

MICROALGAE AS A PROTEIN SOURCE & BENEFICIAL HEALTH INGREDIENT FOR USE IN PET TREAT PRODUCTION

Hayes, M.^{1*}, Gargan, C.¹, Verspreet, J.², Bastiaens, L.²

¹ Food BioSciences Department, Teagasc Food Research Centre, Ashtown, Dublin 15, Ireland.

Contact: Maria.Hayes@teagasc.ie; ² VITO, Flemish Institute for Technological Research, Boeretang 200, 2400 Mol, Belgium.

Abstract

Spirulina sp. (purchased and processed by Teagasc) and *Nannochloropsis* sp. (supplied by partners FZ Jülich, Germany) were characterised for their nutritional (protein, ash and lipid) content and their potential heart health benefits *in vitro* by determining their ability to inhibit the Angiotensin-I-converting enzyme (ACE-1; EC 3.4.15.1). High blood pressure in dogs is systolic blood pressure exceeding 150 mm Hg. Blood pressure above 150 mm Hg can cause negative health in dogs and signs of hypertension relate to the eyes, heart, central nervous system and kidneys. ACE-1 is central to the control of salt-water balance and blood pressure in humans but also in several mammals including dogs. *Spirulina* sp. protein hydrolysates and defatted *Nannochloropsis* sp. were used to manufacture dog treats due to their observed ACE-1 enzyme inhibition activities (Figure 1).

Methods

Dog treats were made with the microalgae in a recipe formulated at Teagasc Ashtown and were subsequently used in a non-invasive dog feeding trial. Ten senior dogs aged between 8-13 years old were fed over a period of 28 days in a "matched design" trial where the four different treat recipes were assessed for their palatability, digestibility, blood pressure reducing effects and acceptability. Blood pressure was measured every second day in the experimental period. Systolic and diastolic blood pressure recordings were taken. Weight gain was also determined.

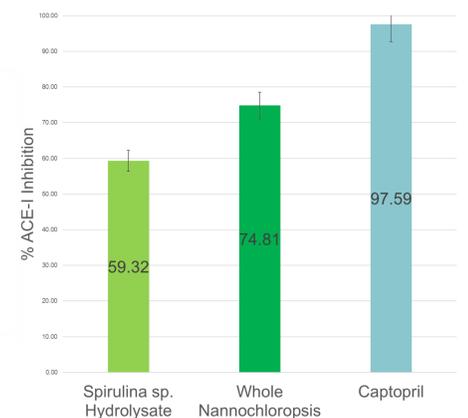


Figure 1: % ACE-1 inhibition by microalgae assayed at a concentration of 1 mg/ml against the control Captopril®

Results

At the end of the trial, it was found that dogs fed the *Spirulina* sp. treat gained weight but the treats had less acceptance in terms of palatability compared to treats made using defatted *Nannochloropsis* sp. When fed to the dogs, both treats caused a reduction in blood pressure in elderly dogs when assessed 28 days.



NUTRITION INFORMATION TYPICAL VALUES		
Nutrient	per 100g	per serving (5g)
Energy	1547kJ / 368kcal	77kJ / 18kcal
Fat	13g	0.6g
of which saturates	1.6g	0g
Carbohydrate	39g	2g
of which sugars	9.5g	0g
Protein	23g	1.1g
Salt	0.35g	0.02g



Figure 2: Formulation of dog treats with *Spirulina* sp. and *Nannochloropsis* sp. for use in a dog-feed trial. Controls & placebo treats were also tested.

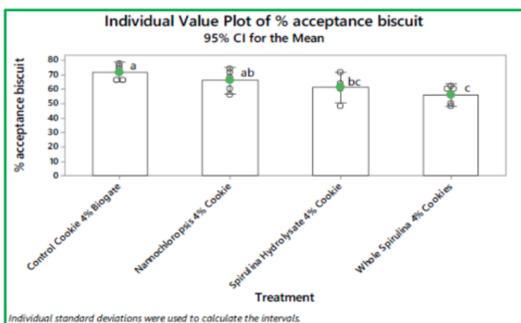


Figure 3: Acceptance of dog treats by dogs

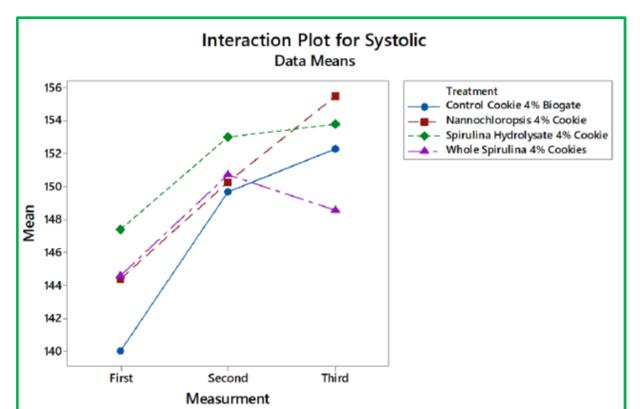
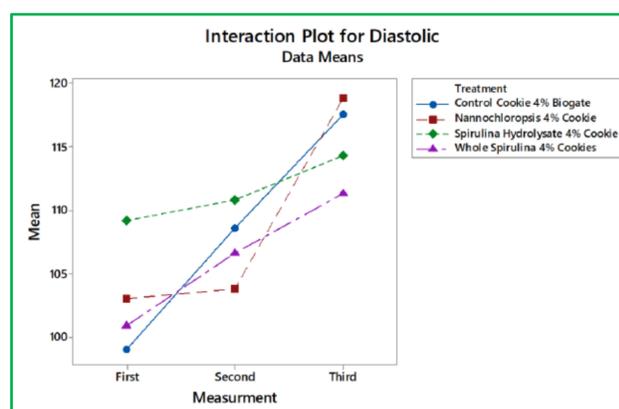


Figure 5a and 5b: Impact of dog treats made with *Spirulina* sp., *Nannochloropsis* sp., and control treats on diastolic and systolic blood pressure in elderly (8-13 year old) dogs measured over a 28 day period.

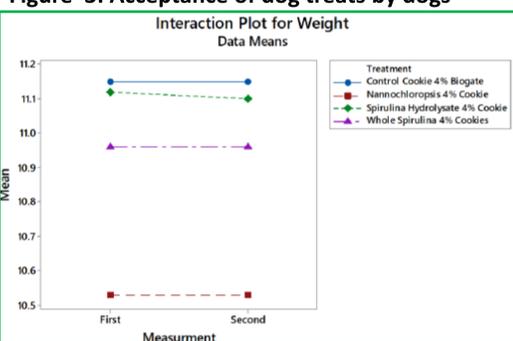


Figure 4: Impact of dog treats on weight gain in dogs

Conclusion

- Treats made using the hydrolysed *Spirulina* sp. impacted both systolic and diastolic blood pressure positively. Treats made with *Nannochloropsis* sp. had the greatest acceptability and also caused weight loss in elderly dogs.
- Microalgal treats may be used to control blood pressure in elderly dogs for the pet treat market which of high economic value and worth €21.5 billion in 2020.

