aquaculture europe 17

International Conference & Exposition

October 17-20, 2017

Dubrovnik, Crotia

ABSTRACTS

Cooperation For Growth

The slow growth in European aquaculture industry over recent years is worrying. Farming of Atlantic salmon is not growing due to problems with sea lice and sites and the sea bass and sea bream industry is not booming either, due to a number of reasons. And new species are slow to develop into commercial production.

Very much can be achieved by cooperating better to achieve growth in the industry. By working together, we can get more for the same amount of money. We do not have to repeat experiments or mistakes others have done. The basic principle in science is to read, learn and build on the work of other scientists. Reading published papers are important but to meet and discuss with the authors face to face is even better. And here in Dubrovnik, Aquaculture Europe 2017 provides an excellent opportunity for scientists and fish farmers to work together and discuss problems and cooperation.

Even with todays' social networks, meeting with real people is important and the basis for good personal networks and relationships. And as EU funding seems to require even broader project consortia, networks such as EAS and events such as AE2017 are crucial for successful proposals. But AE2017 also offers the opportunity to meet with suppliers of equipment and know-how. Cooperating with them is also a great avenue to bring out new ideas and improve research and production.

We should not forget that fish farming requires the support of a long value chain, from administrators and legislators to consumers. Cooperation between everybody is important for growth and success. I would hope that everybody finds their visit to AE2017 productive and would want to come back for more at our future meetings next year for AQUA 2018 (co-organised with WAS) in Montpellier, France from August 25-29 and at AE2019 to be held in Berlin, Germany from October 7-10.

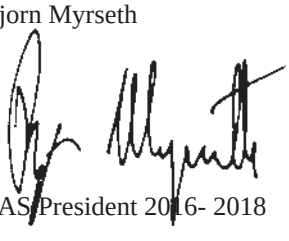
Organising an event of this size and complexity is not a one man show and I would especially like to express my thanks to the Steering Committee members, under the leadership of Ivan Katavić from the Institute of Oceanography in Split and the Local Organising Committee, coordinated by Ana Gavrilovic of the University of Pula for their enormous commitment to this event. The AE2017 Program co-Chairs Snjezana Zrncic of the Croatian Veterinary Institute and Constantinos Mylonas of HCMR in Greece have been doing work that is critical for the success of the conference and have put in a lot of work, together with the chairs of the various sessions.

Since our 40th anniversary in 2016, EAS has been working hard to update our strategy, focusing on our "core business" of membership and events management, with a third element of projects and services when time and money permit. To learn more about this, I invite all EAS members to attend our annual General Assembly, to be held on Wednesday from 17h30 in the the Elafiti 1 room of the Lacroma Hotel.

The support of our sponsors is also crucial for keeping participation costs at affordable levels and is very much appreciated. I would like to thank Our Gold sponsor Biomar, Silver sponsor DSM and AE2017 support provided by The Croatian Government, Chamber of Commerce, the University of Dubrovnik, the Dubrovnik Aquarium, leading Croatian producer Cromaris and the German company Kunststoff Spranger.

While you are here in Dubrovnik, please make sure you find time to visit and enjoy the more than 1000 year-old city.

Bjorn Myrseth



EAS President 2016- 2018

TABLE OF CONTENTS

To find abstracts for a specific author or subject, use the pdf search features built into Adobe Acrobat.

aquaculture europe 17

ABSTRACTS

EFFECT OF SONICATION ON THE NUTRIENT DIGESTIBILITY OF *Chlorella sorokiniana* IN RAINBOW TROUT (*Oncorhynchus mykiss*)

Tulli[1] F., Pascon[1] G., Niccolai[2] A., Chini Zittelli[2] G., Tredici[3] MR., Valente[4] LMP, Tibaldi[1] E.

[1]Dipartimento di Scienze Agroalimentari, Ambientali e Animali, University of Udine, Italy
[2]Centro per lo studio degli Ecosistemi – CNR, Firenze, Italy
[3]Dip. di Scienze delle Produzioni Agroalimentari e dell'Ambiente, University of Firenze, Italy
[4]CIIMAR, Centro Interdisciplinar de Investigação Marinha e Ambiental and ICBAS, Universidade do Porto, Terminal de Cruzeiros do Porto de Leixões, Matosinhos, Portugal.
Corresponding author: francesca.tulli@uniud.it

Introduction

Despite the growing interest in microalgae as sustainable sources of nutrients in complete feeds and recent findings indicating their good potential as a bulk feedstuff for formulated aquafeeds, their dietary inclusion, even at low level, often implies declining nutrient and energy availability in carnivorous fish species (Sorensen et al., 2016; Kousulaki et al., 2015; Tibaldi et al., 2015; Tulli et al., 2012; Burr et al., 2011). A possible adverse role of microalgae cell wall structure and composition on nutrient availability has been hypothesized by different authors. This study was carried out to test sonication as a possible post production cell wall disruption technique to increase the digestibility of *Chlorella sorokiniana* freeze dried biomass in rainbow trout.

Material and Methods

Chlorella sorokiniana (IAM 212 strain from the Culture Collection of Fotosintetica & Microbiologica S.r.l.) biomass (400 g dry weight) was cultivated at the Laboratory for the Ecosystem Studies of CNR, Sesto Fiorentino (FI, Italy) in "Green Wall Panel" photobioreactors (Tredici et al., 2011) under standardized cultivation conditions. An aliquote of the biomass was subjected to sonication (20 kHz and 130 W) (MicrosonTM XL2000, Misonic Inc., Farmingdale, NY, USA) for 30 min at < 25°C. From a basal reference diet mash (CTR) including Chilean fishmeal, wheat gluten, wheat middlings, solvent extracted soybean meal, fish and rapeseed oils, two test diets were obtained including finely ground intact (B1) and sonicated (B1s) *C. sorokiniana* dried biomass at a 12:88 w:w microalgae to reference diet ratio. All diets were added with acid insoluble ash (1.0 %) as an inert marker before being extruded and dried into 3 mm pellets at the facilities of CUSA - University of Udine, Italy.

The apparent digestibility coefficients (ADCs) of dry matter, protein, organic matter and energy for reference and test diets were estimated *in vivo* with juvenile rainbow trout using 9 units of three 75-L tanks, each stocked with 12 fish (52.4±1.5 g), fitted with a settling column for faecal collection. Each diet, offered to visual satiety in two daily meals, was evaluated over three independent 10-day faecal collection periods preceded by 7 days adaptation to the new diet according to a complete Latin square design. Freeze-dried faecal samples were analysed for dry matter, ash, nitrogen, lipid, energy and acid insoluble ash according to official analytical methods. ADCs were calculated by difference relative to those measured with the reference diet according to Cho & Slinger (1979).

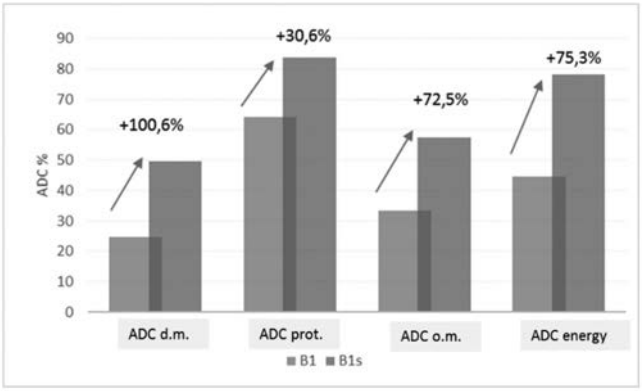


Fig. 1. Effect of sonication on the ADCs of *Chlorella sorokiniana*

(Continued on next page)

Results

The intact *C. sorokiniana* (B1) resulted in ADC of 24.7±3.58 % for dry matter, 64.2±2.1 % for protein, 33.4±4.3 % for organic matter and 44.5±3.5 for energy. Sonicated *Chlorella* (B1s) resulted in ADC of 49.6±3.7 % for dry matter, 83.9±1.5 % for protein, 57.5±5.4 % for organic matter and 78.0±3.8 gross energy. As shown in Figure 1, the apparent digestibility coefficients of all nutrients and energy significantly improved after sonication ($P<0.05$; $P<0.001$).

Discussion

The present results provide the first estimate of the effect of sonication on the apparent digestibility coefficients of a green microalgae, *C. sorokiniana,* for a fish species. The sonication treatment applied to the microalgae biomass significantly improved the availability of nutrients and energy compared to the intact *Chlorella*. Likewise was reported in rats (Janczyk et al., 2007), also in rainbow trout the physical treatment applied to the microalgae seems to affect the microalgae cell wall, letting the nutrients become more bioavailable for animal digestion. The algae nutritional potential was largely enhanced and resulted in nutrient digestibility estimates comparable to conventional plant protein rich ingredients, which use are already consolidated in trout feed formulations.

These results open new perspectives for the utilization of *Chlorella* spp. biomass as alternative ingredient in dietary formulations for carnivorous fish species and the exploitation of its biological properties in aquafeeds. They may also provide clues for finding physical or enzymatic cell wall rupture treatments for green microalgae more compatible with industrial mass production processes.

Aknowledgements

This study was partially supported by MARINALGAE4aqua “Improving bio-utilisation of marine algae as sustainable feed ingredients to increase efficiency and quality of aquaculture production” ERA-NET COFASP/004/2015.

References

Cho C.Y. & Slinger, S.J. (1979) Apparent digestibility measurement in feedstuffs for rainbow trout. In: Haver J.E., Tiew K. (Eds.), Finfish Nutrition and Fishfeed Technology, Vol. II. Heenemann, Berlin, pp. 239-247.

Janczyk P., Franke H., Souffrant W.B. (2007) Nutritional value of *Chlorella vulgaris*: Effects of ultrasonication and electroporation on digestibility in rats. Animal Feed Science and Technology 132: 163-169.

Sørensen M., G. M. Berge, K. I. Reitanc, B. Ruyter (2016) Microalga *Phaeodactylum tricornutum* in feed for Atlantic salmon (*Salmo salar*) —Effect on nutrient digestibility, growth and utilization of feed. Aquaculture, 460(1): 116–123.

Tibaldi E., Chini Zittelli G., Parisi G., Bruno M., Giorgi G., Tulli F., Venturini S., Tredici M.R., Poli B.M. (2015) Growth performance and quality traits of European sea bass (*D. labrax*) fed diets including increasing levels of freeze-dried *Isochrysis* sp. (T-ISO) biomass as a source of protein and n-3 long chain PUFA in partial substitution of fish derivatives. Aquaculture, 440: 60–68.

Tredici M.R., Rodolfi L., Sampietro G., Bassi N. (2011) Low-cost photobioreactor for microalgae cultivation. Patent WO 2011/013104 A1

Tulli F., Chini Zittelli G., Giorgi G., Poli B. M., Tibaldi E. & Tredici M. R. (2012) Effect of the Inclusion of Dried *Tetraselmis suecica* on Growth, Feed Utilization, and Fillet Composition of European Sea Bass Juveniles Fed Organic Diets. Journal of Aquatic Food Product Technology, 21 (3): 188-197.