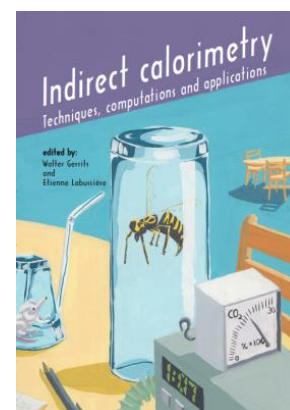


# Course on indirect calorimetry



Directly following the 5<sup>th</sup> International Symposium on Energy and Protein Metabolism and Nutrition in Krakow, Poland from September 12-15, 2016, **Wageningen University, the Netherlands (WU)**, and the **INRA, Rennes, FR** will jointly organize a workshop on indirect calorimetry and selected applications. The course will be held **on September 15-17, 2016 in Krakow**.

## For whom?

The course is aimed at educating those (PhD students, technical staff, researchers) who are, or aim to 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.

## Venue

Aleje Adama Mickiewicza 24/28, Krakow. It is about 30 minutes walking from the ISEP venue

## Registration and fee

The registration deadline has already passed. You may, however, contact [yvonne.vanholland@wur.nl](mailto:yvonne.vanholland@wur.nl) to inform yourself about the possibility to participate.

The registration fee is €350 for PhD students and €700 for other participants. It includes dinner on Thursday and lunch breaks on Friday and Saturday, lunches on Friday and Saturday and the book: Indirect Calorimetry – techniques, computations and applications, which will be used as course material. Lodging arrangements are your own responsibility.

# Course Indirect Calorimetry

## Final Program

	Title	Who
<b>Thursday September 15</b>		
16:00 – 16:30	<b>Welcome, intro to course</b> Course overview	Walter Gerrits, Wageningen UR, NL
16:30 – 17:15	<b>Calculating heat production from gas exchange</b> Usually done by the Brouwer equation. Explanation of the basics and assumptions. Comparison with serial slaughter trials. Potential hick-ups in particular species;	Walter Gerrits, Wageningen UR, NL Etienne Labussière, INRA, FR
17:30 – 18:30	<b>Demo calorimetry setup</b>	John Lighton, Sable Systems International, USA
Dinner at a nearby restaurant, price included in course fee		
20:30 – 22:00	<b>Informal session</b> Informal gathering	
<b>Friday September 16</b>		
09:00 – 09:45	<b>Design of calorimeters</b> General principles, brief overview – emphasis on lab scale systems	John Lighton, Sable Systems International, USA
09:45 – 10:30	<b>Design of calorimeters for large animals</b> Dealing with large, climatized systems with flexible walls	Marcel Heetkamp, Wageningen UR, NL
11:00 – 11:45	<b>Application 1: calorimetry in companion animals</b> Duration of measurement, (behavioural) adaptation and activity measurement	Kate Shoveller, University of Guelph, CA
11:45 – 12:30	<b>Application 2: Measuring methane</b> Measurement of methane emissions in different systems, greenfeed systems vs hood chambers vs open circuit systems.	Ermias Kebreab, UC Davis, USA
Lunch in nearby restaurant, price included in course fee		
13:30 – 14:15	<b>Application 3: heat and cold stress</b> Measurement of heat production and energy balance under different climatic conditions (temperature, relative humidity).	John Gaughan, UQ, AU Marcel Heetkamp, Wageningen UR, NL
14:15 – 15:00	<b>Application 4: stable isotope tracer methodology</b> Moving from a complete energy balance towards substrate oxidation: use of stable isotopes	Joost van den Borne, Friesland-Campina, NL
15:30 – 16:15	<b>Respirometry at tissue level</b> (tentative)	Isabelle Ortigues, INRA, FR
<b>Saturday September 17</b>		
9:00 – 10:30	<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.	Marcel Heetkamp, Wageningen UR, NL Walter Gerrits, Wageningen UR, NL Etienne Labussière, INRA, FR
11:00 – 12:00	<b>Modeling of heat production (I)</b> 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.	Etienne Labussière, INRA, FR Walter Gerrits, Wageningen UR, NL Rik van Erp, Wageningen UR, NL
Lunch in nearby restaurant, price included in course fee		
13:00 – 14:30	<b>Modeling of heat production (II)</b> Computer practical separating heat production into the thermic effect of feeding (TEF) and basal metabolic rate, activity related heat production. Three approaches will be illustrated using the same	Etienne Labussière, INRA, FR Marcel Heetkamp, Wageningen UR, NL Walter Gerrits, Wageningen UR, NL Rik van Erp, Wageningen UR, NL

	dataset. Differences, pro's and con's will be discussed.	
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## Course leaders

**Walter JJ Gerrits**, PhD, Wageningen University, Animal Nutrition Group, Wageningen, the Netherlands

**Etienne Labussière**, PhD, Researcher, INRA Rennes, FR

## Lecturers

**Rik van Erp**, MSc, Wageningen University, Animal Nutrition Group, Wageningen, The Netherlands

**John Gaughan**, PhD, School of Agriculture and Food Sciences, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Gatton, Australia

**Marcel HJ Heetkamp**, Wageningen University, Adaptation Physiology Group, Wageningen, the Netherlands

**Ermias Kebreab**, PhD, Professor of Animal Science, Department of Animal Science, University of California, Davis, USA

**John Lighton**, PhD, President and Chief Scientist, Sable Systems International, Las Vegas, USA

**Isabelle Ortigues**, Researcher, INRA, Centre de recherche de Clermont-Ferrand –Theix-Lyon, France

**Kate Shoveller**, PhD, University of Guelph, Canada

**Joost JGC Van den Borne**, PhD, Friesland-Campina Research, Wageningen, the Netherlands