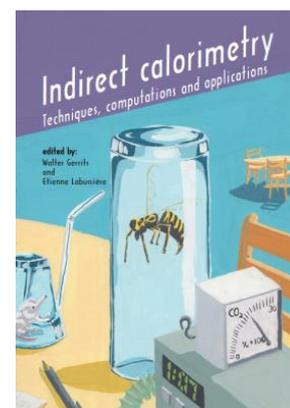


# Course on indirect calorimetry



Directly following the 7<sup>th</sup> International Symposium on Energy and Protein Metabolism and Nutrition in Granada, Spain from September 12-15, 2022, **Wageningen University, the Netherlands (WU)**, and the **INRAE, Rennes, FR** will jointly organize a workshop on indirect calorimetry and selected applications. The course will be held **on September 15-16, 2022 in Granada**.

## *For whom?*

The course is aimed at educating those (PhD students, technical staff, researchers) who use measurements of gaseous exchange ( $\text{CO}_2$ ,  $\text{O}_2$ ,  $\text{CH}_4$ , etc) in their research program, and/or are setting up facilities in which those measures can be performed, either with or without climate control. Depending on the level of experience of the audience, we intend to provide lectures/practicals for advanced data analysis.

## *Organization*

The organization will be a joint effort of Wageningen University and INRA and will be hosted by the Spanish National Research Council (CSIC) and the University of Granada. Parts of the course will be taught by experts in the field from other institutions.

## *Preliminary program*

In the course, attention will be paid to the basics of indirect calorimetry, i.e. i) setting up a calorimetry unit; ii) the measurement of gas exchange; iii) dealing with the data: Brouwer's equation and modelling techniques. Furthermore, selected applications will be presented and discussed, including i) combining calorimetry with stable isotope research; ii) separating activity related from activity free heat production; iii) measuring methane emission in respiration chambers or using alternative techniques. Depending on the level of experience of participants, parts of the course will be devoted to advanced data analysis.

The course will comprise lectures, computer practicals and dedicated sessions for exchanges between participants. We are trying to create an opportunity for hands-on experience on-site.

## *Registration and fee*

Registration before May 20, 2022 via the secretariat of the Animal Nutrition Group at WUR. Please use the registration form below.

The registration fee will be €350 for PhD students and €700 for other participants. It includes dinner on Thursday, lunch on Friday and the book: Indirect Calorimetry – techniques, computations and applications, which will be used as course material. Lodging arrangements are your responsibility. The maximum number of participants is 25, and will be dealt with on a first-come first serve basis. If the number of registrations does not exceed 15 the course will be cancelled. In that case, registrants will be notified before June 1st.

*More information*

For further information please contact Walter Gerrits at [walter.gerrits@wur.nl](mailto:walter.gerrits@wur.nl)

Wageningen University  
Walter.J.J. Gerrits, PhD  
Professor in Animal Nutrition  
Wageningen University, NL

INRAE  
Etienne Labussière, PhD  
Researcher Feeding and Nutrition  
INRAE Rennes, FR



## Preliminary Programme Course on Indirect Calorimetry

<b>Thursday September 15</b>	
13:30 – 13:45	<b>Welcome, intro to course</b> Course overview <i>Walter Gerrits, Wageningen UR, NL</i>
13:45 – 14:30	<b>Indirect calorimetry</b> Calculating heat production from gas exchange Usually done by the Brouwer equation. Explanation of the basics and assumptions. Potential hick-ups in particular species. <i>Walter Gerrits, Wageningen UR, NL</i> <i>Etienne Labussière, INRAE, FR</i>
14:45 – 15:30	<b>Stoichiometry of nutrient metabolism</b> From intracellular to whole animal level <i>Jaap van Milgen, INRAE, FR</i>
16:00 – 17:30	<b>Design of calorimeters / recovery testing / water balance</b> Background and general principles <i>Marcel Heetkamp, Wageningen UR, NL</i> <i>Etienne Labussière, INRAE, FR</i>
17:30 – 18:15	<b>Practical building of respiration chamber</b> Melissa Terranova, ETH Zurich, CH
20:30	<b>Informal Dinner</b>
<b>Friday September 16</b>	
08:30 – 10:30	<b>Demo calorimetry setup</b> <i>Francesco Mannara, Harvard Apparatus / Panlab</i>
11:00 – 11:45	<b>Application 1: Calorimetry on animals</b> Duration of measurement, (behavioural) adaptation and activity measurement – emphasis on companion animals <i>Kate Shoveller, University of Guelph, CA</i>
11:45 – 12:30	<b>Application 2: Measuring methane</b> Measurement of methane emissions in different systems. <i>Chris Reynolds, University of Reading, UK</i>
<b>Lunch</b>	
13:30 – 14:30	<b>Application 3: stable isotope tracer methodology</b> Moving from a complete energy balance towards substrate oxidation: use of stable isotopes <i>Walter Gerrits, Wageningen UR, NL</i>
14:30 – 16:00	<b>Calculating heat production and energy balance</b> Computer practical with the objective of dealing with the steps from measuring gas concentrations, air flow, etc. into a complete energy balance; Important calibration steps of the calorimetry system will be dealt with. <i>Marcel Heetkamp, Wageningen UR, NL</i> <i>Walter Gerrits, Wageningen UR, NL</i> <i>Etienne Labussière, INRAE, FR</i>

16:30 – 17:30	<p><b>Modeling of heat production</b></p> <p>Discussing various approaches of partitioning of heat production into the components like the thermic effect of feeding, basal metabolic rate and activity related heat production. Three approaches will be illustrated using the same dataset. Differences, pro's and con's will be discussed.</p> <p><i>Etienne Labussière, INRAE, FR</i>  <i>Walter Gerrits, Wageningen UR, NL</i></p>
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## Lecturers

Walter Gerrits, PhD, Professor in Animal Nutrition, Wageningen University, NL  
 Marcel Heetkamp, Senior Technician Calorimetry, Wageningen University, NL  
 Francesco Mannara, PhD, Senior Applications Scientist, Harvard Apparatus / Panlab, ES  
 Jaap van Milgen, PhD, Senior Researcher INRA, Rennes, FR  
 Melissa Terranova, PhD, Department of Environmental Systems Science, ETH Zurich, CH  
 Etienne Labussière, PhD, Senior Researcher INRAE, Rennes, FR  
 Chris Reynolds, PhD, Professor of Animal & Dairy Science, University of Reading, UK  
 Kate Shoveller, PhD, Professor, Department of Animal Biosciences, University of Guelph, CA

## Course leaders

Walter Gerrits  
 Etienne Labussière

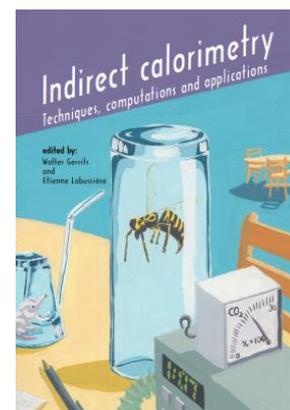
## Local organization

Ignacio Fernández-Figares, PhD, Senior researcher in Animal Nutrition, Estación Experimental del Zaidín – CSIC, Granada, ES  
 Manuel Garcia Gallego, PhD, Professor of Zoology, Faculty of Sciences, University of Granada, Granada, ES



Registration form

# Course on indirect calorimetry 2022



Submit before the registration deadline May 20, 2022

Name (first & last)	
Address	
Zip code	
Country	
Email	
Phone (preferably where we can reach you around the start of the course if needed)	
Job details	
PhD student	Yes / No
Experience (please elaborate, we will use this to adjust the course contents)	
What do you expect to learn during the course	

Please complete this form and Email it to: [yvonne.vanholland@wur.nl](mailto:yvonne.vanholland@wur.nl).

You will receive a confirmation of receipt of your registration. Please note the course will be cancelled if the number of participants does not exceed 15 (by May 20). In this case, you will be informed before June 1<sup>st</sup>. Payment of the registration fee is due on June 31<sup>st</sup>. You will receive payment details after registration. Do not hesitate to contact [walter.gerrits@wur.nl](mailto:walter.gerrits@wur.nl) in case of questions.