



# Feed Ingredient Course

## June 25 to 29, 2018

### Organizers

Universidad Politécnica de Madrid, Madrid, Spain  
University of Illinois, Urbana-Champaign, USA

### Co-sponsors

USSEC (St. Louis)  
Fedna (Madrid)  
Others to be announced

### Program Directors

Professor Hans H. Stein, University of Illinois, USA  
Professor Gonzalo G. Mateos, Universidad Politécnica de Madrid, Spain

### Location

Campus of Universidad Politécnica, Madrid.  
(Exact location to be announced after final registration.)



# **Course Objective**

To describe commonly used feed ingredients in diets in terms of chemical composition, anti-nutritional factors, digestibility of energy and nutrients, recommended inclusion rates for pigs and poultry, and quality control. At the conclusion of the course, participants will have gained knowledge that will enable them to effectively evaluate and use feed ingredients that are available to the global feed industry.

## **Registration and contacts**

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Joan Archs ([jlatoledo91@gmail.com](mailto:jlatoledo91@gmail.com); phone: +34 616 384 420)

Guillermo Fondevila ([guillermofondevila@gmail.com](mailto:guillermofondevila@gmail.com); phone: +34 653 626 017)

Cost of attending the course: 500 €

PhD students: Free of charge

Co-sponsors' invitees: Free of charge

## **Payment Details**

Please transfer your payment to the following bank account:

Account name: Fundación Española para el Desarrollo de la Nutrición Animal

Account number or IBAN: ES64 0182 4058 9100 0003 7276

Swift Code/BIC: BBVAESMM

Bank name: BBVA

Bank address:

Street: Avda. Reina Victoria, 66

City: Madrid

Zip Code: 28003

Country: Spain

Designation: Ingredient course.

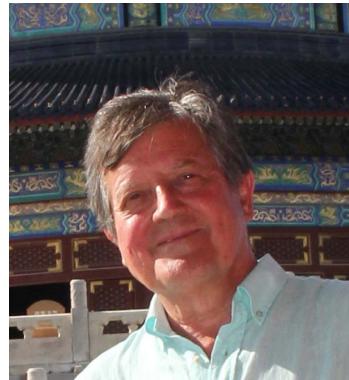
# Speakers and Instructors



**Juan Acedo-Rico**  
Acedo-Rico & Asociados sl  
Madrid, Spain



**Gloria A. Casas**  
Universidad Nacional de Colombia  
Bogotá, Colombia



**Gonzalo G. Mateos**  
Universidad Politécnica de Madrid  
Spain



**Francesc Molist**  
Schothorst Feed Research  
The Netherlands



**Charles Martin Nyachoti**  
University of Manitoba  
Canada



**Markus Rodehutscord**  
Hohenheim University  
Germany



**Hans H. Stein**  
University of Illinois  
USA



**Rommel C. Sulabo**  
University of the Philippines  
Los Baños, The Philippines



**Birger Svhuis**  
Norwegian University of Life Sciences  
Aas, Norway



**Ester Vinyeta**  
Nutreco BV  
Spain

# **Program**

## **Day I. Monday June 25, 2018**

<b>9:00</b>	Arrival of participants Welcome, introduction, and overview. ....	Hans H. Stein and Gonzalo G. Mateos
<b>Session I: Chemical composition of feed ingredients and procedures for evaluating nutritional value.</b>		
Instructors: G. G. Mateos, R. C. Sulabo, C. M. Nyachoti and H. H. Stein		
<b>9:15</b>	Nutrient composition and nutritive value. ....	Gonzalo G. Mateos
	- Proximate analyses	
	- Amino acid profile and mineral content.	
<b>10:15</b>	Fiber fractions in feed ingredients, definition and analysis. ....	Hans H. Stein
<b>11:15</b>	Coffee break	
<b>11:45</b>	Nutrient digestibility and procedures for evaluation. ....	Rommel C. Sulabo
<b>12:45</b>	Lunch	
<b>14:00</b>	Energy systems for pigs and poultry and methods for evaluation. ....	C. Martin Nyachoti
<b>Session 2: Pulse crops. Overview over global production, types, nutritional composition, energy content, anti-nutritional factors, inclusion rates, and quality control.</b>		
Instructors: C. M. Nyachoti, H. H. Stein, G. G. Mateos		
<b>15:00</b>	Global production of pulse crops. ....	Hans H. Stein
<b>15:05</b>	Field peas, split peas, and pea protein concentrate. ....	C. Martin Nyachoti
<b>16:00</b>	Coffee break	
<b>16:20</b>	Faba beans. ....	Gonzalo G. Mateos
<b>16:45</b>	Lupins, lentils, and other legumes. ....	C. Martin Nyachoti
<b>17:15</b>	Adjourn	

## **Day 2. Tuesday June 26, 2018**

### **Session 3: Oilseeds and oilseed meal: Overview over global production, processing technology, nutrient content, antinutritional factors, inclusion rates, and quality control.**

Instructors: C. M. Nyachoti, G. G. Mateos, R. C. Sulabo, and H. H. Stein

**9:00** Global production of oilseeds and oilseed meal. ....Hans H. Stein

**9:10** Soybeans and soybean derived products: full fat soybeans, soybean meal, soybean expellers. ....Gonzalo G. Mateos

**10:15** Added value soybean products: fermented and enzymatically processed soybean meal, soy protein concentrates, and soy protein isolate. ....Hans H. Stein

**10:45** Quality control of soy products. ....Gonzalo G. Mateos

**11:15** Coffee break

**11:45** 00-Rapeseeds/canola seeds, 00-rapeseed/canola meal, 00-rapeseed/canola expellers. Conventional and high protein 00-rapeseed/canola. ....C. Martin Nyachoti

**12:45** Lunch

**14:00** Cotton seeds and cotton seed meal, peanut meal, sesame meal. ....Rommel C. Sulabo

**14:20** Sunflower seeds, sunflower meal, sunflower expellers, and sunflower protein concentrate. ....C. Martin Nyachoti

**14:40** Copra meal, copra expellers, palm kernel meal, palm kernel expellers. ....Rommel C. Sulabo

**15:00** Coffee break

### **Session 4: Fats and oils.**

Instructors: G. G. Mateos, C. M. Nyachoti

**15:20** Animal fats (tallow, lard, poultry grease, fish oil), plant oils (maize oil, soybean oil, palm oil, copra oil), and technical fats. ....Gonzalo G. Mateos

**15:45** Quality control of fats. ....Gonzalo G. Mateos

**16:15** Energy assessment of fats and oils. ....C. Martin Nyachoti

**16:45** Inclusion rates and influence of lipid sources on feed quality. ....Gonzalo G. Mateos

**17:15** Adjourn

## **Day 3. Wednesday June 27, 2018**

### **Session 5: Cereals and cereal co-products: Definition of products. Nutrient evaluation.**

Instructors: R. C. Sulabo, M. Rodehutscord, G. A. Casas, C. M. Nyachoti, B. Svhuis, and H. H. Stein

**9:00** Global production of cereal grains and cereal grain co-products. ....Hans H. Stein

**9:10** Nutritional composition of maize, wheat, barley, triticale, rye, and oats. ....Markus Rodehutscord

**9:50** Sorghum and sorghum co-products, including sorghum DDGS. ....Rommel C. Sulabo

**10:20** Digestibility of energy and nutrients in wheat, triticale, barley, and rye fed to growing pigs. ....Markus Rodehutscord

**10:50** Coffee break

**11:20** Digestibility of nutrients and concentration of ME in corn, wheat, triticale, and rye fed to poultry. ....Markus Rodehutscord

**11:50** Rice and rice co-products: brown rice, broken rice, rice bran, and others. ....Gloria A. Casas

**12:30** Bakery meal, cookie meal, confectionary products. ....Hans H. Stein

**12:45** Lunch

**14:00** Maize and wheat co-products including DDGS, gluten feed, gluten meal, germ meal, middlings, and others. ....Hans H. Stein

**15:00** Oats and oat co-products. ....C. Martin Nyachoti

**15:20** Coffee break

**15:40** Use of cereal grain co-products in diets for poultry. ....Birger Svhuis

**16:40** Cassava meal, cassava co-products, and other tubers. ....Rommel C. Sulabo

**17:15** Adjourn

## **Day 4. Thursday June 28, 2018**

### **Session 6: Mineral sources and ingredients in pig and poultry diets. Digestibility and phytase application.**

Instructors: H. H. Stein, M. Rodehutscord, C. M. Nyachoti

**9:00** Calcium sources and utilization: Plant and mineral (limestone, calcium carbonate, dicalcium and monocalcium phosphate) origin. ....Hans H. Stein

**9:30** Phosphorus sources and utilization: mineral, animal and vegetable sources. The role of phytic acid. ....Markus Rodehutscord

**10:00** Phytase effects on P availability in pigs and poultry. ....C. Martin Nyachoti

**10:30** Coffee break

**11:00** Calcium and phosphorus digestibility by pigs. ....Hans H. Stein

**12:00** Calcium and phosphorus digestibility by poultry. ....Markus Rodehutscord

**13:00** Lunch

### **Session 7: Animal proteins.**

Instructors: R. C. Sulabo, F. Molist

**14:15** Meat and bone meal, poultry meal, fish meal. ....Rommel C. Sulabo

**15:00** Co-products from the dairy industry: skim milk powder, whey powder, whey permeate. ....Fransesc Molist

**15:30** Coffee break

**15:45** Blood meals, blood plasma, and blood cells. ....Rommel C. Sulabo

**16:15** Intestinal co-products. ....Rommel C. Sulabo

**16:30** New proteins: Insect protein, algae protein, single cell protein, lemlna meal. ....Fransesc Molist

**17:15** Adjourn

## ***Day 5. Friday June 29, 2018***

### **Session 8: Implementation of concepts and quality control in feed milling. Good manufacturing practices.**

Instructors: J. Acedo-Rico, E. Vinyeta, H. H. Stein

**9:00** Feed mill equipment, technologies, and quality of final products. ....Juan Acedo-Rico

**9:45** Feed milling cost analysis. Influence of feed formulation. ....Juan Acedo-Rico

**10:15** Coffee break

**10:45** Use of feed technology to improve the nutritional value of feed for poultry. ....Ester Vinyeta

**11:30** Use of feed technology to improve the nutritional value of feed for pigs. ....Hans H. Stein

**12:15** Course evaluation and certificates. ....Gonzalo G. Mateos and Hans H. Stein

**13:00** Adjourn