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# University of Natural Resources and Life Sciences

## Department of Sustainable Agricultural Systems

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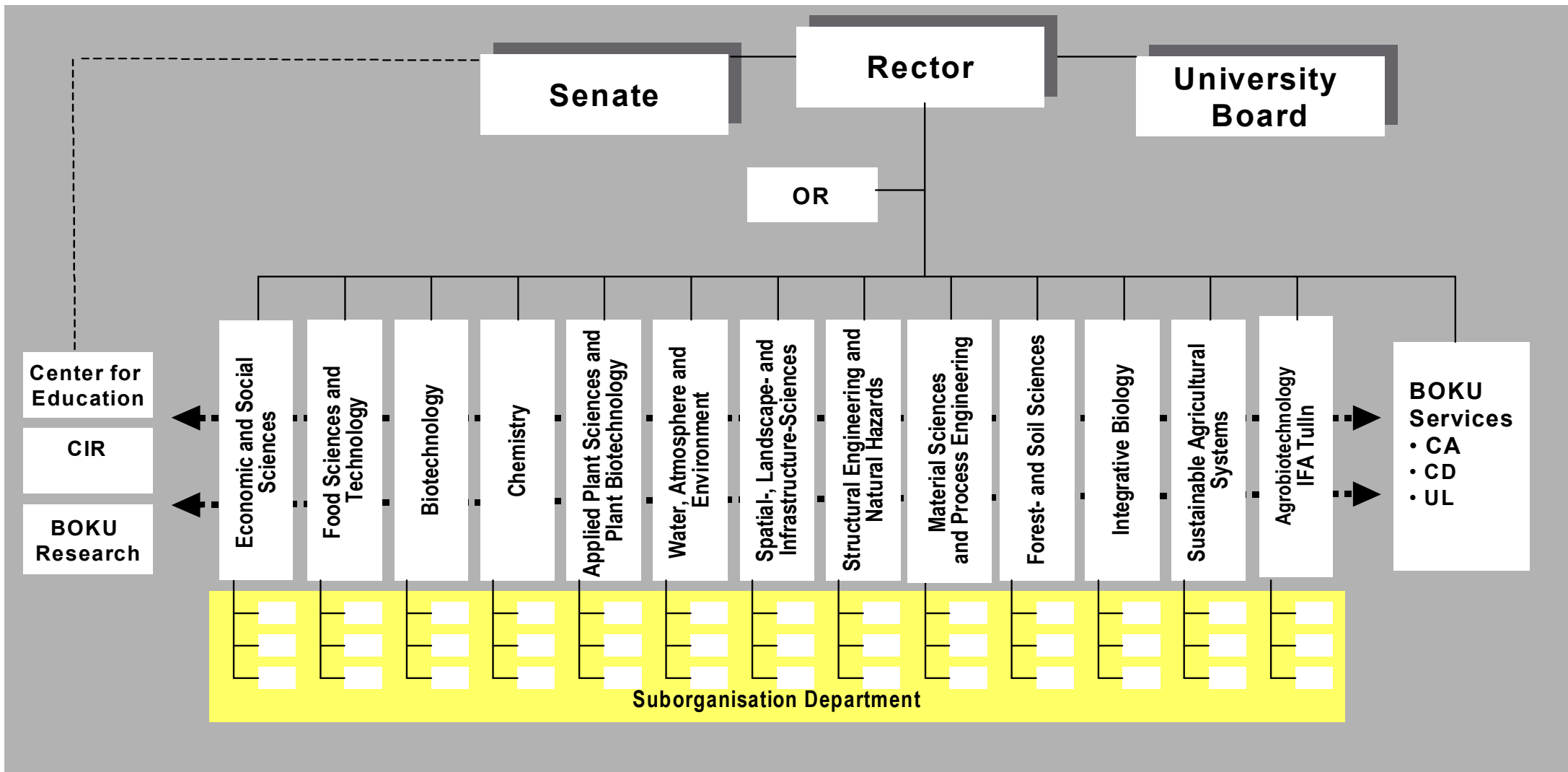
## A Teaching and Research Center for Renewable Resources

- To contribute to the **conservation and protection of resources** for future generations
- To increase knowledge of the ecologically and economically **sustainable use** of natural resources by **connecting natural sciences, engineering and economic sciences**
- To create **comprehensive questions about the future of our planet** and to lead to innovative problem solving through **interdisciplinary cooperation of scientists** on an international level
- To teach **state of the art contents and current issues** that are based on dynamic research and a **high level of practical relevance**

# BOKU – organisation chart



Universität für Bodenkultur Wien



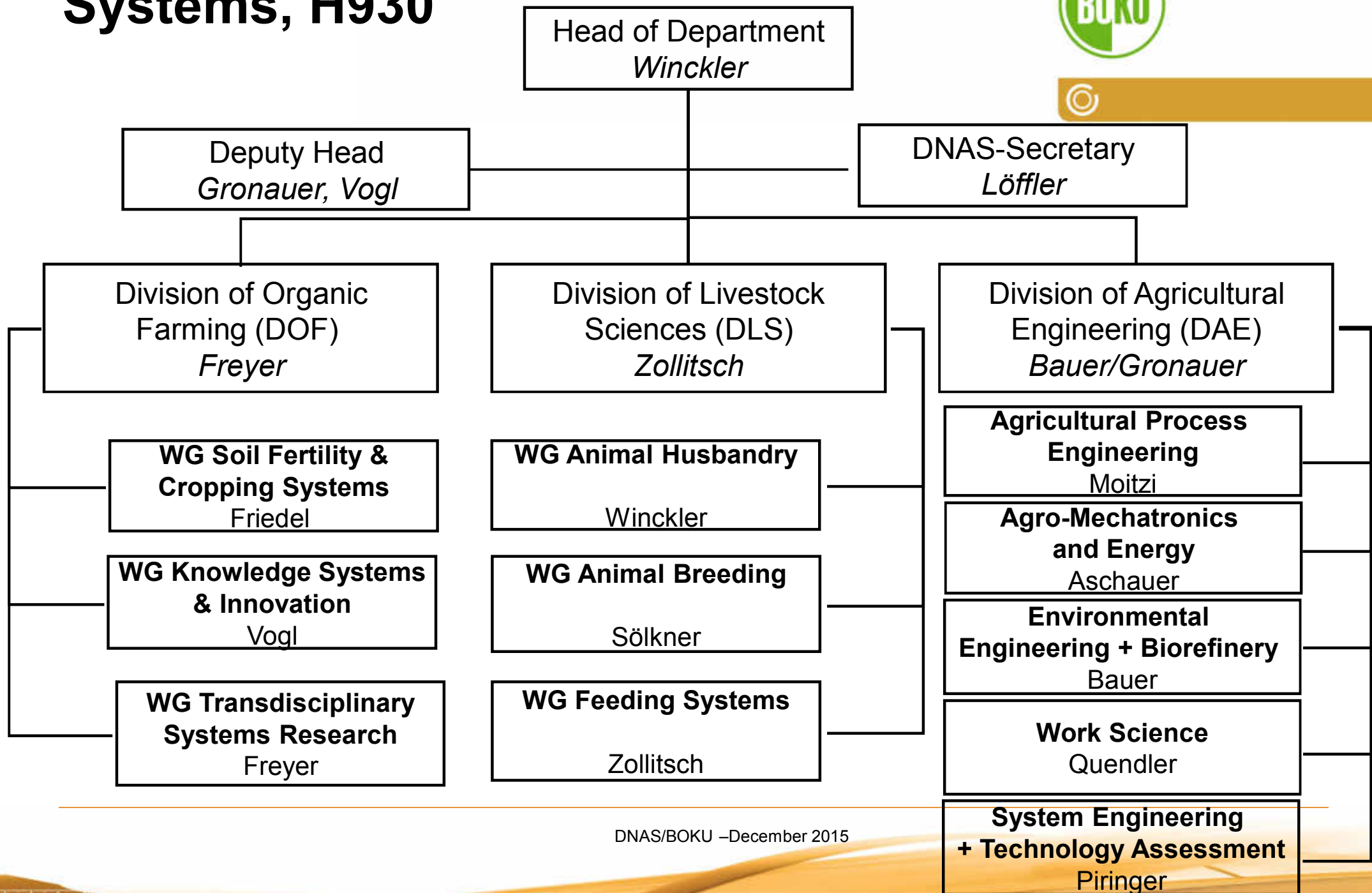
# Department of Sustainable Agricultural Systems



Contributing to a network of sustainable agricultural systems, which provide food, renewable resources, energy and other services relevant for society.

- productivity issues
- characteristics of production systems, including the role of producers and stakeholders
- societal demands on agricultural production processes

# Department for Sustainable Agriculture Systems, H930





# Facts and Figures of DNAS

## Employees:

36 from university budget  
(28 scientific staff, 8 technical/administrative staff)

20-25 scientific staff from third-party projects  
(mostly PhD students)

## Campuses:

Türkenschanze, Tulln



# Teaching

## BSc programmes:

- **Bachelor Agricultural Sciences**
- Bachelor Equine Science (in cooperation with Vet School)

## MSc programmes:

- **MSc Livestock Sciences**
- **MSc AgrEco-Organic and EUR-Organic**
- **DDP European MSc Animal Breeding and Genetics**
- MSc Applied Plant Sciences
- MSc Environmental Sciences Soil, Water and Biodiversity
- DDP MSc Material and Energetic Exploitation of Renewable Raw Materials
- International MSc Horticultural Sciences
- MSc Management of Environment and Bio Resources

# Livestock Sciences

## *Animal Husbandry*



Aim: Understanding and improving farm animal health and welfare (‘fourth’ pillar of sustainable livestock farming systems)

### ■ **Applied research – On-Farm:**

- development and implementation of comprehensive assessment systems (e.g. Welfare Quality)
- novel housing systems/design (e.g. free farrowing systems)

### ■ **Management and quality assurance tools**

- “Health and Welfare Planning” (BEP Bioschwein)
- Animal welfare and environmental impact in organic pig farming (ProPig)

### ■ **Advisory strategies**

- “Stable Schools” (ANIPLAN), “Kuhpraktiker” (BioAustria)



# Livestock Sciences

## *Animal Breeding and Genetics*



- Quantitative Genetics (Sölkner)
  - Conservation Genetics (Fürst-Waltl)
  - Design of Breeding Programs (Willam)
  - Animal Breeding in the Tropics (Wurzinger)
- 
- ✓ Genotype X environment interactions in organic farming
  - ✓ Functional traits in cattle and pigs
  - ✓ Breeding for dairy cattle health (COREOrganic Dairy health)

# Livestock Sciences

## *Feeding Systems*



- **Sustainability assessment of animal production systems**
  - E.g. eco-balances (nutrient balances, emissions, LCA)
  - Nutrient and energy efficiency of animal production systems
  - Resource use and food security
- **Feed resources: analysis and development**
  - Grassland-based production systems
  - Animal production systems in the tropics
- **Feeding management**
  - Analysis and optimization
  - Low-input production systems

**-> Mainly in organic farming systems**

# Organic Farming

## *Soil Fertility/Cropping Systems*



- **Soil fertility and nutrient cycles**
  - Biological nitrogen fixation
  - Nutrient cycles in farms containing little to no animals
- **Cropping systems**
  - Crop rotation design
  - Drought tolerance in alfalfa
- **Natural resource protection**
  - Impact from cultivation measures on nitrate leaching, climate gas emission and biodiversity indicators

# Organic Farming

## *Knowledge Systems/ Innovations*



### ■ Local knowledge

- E.g. ethnobotanical and ethnometrological research
- Transformation and transmission processes of local knowledge

### ■ Organic farmers' experiments and innovations

- Factors promoting/preventing innovation
- Alternative and regional food networks, food sovereignty

# Organic Farming

## *Transdisciplinary Systems Research*



- **Transformation processes for sustainability**
  - Structure and dynamics of organic and alternative food and farming systems
  - Philosophical, social, political and socio-psychological dimensions of organic or other alternative movements and their future perspectives
- **Implementation of positive change**
  - E.g. smallholder farmer strategies to cope with climate change, Ethiopia/Kenia



# Agricultural Engineering

## *Agricultural Process Engineering*



- Assessment of **performance characteristics** for the **evaluation and optimization of processes** (with respect to ground coverage, energy input, soil pressure and external effects)
- **Energy input and energy efficiency** in agriculture (arable farming and livestock husbandry)



# Agricultural Engineering

## *Work Science*



- **Optimisation and development of work systems in Agriculture**
  - Working time studies, ergonomics und usability
  - Safety at work and health issues



# Agricultural Engineering

## *Agro-Mechatronics and Energy*



- Planning, construction and establishment of test stands
- Sensor and actuator technology
- Modeling, simulation and optimization of control loops in agro-mechatronic processes



# Agricultural Engineering

## *Environmental Engineering and Biorefinery*



- Optimization of biomass utilization as raw material and for energy generation
- Cascading use of biomass in biorefinery systems and biogas technology
- Identification of the potential yield of agricultural crops at various locations within Austria



# Agricultural Engineering

## *System Engineering and Technology Assessment*



- Analysis and assessment of procedural systems in rural areas
- Life cycle assessment of agricultural production techniques and goods
- Methodological development of the life cycle assessments

