

# Evaluation of the in vitro digestibility of Veggiedent® FR3SH™ and five other dental chews for dogs

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## Summary

Dental chews are recommended by veterinary dentists [1] as home dental care to help maintain teeth clean. Safety and digestibility of these dental chews is, however, a major concern for the pet owners and the veterinarians.

In vitro digestibility of the following 6 dental chews was therefore evaluated: Veggiedent® FR3SH™ (Virbac), Greenies™ Fresh (Mars), Oravet™ (Merial), Dentastix™ (Mars), Prozym® sticks (Ceva) and Hill's® Prescription Diet® Dental Care Chews (Hill's).

The results are expressed as the % of protein dissolved by pepsic enzymes (based on nitrogen content) and as the % of dry matter dissolved by ileal digestibility (i.e dissolved by gastric + intestinal enzymes).

The humidity level ranged between 9.8% and 16.1% with a median of 13.5% and the protein content ranged between 6.5% and 43.1% of crude matter with a median of 15.55%.

The results for pepsic and ileal digestibility were respectively of: 100% and 100% for Veggiedent® FR3SH™; 96.5% and 91.8% for Greenies™, 100% and 98% for Oravet™, 96% and 100% for Dentastix™, 90.5% and 88.7% for Prozym® sticks and 97.2% and 100% for Hill's® Prescription Diet® dental care chews.

Veggiedent® FR3SH™ is therefore totally digestible, as assessed by in vitro reference methods.

## Material and methods

In vitro digestibility was tested in an independent lab on 500g samples of:

- Veggiedent® FR3SH™ (Virbac),
- Greenies™ Fresh (Mars),
- Oravet™ (Merial),
- Dentastix™ (Mars),
- Prozym® sticks (Ceva) and
- Hill's® Prescription Diet® Dental Care Chews (Hill's).

The humidity level and protein content (Kjeldahl method) were first evaluated.

To assess in vitro pepsic digestibility, samples were heated for 48 hours at 40 °C in a solution of pepsin hydrochloride, as described by the European commission

[2]. The nitrogen (N)/protein content was evaluated after filtration, according to the Kjeldahl method - Nx6.25).

Ileal digestibility was assessed using a protocol described by Boisen et al. [3] for monogastric animals: samples were first incubated with a pepsin solution, pH2 for 6h to mimic gastric digestion and then with a pancreatin solution, pH 6.8 for 18h to mimic small intestinal digestion.

The results are expressed as the % of protein dissolved by pepsic digestibility (vs total protein) and as the % of dry matter dissolved by ileal digestibility (i.e matter dissolved by gastric + intestinal enzymes).

## References

1. Niemiec BA, Gawor J, Nemeč A, et al. World Small Animal Veterinary Association Global Dental Guidelines. 2017. [www.wsava.org/guidelines/global-dental-guidelines](http://www.wsava.org/guidelines/global-dental-guidelines). Accessed December 2018
2. Third Commission Directive 72/199/EEC of 27 April 1972 establishing Community methods of analysis for the official control of feedingstuffs. (access on line: [publications.europa.eu/en/publication-detail/-/publication/e2f83ae9-26d3-4417-82e5-0d8e761cff26/language-en](http://publications.europa.eu/en/publication-detail/-/publication/e2f83ae9-26d3-4417-82e5-0d8e761cff26/language-en))
3. Boisen S., Fernandez J.A. Anim. Feed Sci. Technol. 1995. 51, 29-43

## Conclusion

Contrary to certain dental chews for dogs, Veggiedent Fresh is 100% digestible, as assessed by in vitro reference methods.

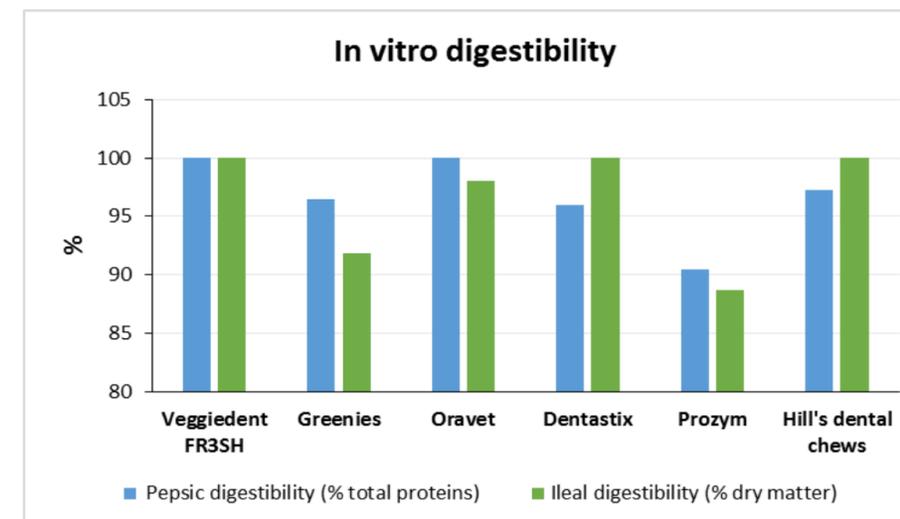
## Results

The humidity level and protein contents were variable between the dental chews (see table below). The humidity level ranged between 9.8% (Prozym sticks) and 16.1% (Oravet) with a median of 13.5% and the protein content ranged between 6.5% (Dentastix) and 43.1% (Oravet) of crude matter with a median of 15.55%.

The pepsic digestibility ranged between 90.5% (Prozym sticks) and 100% (Veggiedent FR3SH) of total proteins, with a median of 96.85% and the ileal digestibility ranged between 88.7% (Prozym sticks) and 100% (Veggiedent FR3SH) of dry matter, with a median of 99% (see table and figure)

Table: Humidity level, protein content, pepsic and ileal digestibilities of 6 dental chews for dogs, measured by in vitro methods

	Humidity (g/100g) [uncertainty]	Protein content (g/100g) [uncertainty]	Pepsic digestibility (% of total proteins)	Ileal digestibility (% of dry matter) [uncertainty]
Veggiedent FR3SH	14.6 [0.6]	18.8 [0.6]	100	100 [2]
Greenies Fresh	13.1 [0.6]	31.8 [1]	96.5	91.8 [2]
Oravet	16.1 [0.6]	43.1 [1.3]	100	98 [2]
Dentastix	13.9 [0.5]	6.5 [0.4]	96	100 [2]
Prozym Sticks	9.8 [0.6]	9.3 [0.4]	90.5	88.7 [2]
Hill's dental chews	12.9 [0.6]	12.3 [0.4]	97.2	100 [2]



Graph: Pepsic (blue) and ileal (green) digestibility of 6 dental chews for dogs, measured in vitro.

The pepsic digestibility is expressed as the % of total protein dissolved and the ileal digestibility as the % of dry matter dissolved. Veggiedent FRESH chews showed the highest levels of digestibility in vitro, compared to the 5 other dental chews tested.