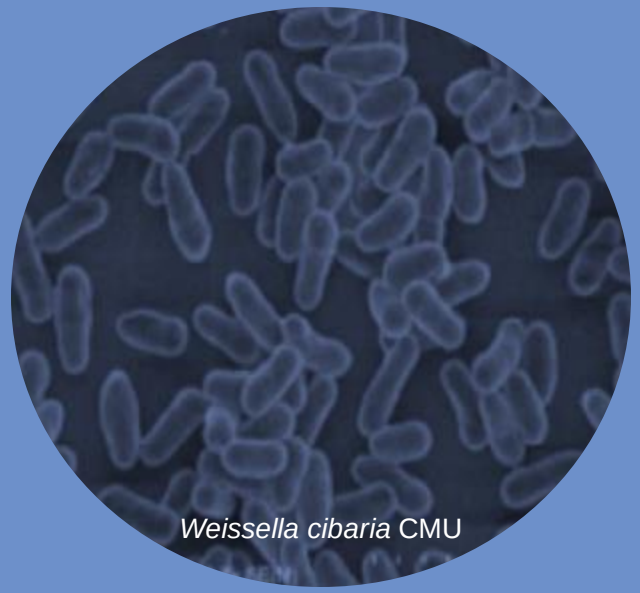
What is OraCMU™?



Weissella cibaria CMU

- OraCMU™ is a trademarked oral probiotic strain of *Weissella cibaria* discovered at **C**honnam ***M***edical ***U***niversity (“CMU”)
- While *W. cibaria* is essential in the fermentation of kimchi (a delicious, spicy Korean sauerkraut), the OraCMU™ strain was isolated from the saliva of healthy children due to its outstanding ability to produce hydrogen peroxide (known for its antibacterial and teeth whitening properties).
- There are nine human clinical trials that demonstrate the ability of OraCMU™ to help reduce bad breath, VSCs, and support oral health in various healthy adult populations.
- There are two canine clinical trials that demonstrate the ability of OraCMU™ to help reduce bad breath, VSCs, and support oral health in dogs.

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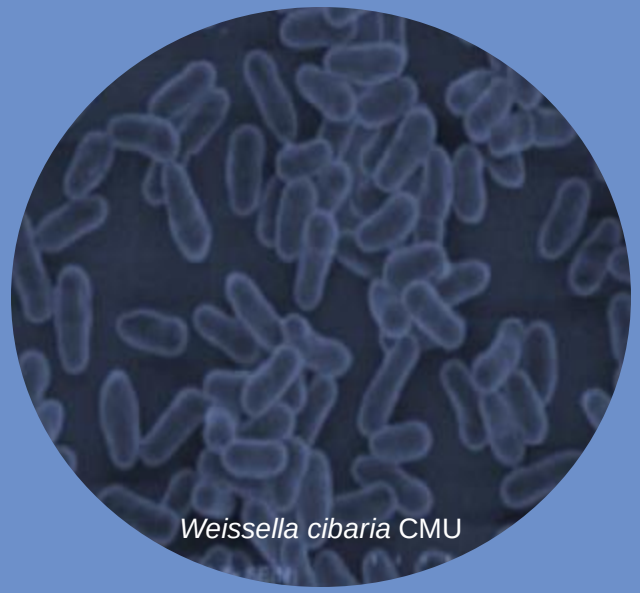
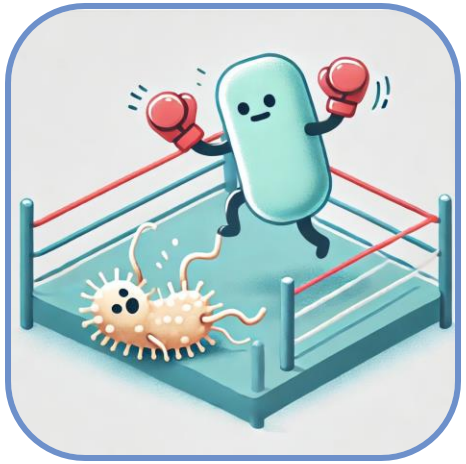
How does OraCMU™ work?



Weissella cibaria CMU

- Oral probiotics are an alternative halitosis solution that target odor-causing bacteria while sparing helpful oral bacteria, preserving oral microbiome balance.
- OraCMU™ produces high levels of hydrogen peroxide naturally, which breaks up undesirable bacterial biofilms
- OraCMU™ produces bacteriocin-like compounds which target undesirable odor-causing bacteria
- OraCMU™ colonizes the oral cavity quickly and effectively, crowding out undesirable odor-causing bacteria
- OraCMU™ specifically reduces VSC production by odor-causing bacteria



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Do KH, et al. Oral malodor-reducing effects by oral feeding of *Weisella cibaria* CMU in beagle dogs. *Korean Journal of Veterinary Research*. 2018;58(2):87-94.

- **6-week, placebo-controlled study**
- **18 healthy female and male beagles, aged 1-3 years, weighing 9.8±2.18 kg, commercial dog diet**
- **Three experimental groups:**
  - Positive control (PC) = Placebo (maltodextrin placebo)
  - Negative control (NC) = Scaling + Placebo (dental scaling done one week before experiment, maltodextrin placebo)
  - **Treatment with OraCMU™, powder form, maltodextrin carrier, three different doses**
    - Low: "CMU-L" = 20M CFU OraCMU™
    - Medium: "CMU-M" = 200M CFU OraCMU™
    - High: "CMU-H" = 2 B CFU OraCMU™
- **Treatment and placebo powders were mixed with 2 mL of phosphate-buffered saline and then immediately administered orally via syringe once daily**

Do KH, et al. Oral malodor-reducing effects by oral feeding of *Weisella cibaria* CMU in beagle dogs. *Korean Journal of Veterinary Research*. 2018;58(2):87-94.

- **Organoleptic Evaluation**
  - Conducted by a trained examiner assessing malodor from 2 cm distance from dog's mouth. Scores ranged from 0 (no odor) to 5 (severe putrefactive odor)
- **Measurement of VSCs**
  - Ensuring dog is breathing through their nose, air was collected from the oral cavity via syringe and measured using a portable gas chromatograph (OralChroma CHM-2), which detects hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and total VSC concentrations.
- **Measurement of Clinical Indicators**
  - Measured after fasting dogs for 24 hours and sedating, at baseline and weeks 2, 4, 6)
  - Calculus (Tartar/hardened plaque) (Warrick-Gorrel method)
  - Plaque (Logan-Boyce modification)
  - Gingivitis Index (Löe-Silness method)*

*Not a dietary supplement claim

Halitosis reducing effect of Weissella cibaria CMU in beagle dogs 89

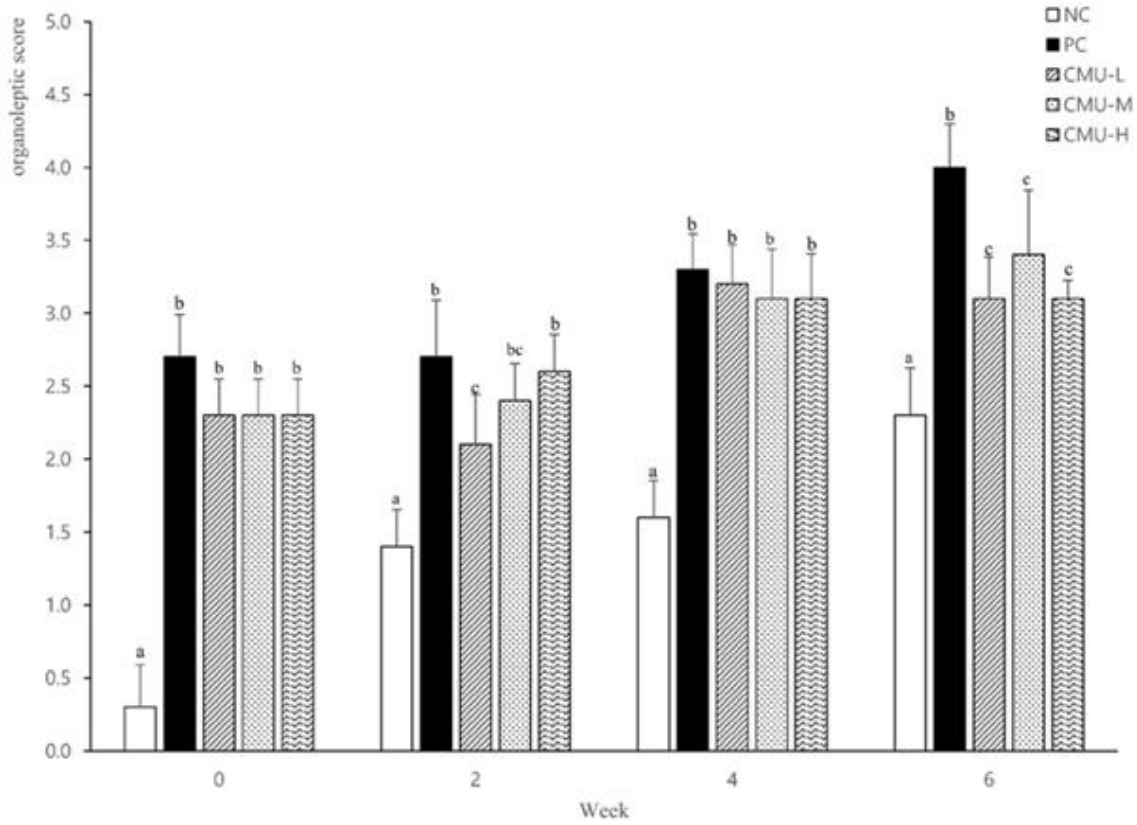


Fig. 1. The organoleptic scores in beagle dogs after consumption of a *Weissella cibaria* CMU. Data represents the mean ± SD. Different superscript letters (a, b, and c) indicate the statistical differences determined by ANOVA ($p < 0.05$). Negative control (NC) group's teeth were scaled before experiment. NC and positive control (PC) groups were fed maltodextrin 2.4×10^{-4} g, daily. CMU-L group were fed *W. cibaria* CMU 2.0×10^{7} CFU, daily. CMU-M group were fed *W. cibaria* CMU 2.0×10^{8} CFU, daily. CMU-H group were fed *W. cibaria* CMU 2.0×10^{9} CFU, daily. CFU, colony-forming unit.

Organoleptic/Sensory Evaluation:

- NC = scaling + placebo
- PC = placebo
- **Results:**
  - At week 2, the organoleptic index of the 20M CFU OraCMU™ group was significantly lower vs. placebo
  - All doses of OraCMU™ had significantly better breath scores vs. placebo by week 6

Table 1. Concentrations of total volatile sulfur compounds in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.2 ± 0.16^{a}	1.1 ± 0.58^{a}	1.6 ± 0.92^{a}	1.8 ± 1.02^{a}
PC	2.2 ± 0.72^{b}	3.2 ± 1.65^{b}	4.1 ± 1.78^{b}	4.0 ± 2.29^{b}
CMU-L	2.1 ± 1.30^{b}	2.0 ± 1.04^{c}	2.7 ± 0.80^{c}	1.6 ± 1.03^{a}
CMU-M	2.2 ± 1.36^{b}	2.4 ± 1.05^{cd}	2.2 ± 1.20^{c}	2.5 ± 1.29^{c}
CMU-H	2.2 ± 1.72^{b}	2.6 ± 1.33^{d}	2.3 ± 1.31^{c}	2.0 ± 1.30^{ac}

The values are expressed as mean ± SD in ng/10 mL. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$). NC, negative control; PC, positive control.

Measurement of VSCs

Results: There was a significant reduction in total VSCs in all OraCMU™ groups vs. placebo in as little as two weeks, and this reduction was significantly sustained through the end of the study.

Table 2. Concentrations of hydrogen sulfide (H_2S) in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.0 ± 0.00^{a}	0.0 ± 0.00^{a}	0.0 ± 0.08^{a}	0.0 ± 0.13^{a}
PC	0.0 ± 0.07^{a}	0.0 ± 0.05^{a}	0.0 ± 0.04^{a}	0.0 ± 0.11^{a}
CMU-L	0.1 ± 0.14^{a}	0.0 ± 0.02^{a}	0.0 ± 0.04^{a}	0.0 ± 0.09^{a}
CMU-M	0.0 ± 0.01^{a}	0.0 ± 0.04^{a}	0.0 ± 0.04^{a}	0.0 ± 0.10^{a}
CMU-H	0.1 ± 0.12^{a}	0.0 ± 0.05^{a}	0.0 ± 0.07^{a}	0.0 ± 0.01^{a}

The values are expressed as mean ± SD in ng/10 mL. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Table 3. Concentrations of methyl mercaptan (CH_3SH) in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.1 ± 0.13^{a}	0.4 ± 0.40^{a}	0.4 ± 0.43^{a}	0.6 ± 0.51^{a}
PC	1.5 ± 0.84^{b}	2.4 ± 1.21^{b}	3.1 ± 1.64^{b}	2.6 ± 1.82^{b}
CMU-L	1.4 ± 1.28^{b}	1.4 ± 0.83^{c}	1.8 ± 0.79^{c}	0.8 ± 0.69^{ac}
CMU-M	1.8 ± 1.04^{b}	1.9 ± 1.05^{d}	1.5 ± 0.96^{c}	1.5 ± 1.24^{d}
CMU-H	1.6 ± 1.26^{b}	1.9 ± 1.14^{d}	1.5 ± 1.04^{c}	1.1 ± 0.89^{cd}

The values are expressed as mean ± SD in ng/10 mL. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Table 4. Concentrations of dimethyl sulfide [$(CH_3)_2S$] in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.1 ± 0.15^{a}	0.7 ± 0.50^{ab}	1.1 ± 0.75^{a}	1.1 ± 0.83^{ab}
PC	0.6 ± 0.42^{b}	0.8 ± 0.88^{b}	1.0 ± 0.87^{ab}	1.3 ± 1.05^{b}
CMU-L	0.6 ± 0.49^{b}	0.6 ± 0.52^{ab}	0.9 ± 0.61^{ab}	0.7 ± 0.81^{a}
CMU-M	0.4 ± 0.53^{ab}	0.5 ± 0.55^{a}	0.7 ± 0.57^{b}	1.0 ± 1.12^{ab}
CMU-H	0.5 ± 0.55^{b}	0.6 ± 0.58^{ab}	0.7 ± 0.72^{b}	0.8 ± 0.83^{a}

The values are expressed as mean ± SD in ng/10 mL. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Measurement of VSCs

Results:

- As early as week 2, all OraCMU™ groups showed significant reductions in methyl mercaptan vs. placebo and this was sustained through week 6.
- 200M CFU OraCMU™ showed significant reduction in dimethyl sulfide at week 2 vs. placebo. And, at week 6, 20M and 2B CFU OraCMU™ showed significant reductions vs. placebo
- No significant differences in hydrogen sulfide between experimental groups

Table 5. Calculus index in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.0 ± 0.00^{a}	2.1 ± 0.93^{a}	2.7 ± 0.73^{a}	3.0 ± 1.42^{a}
PC	3.9 ± 1.49^{b}	4.8 ± 2.59^{a}	6.4 ± 1.46^{a}	7.1 ± 2.66^{b}
CMU-L	4.6 ± 3.20^{b}	4.9 ± 3.04^{a}	5.3 ± 1.38^{a}	5.7 ± 2.59^{ab}
CMU-M	3.9 ± 1.88^{b}	4.7 ± 1.61^{a}	5.0 ± 0.91^{a}	5.7 ± 1.75^{ab}
CMU-H	3.0 ± 1.25^{ab}	3.8 ± 1.58^{a}	4.9 ± 0.57^{a}	5.2 ± 1.03^{ab}

The values are expressed as mean ± SD. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Table 6. Plaque index in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	1.9 ± 1.26^{a}	2.7 ± 0.18^{a}	3.0 ± 0.73^{a}	3.8 ± 1.08^{a}
PC	4.4 ± 0.46^{b}	4.7 ± 0.63^{b}	4.8 ± 0.57^{a}	5.9 ± 1.08^{c}
CMU-L	3.6 ± 0.60^{ab}	3.2 ± 0.77^{ab}	3.9 ± 0.75^{a}	5.3 ± 0.78^{bc}
CMU-M	3.5 ± 0.12^{ab}	3.2 ± 0.25^{ab}	3.9 ± 0.20^{a}	5.2 ± 0.83^{abc}
CMU-H	4.3 ± 0.52^{ab}	3.3 ± 0.30^{ab}	4.1 ± 0.19^{a}	4.5 ± 0.28^{ab}

The values are expressed as mean ± SD. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Table 7. Gingivitis index in beagle dogs after consumption of *Weissella cibaria* CMU

Group	Week			
	0	2	4	6
NC	0.1 ± 0.08^{a}	0.3 ± 0.19^{a}	0.2 ± 0.01^{a}	0.5 ± 0.15^{a}
PC	0.6 ± 0.21^{b}	0.9 ± 0.36^{b}	0.7 ± 0.11^{b}	0.5 ± 0.05^{a}
CMU-L	0.8 ± 0.37^{b}	0.5 ± 0.35^{ab}	0.6 ± 0.18^{ab}	0.4 ± 0.13^{a}
CMU-M	0.6 ± 0.19^{b}	0.5 ± 0.24^{ab}	0.5 ± 0.13^{ab}	0.6 ± 0.14^{a}
CMU-H	0.7 ± 0.12^{b}	0.7 ± 0.27^{ab}	0.3 ± 0.03^{a}	0.4 ± 0.06^{a}

The values are expressed as mean ± SD. Different superscript letters indicate the statistical differences determined by ANOVA ($p < 0.05$).

Clinical Indicators

Results:

- At week 4, 2B OraCMU™ exhibited significant reduction in gingivitis index* vs. placebo

  *Not a dietary supplement claim

- At week 6, 2B OraCMU™ showed significant reduction in plaque index vs. placebo
- Calculus index scores showed no significant differences between OraCMU™ vs. placebo

Do KH, et al. Effects of *Weissella cibaria* CMU on Halitosis and Calculus, Plaque, and Gingivitis Indices in Beagles. *Journal of Veterinary Dentistry*. 2019;36(2):135-142.

- **6 week, placebo-controlled study**
- **18 healthy female and male beagles, aged 1-3 years, weighing 9.8±2.18 kg, commercial dog diet**
- **All dogs received a professional dental scaling 1 week prior to the start of the experiment.**
- **Three experimental groups:**
  - Positive control (PC) = Placebo (maltodextrin placebo)
  - Treatment with OraCMU™, powder form, maltodextrin carrier, two different doses
    - Low: "CMU-L" = 20M CFU OraCMU™
    - High: "CMU-H" = 2 B CFU OraCMU™
- **Treatment and placebo powders were mixed with 2 mL of phosphate-buffered saline and then immediately administered orally via syringe once daily**

Do KH, et al. Effects of *Weissella cibaria* CMU on Halitosis and Calculus, Plaque, and Gingivitis Indices in Beagles. *Journal of Veterinary Dentistry*. 2019;36(2):135-142.

- **Organoleptic Evaluation**
  - Conducted by a trained examiner assessing malodor from 2 cm distance from dog's mouth. Scores ranged from 0 (no odor) to 5 (severe putrefactive odor)
- **Measurement of VSCs**
  - Ensuring dog is breathing through their nose, air was collected from the oral cavity via syringe and measured using a portable gas chromatograph (OralChroma CHM-2), which detects hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and total VSC concentrations.
- **Measurement of Clinical Indicators**
  - Measured after fasting dogs for 24 hours and sedating, at baseline and weeks 2, 4, 6
    - Calculus (Warrick-Gorrel method)
    - Plaque (Logan-Boyce modification)
    - Gingivitis Index (Löe-Silness method)*

*Not a dietary supplement claim

- **Oral Bacterial Analysis**
  - OraCMU™ and 5 periodontal pathogens (*A. actinomycetemcomitans*, *F. nucleatum*, *P. gingivalis*, *Prevotella (Pr.) intermedia*, and *T. forsythia*) and 2 cariogens (*S. mutans* and *S. sobrinus*) were analyzed.

Table 5. Organoleptic Scores (Mean ± Standard Deviation) in Beagles After Treatment of *Weissella Cibaria* CMU.

	Week			
Group	0	2	4	6
Control	3.0 ± 0.43^{1}	3.4 ± 0.51^{1}	3.5 ± 0.67^{1}	3.7 ± 0.49^{1}
CMU-L	2.9 ± 0.51^{1}	$3.0 \pm 0.60^{1,2}$	2.8 ± 0.39^{2}	2.8 ± 0.58^{2}
CMU-H	2.8 ± 0.87^{1}	2.8 ± 0.62^{2}	2.3 ± 0.45^{3}	2.2 ± 0.39^{3}

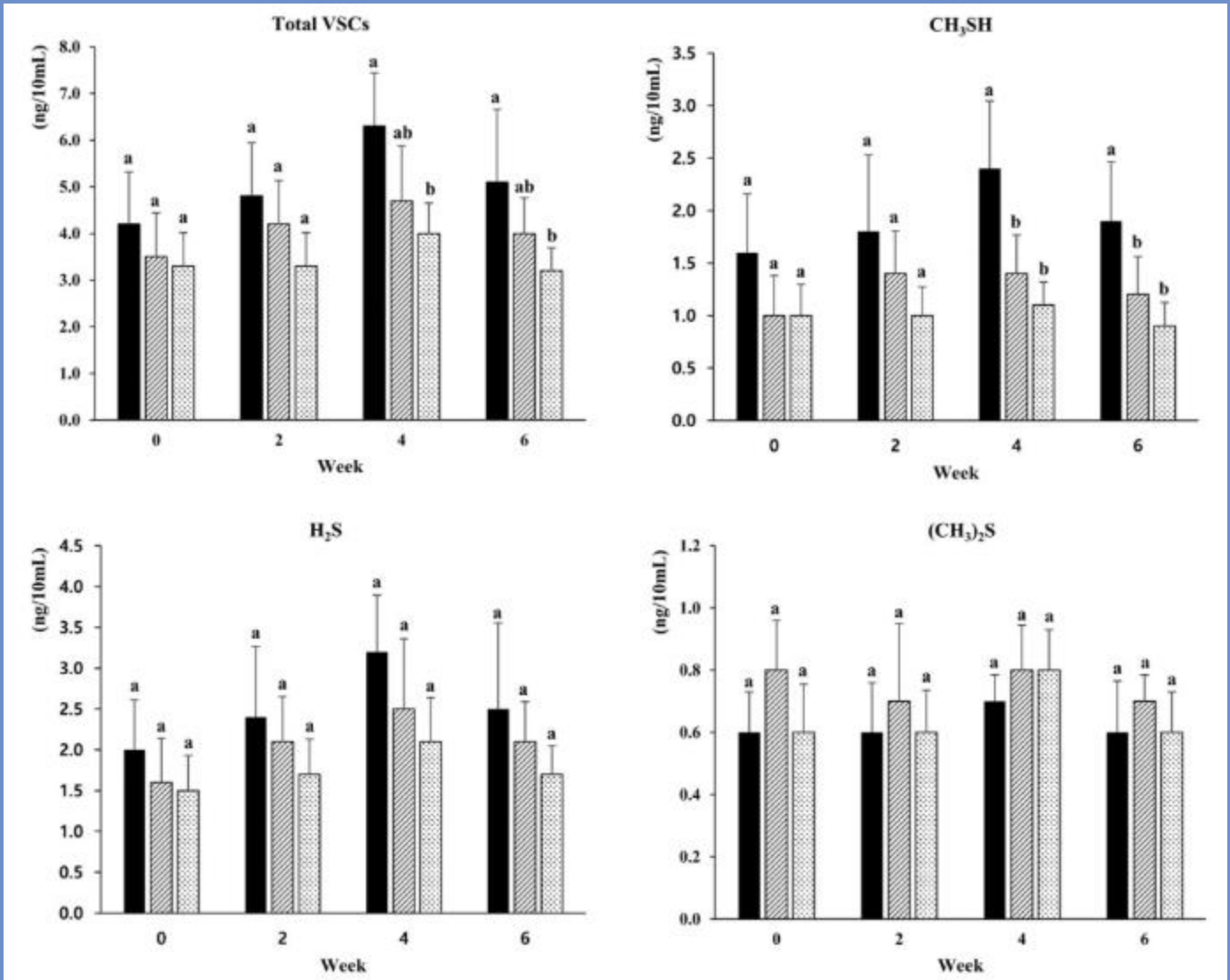
Abbreviations: ANOVA, analysis of variance; CMU, Chonnam Medical University.

[a]Different superscript numbers (1, 2, 3) indicate the statistical differences determined by ANOVA ($P < .05$). CMU-H = 2×10^{9} CFU. CMU-L = 2×10^{7} CFU.

Organoleptic Evaluation

Results:

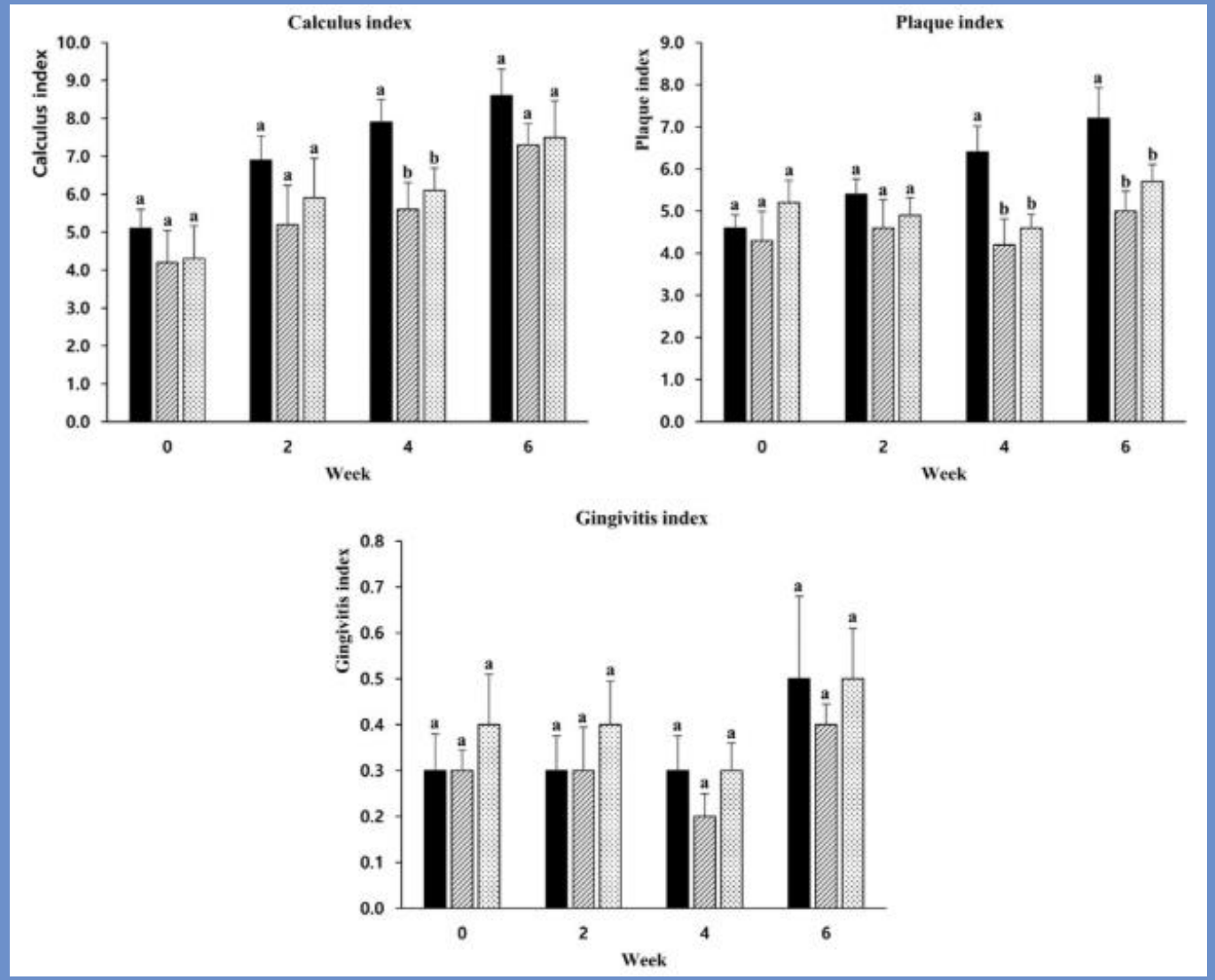
- 2B CFU OraCMU™ had significantly better breath scores vs. placebo in as little as two weeks and this significant reduction was sustained until the end of the study.
- 20M CFU OraCMU™ had significantly better breath scores vs. placebo by week 4.



Measurement of VSCs

Results:

- By week 4, the total VSC concentrations in the 2B OraCMU™ group were significantly lower vs. placebo and this significant reduction was sustained through to the end of the study
- By week 4, 20M and 2B CFU OraCMU™ had significantly reduced methly mercaptan levels vs. placebo and this was sustained until the end of the study
- Levels of hydrogen sulfide and dimethyl sulfide were lower but not significant



Clinical Indicators

Results:

- The placebo group showed persistently increasing plaque index, whereas 20M and 2B CFU OraCMU™ maintained the same values as the start of the experiment (just after dental scaling).
- By week 4, 20M and 2B CFU OraCMU™ had significantly lower plaque index score vs. placebo
- Calculus index increased over time in all groups, however at week 4, 20M and 2B CFU OraCMU™ were significantly lower vs. placebo
- No significant change in gingivitis index.

Table 6. Mean Log_{10} DNA Copy ± SD Values for Bacterial Counts of Dental and Supragingival Swab Samples After Treatment of *Weissella Cibaria* CMU.

		Mean Log_{10} DNA Copy ± SD		
Bacteria	Week	Control	CMU-L	CMU-H
Fusobacterium Nucleatum	0	4.3 ± 0.26[1,2]	4.6 ± 0.13[1]	4.2 ± 0.25[2]
	2	4.6 ± 0.25[1]	4.4 ± 0.23[1]	4.4 ± 0.27[1]
	4	4.4 ± 0.16[1]	3.9 ± 0.46[1]	4.0 ± 0.60[1]
	6	4.5 ± 0.26[1]	4.1 ± 0.42[2]	4.0 ± 0.24[2,3]
Porphyromonas Gingivalis	0	4.8 ± 0.27[1]	5.0 ± 0.28[1]	4.6 ± 0.51[1]
	2	5.0 ± 0.31[1]	4.5 ± 0.35[1,2]	3.8 ± 1.02[2,3]
	4	4.5 ± 0.34[1]	3.8 ± 0.66[2]	4.0 ± 0.42[1,2]
	6	4.4 ± 0.37[1]	3.8 ± 0.56[2]	3.8 ± 0.22[2,3]
Prevotella intermedia	0	0.9 ± 1.04[1]	0.4 ± 0.48[1]	0.5 ± 0.76[1]
	2	1.1 ± 1.05[1]	0.4 ± 0.87[2]	3.2 ± 0.61[3]
	4	2.6 ± 2.20[1]	3.4 ± 2.71[1]	2.4 ± 1.54[1]
	6	2.7 ± 1.45[1]	0.4 ± 0.73[2]	0.6 ± 0.76[2,3]
Tannerella forsythia	0	6.6 ± 0.73[1]	7.0 ± 0.36[1]	7.0 ± 0.76[1]
	2	7.0 ± 0.37[1]	6.4 ± 0.46[2]	6.3 ± 0.39[2,3]
	4	6.2 ± 0.26[1]	5.6 ± 0.38[2]	6.0 ± 0.27[3]
	6	6.3 ± 0.22[1]	5.9 ± 0.53[1]	5.8 ± 0.38[1]
Weissella cibaria	0	0.6 ± 1.37[1]	0.9 ± 1.46[1]	0.6 ± 0.77[1]
	2	0.5 ± 1.08[1]	0.6 ± 1.51[1]	0.5 ± 1.20[1]
	4	0.4 ± 0.58[1]	1.9 ± 1.56[1]	2.0 ± 1.70[1]
	6	0.6 ± 1.35[1]	2.4 ± 0.50[2]	0.7 ± 0.80[3]

Abbreviations: ANOVA, analysis of variance; CMU, Chonnam Medical University; SD, standard deviation.

[a]Different superscript numbers (1, 2, and 3) indicate the statistical differences determined by ANOVA ($P < .05$). CMU-H = 2×10^9 CFU. CMU-L = 2×10^7 CFU.

Oral Bacteria Analysis

Results:

- At week 6, the 20M and 2B CFU OraCMU™ groups had significantly lower levels of *F. nucleatum* and *P. gingivalis* vs. placebo
- At week 6, OraCMU™ levels were significantly higher in 20M and 20B CFU OraCMU™ groups vs. placebo (demonstrating effective colonization)
- *A. actinomycetemcomitans*, *S. mutans*, and *S. sobrinus* were not detected

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Better breath in two weeks

In summary, based on the findings of these two canine clinical studies:

- **Organoleptic Evaluation:**
  - 2B CFU OraCMU™ had better sensory evaluation scores vs. placebo by week 2
  - 20M CFU OraCMU™ had better sensory evaluation scores vs. placebo by week 4
  - 20M, 200M, and 2B CFU OraCMU™ had significantly better scores for sensory evaluation of dog breath vs. placebo in 6 weeks
- **Measurement of VSCs:**
  - 20M, 200M, and 2B CFU OraCMU™ lower VSCs in as little as two weeks vs. placebo
- **Measurement of Clinical Indicators:**
  - 20M and 2B CFU OraCMU™ significantly reduced the plaque index vs. placebo
  - 2B CFU OraCMU™ significantly reduced the gingivitis index* vs. placebo *not a dietary supplement claim
- **Oral Bacteria Analysis**:
  - 20M and 2B CFU OraCMU™ significantly reduced undesirable VSC producing oral bacteria *P. gingivalis* and *F. nucleatum*
  - OraCMU™ was able to colonize the canine oral cavity successfully

Formulating with OraCMU™

OraCMU™ can add stand-out claims to canine oral health formulas:

- Researched in dogs, for dogs
- Supports fresh breath
- Targets bacteria associated with bad breath
- Helps reduce odorous gas linked to bad breath
- Helps reduce bacterial production of malodorous gases
- Helps maintain a balanced oral microbiome
- Supports healthy teeth and gums
- Helps maintain overall oral health
- Helps with plaque

Formulating Notes:

- OraCMU™ is a live probiotic. It must be kept away from heat and stay dry (until just before application). It is room temperature stable.
- The longer the contact with the oral cavity, the more colonization can occur.
- Dose of 2B CFU (20 mg) at time of manufacture helps achieve efficacious 20M CFU OraCMU™ remaining at product expiration while keeping dose within researched range (no overage in studies).
- Suggested delivery formats: Capsule or stick pack to open and mix with treat paste that will stay in the oral cavity.
- Dairy

OraCMU™ stands out as a well-researched, unique probiotic strain that helps support oral health and better breath in dogs via activity directly in the oral cavity. Nine human clinical trials support the efficacy and safety of OraCMU™, and two canine clinical trials support strong claims for better breath in as little as 2 weeks.

OraCMU™ is non-GMO, self-affirmed GRAS, manufactured in South Korea, and distributed by Stratum Nutrition in Missouri, USA.

Thank you for your time and attention.

www.stratumnutrition.com

Bagel and Nutella, Stratum Nutrition's newest canine team members

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3. Ito N, et al. Volatile sulfur compounds produced by the anaerobic bacteria *Porphyromonas* spp. Isolated from the oral cavities of dogs. *Veterinary Sciences* 2023;10(503).