



The 2nd International Conference 'Insects to Feed the World' (IFW 2018)

15-18 May 2018

Wuhan, China P.R.

This supplement of *Journal of Insects as Food and Feed* can be found at

<https://www.WageningenAcademic.com/IFW2018>.

Local organising committee

- **Ziniu Yu**
Huazhong Agricultural University, China P.R.
- **Longyu Zheng**
Huazhong Agricultural University, China P.R.
- **Jibin Zhang**
Huazhong Agricultural University, China P.R.
- **Hong Yang**
Central China Normal University, China P.R.
- **Yusheng Liu**
Shandong Agricultural University, China P.R.
- **Ying Feng**
Chinese Academy of Forestry Sciences, China P.R.
- **Richou Han**
Guangdong Institute of Applied Biological Resources,
China P.R.
- **Yun Ke**
State Key Laboratory of Agricultural Microbiology,
Huazhong Agricultural University, China P.R.
- **Zheng Wu**
JM Green Co. Ltd., China P.R.

Secretariat

- **Longyu Zheng**
Huazhong Agricultural University, China P.R.
- **Qing Li**
Huazhong Agricultural University, China P.R.
- **Minmin Cai**
Huazhong Agricultural University, China P.R.
- **Wu Li**
Huazhong Agricultural University, China P.R.
- **Linghua Ding**
Huazhong Agricultural University, China P.R.
- **Xiaopeng Xiao**
Huazhong Agricultural University, China P.R.
- **Zhaolu Zhu**
Huazhong Agricultural University, China P.R.

International advisory board

South and Central America

- **Eraldo M. Costa Neto**
Universida de Estadual de Feira de Santana, Brazil.

North America

- **Katharina Unger**
Livin Farms Ltd., Hong Kong.
- **Jeffery K. Tomberlin**
Texas A&M University, USA.

Asia

- **Huanchun Chen**
Chinese Academy of Engineering Academicians,
Huazhong Agricultural University, China P.R.
- **Long Li**
Sericultural Research Institute, Chinese Academy of
Agricultural Sciences, Laboratory of Quality & Safety
Risk Assessment for Sericultural Products and Edible
Insects, China P.R.
- **Yongping Huang**
Institute of Plant Physiology and Ecology Shanghai
Institutes for Biological Sciences, Chinese Academy
of Sciences, China P.R.
- **Yupa Hanboonsong**
Khon Kaen University, Thailand.
- **Victor Benno Meyer-Rochow**
Research Institute of Luminous Organisms, Japan.

Europe

- **Antoine Hubert**
International Platform of Insects for Food and Feed
(IPIFF), Belgium.
- **Arnold van Huis**
Wageningen University & Research, the Netherlands.

Africa

- **Segenet Kelemu**
Africa Insect Science for Food and Health, Kenya.

G. Daoulas

Ynsect, Evry Genopole Campus 3 Bat 2, 91000 Evry, France; gda@ynsect.com

In 2015, Ynsect demonstrated the high quality and performance of its blockbuster product YnMeal™ (*Tenebrio molitor* defatted protein meal) in juvenile rainbow trouts in comparison with a super prime fish meal 70 LT (+34% weight gain and -15% FCR after 90 days). Unpublished trials (for confidentiality reasons) on poultry and mice also showed significant impact on growth, well-being and the health of these animals. The company aims to diversify its market targets in many species and different regions. The white leg shrimp (*Litopenaeus vannamei*) is one of the main species in aquaculture, of which total production amounts to 3.7 million tonnes per year and where the largest producers are China, Thailand, Vietnam, and Indonesia. Ynsect launched a new trial with Kasetsart University (Bangkok, Thailand) on juvenile shrimps in 2016. The control diet contains 25% fish meal (FM) and a total of five different diets with increasing rates of inclusion of YnMeal™ as a replacement for the FM, which were designed with iso-nutritive contents. No significant difference was assessed in the palatability test between the diets. The T5 diet (100% FM replacement by YnMeal™ increased weight gain by 21% and final body weight by 12.4% after 8 weeks of feeding, but the best results were found for the 10.3% YnMeal™ inclusion in the diet (50% FM replacement): an increase by 33.7% in weight gain and by 24% in final body weight after 8 weeks of feeding. The FCR decreased significantly by up to 25%. The apparent digestibility of proteins and lipids was above 97.4%. A challenge test was performed with a frequent pathogen in aquaculture (*Vibrio parahaemolyticus*), responsible for the well-known early mortality syndrome (EMS). After 10 days, the survival rate reached 90% in the diet with 50% FM replacement by YnMeal™ compared to 56.7% in the control diet. Mortality could be observed directly from 5% YnMeal™ inclusion. The mortality was divided by up to 4, which is due to the patented bacteriostatic effect of YnMeal™ and the constant increase of the phenol oxidase activity (up to +400% in the diet with 100% FM replacement by YnMeal™). Since the shrimp does not have an acquired immune system, this immuno-stimulant property is very promising.

Apparent digestibility of insect protein meals for rainbow trout

Session 7
Effect of insect diets on animals 9L. Gasco¹, A. Schiavone², G. Serra³, R. Anedda⁴, A. Trocino⁵, C. Caimi¹, M. Gariglio², V. Malfatto¹, S. Dabbou², E. Devic⁶, S. Chatzifotis⁷, M. Meneguz¹ and F. Gai⁸

¹Univ. Turin, Dep. Agricultural, Forest and Food Sciences, Largo P. Braccini 2, 10095 Grugliasco, Italy, ²Univ. Turin, Dep. Veterinary Sciences, Largo P. Braccini 2, 10095 Grugliasco, Italy, ³CNR, Institute of Ecosystem Study, Traversa La Crucca 3, Regione Balduina, 07100 Sassari, Li Punti, Italy, ⁴Porto Conte Ricerche S.r.l., S.P. 55 Porto Conte, Capo Caccia km 8,400 Loc. Tramariglio, 07041 Alghero, Italy, ⁵Univ Padua, Dep. Comparative Biomedicine and Food Science, Viale dell'Università, 16, Polo di Agripolis, 35020 Legnaro (PD), Italy, ⁶Entofood Sdn Bhd, Viva Residency, Unit B013, Jalan Supiah Pillay, Wilayah Persekutuan, 51200 Kuala Lumpur, Malaysia, ⁷Institute of Marine Biology, Biotechnology and Aquaculture, HCMR, Thalassocosmos, Gournes Pedidos, 715 00 Heraklion, Crete, Greece, ⁸CNR, Institute Science of Food Production, Largo P. Braccini 2, 10095 Grugliasco, Italy; laura.gasco@unito.it

Insect meals are considered to be promising future ingredients for aquaculture feeds. In past feeding trials in rainbow trout, insect meals were included in diets only on the basis of their nutrients content and energy density without taking into account their biological availability due to the lack of their digestible values. Apparent digestibility (ADC) provides good indication of the bioavailability of nutrients and energy thus providing rational basis for the correct inclusion of feedstuffs. The aim of this research was to assess, in an *in vivo* trial on rainbow trout, the ADC of five full fat insect meals: one *Tenebrio molitor* (TM), two *Hermetia illucens* obtained through two different process (HI1 and HI2), one *Musca domestica* (MD), and one *Alphitobius diaperinus* (AD). Fish were fed a high-quality reference diet (R) and test diets obtained mixing the R diet with each of the test ingredients at a ratio of 70:30. Diets contained 1% celite as inert marker. Fish were fed to visual satiety twice a day and faecal samples collected using a continuous automatic device. Faeces were freeze dried and frozen (-20 °C) until analyses. The ADC of dry matter, crude protein and ether extract of each insect meal diet were calculated. ADC for dry matter varied between 70.07 (HI1) and 80.85 (TM). ADC for protein was above 84% in all treatments and resulted the highest in MD, TM and AD treatments. Ether extract apparent digestibility significantly differed among diets with the highest value reported for TM treatment. All treatments reported values higher than 96%. Observed differences could be due to the insect species and meal treatment but in general, tested insect meals were highly digestible for rainbow trout. The results from this research could be useful to optimize the diet formulation.