Introduction to INCAP (1): Motivation for developing INCAP

- Understanding the impact of climate change:
  - on society ✓
  - at the farm level in specific regions and production systems ?

- Objectives:
  - Gain better insight into the costs of climate change arising to farmers
  - Develop a data set suitable for
    - modelling
    - communicating the effects of climate change at the micro-economic level
Introduction to INCAP (2): Scope and tasks involved

- **Scope of INCAP:**
  - a multi-purpose cost data set accounting for...
  - all important plant and livestock production activities in Austria
  - specific attributes of each activity
  - an extended period (from the past into the future)

- **Tasks involved:**
  - Define scope and structure
  - Review available data
  - Select data and develop INCAP
  - Replace explicit data by functions (where possible)
  - Testing and validation
  - Dissemination

* activities, gross margin components, attributes, time, area

Introduction to INCAP (3): The concept of gross margins

- **Concept:**
  - Revenue - variable costs = gross margin
  - Gross margin: amount available for covering fixed costs + income

- **Advantages:**
  - common usage
  - farm records
  - benchmarking possible
  - no/little distortion through fixed costs

- **Disadvantages:**
  - depending on the purpose (analyse the past, plan for the future …)
  - no uniform concept regarding the considered cost items
  - detailed data required
  - understanding of the underlying system required to allow benchmarking

Introduction to INCAP (4): Primary data source used: ‘Internet Gross Margins’

**Livestock activities - available:**
- Dairy cow and milk production
- Heifer rearing
- Bull fattening
- Suckler cow and beef calf production
- Piglet production
- Pig fattening

**Livestock activities - under development:**
- Sheep etc.

**Livestock-related activities - available:**
- Maize silage
- Grass silage
- Hay

Introduction to INCAP (5): Scope and structure

INCAP consists of 2 activity groups.

**Activity groups**
- Plant production activities (INCAP.p)
- Livestock activities (INCAP.l)

**Activity types**
- Cereals, oilseeds, protein crops, root crops, catch crops, fallow land, silage, hay
- Dairy cow and milk prod., heifer rearing, bull fattening, sucker cow + beef calf prod., piglet production, pig fattening

Link to Internet Gross Margins application [publicly accessible]: [http://www.awi.bmlfuw.gv.at/idb/default.html](http://www.awi.bmlfuw.gv.at/idb/default.html)
Introduction to INCAP (6):
Scope and structure

Each activity has at least 3 dimensions.

**Activity**

Gross margin components

- Revenue: (e.g. milk, meat)
- Variable costs: (e.g. replacement, reproduction, feed, health)

Components

- Revenue components: (e.g. milk, meat)
- Variable cost components: (e.g. replacement, reproduction, feed)

**Attributes**

- Attribute types: (e.g. farming system, replacement type, reproduction type, feed)

**Time**

- Past/Present
- Future

**Area**

- Austria
- Provinces
- Communities

Dimensions

- Differentiation within the dimensions

Capture heterogenous management systems

Capture heterogeneous management systems

Capture development over time

Purpose

- Allow spatially-explicit analyses

Example:

'Suckler cow and beef calf production' activity

Fleckvieh suckler cow and calf

(Source: Humer (2014): Diplomarbeit Kälbersterblichkeit, LFZ Raumberg-Gumpenstein)

Suckler cow activity (1):

Gross margin calculation scheme

<table>
<thead>
<tr>
<th>Component</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>Complementary products</td>
</tr>
<tr>
<td>Calves</td>
<td></td>
</tr>
<tr>
<td>Cow</td>
<td></td>
</tr>
<tr>
<td>Dung and manure</td>
<td></td>
</tr>
</tbody>
</table>

Variable costs

- Heifer replacement
- Concentrate, minerals
- Forage
- Health, hygiene
- Reproduction
- Litter
- Water, energy
- Machinery
- Other

excluding:
- CAP payments
- tax

including:
- cow
- calves
- proportion of heifer, if applicable
- proportion of bull, if applicable
- losses (cow, calves, heifers)

Gross margin

in EUR/cow/year

Suckler cow activity (2):

Activity-attribute-combinations

Activity

- 'Suckler cow and beef calf production'

Attribute groups: attribute types

- Farming system: conventional, organic
- Heifer replacement: reared, bought-in
- Reproduction type: artificial insemination (AI), bull
- Calf type: fattening, slaughter
- Forage type: silage + pasture, hay + pasture, silage + hay + pasture
- Slope: 0-25%, 25-35%, 35-50%

large number of activity-attribute combinations

144 unique combinations in a single period

(and more if further dimensions and/or attributes are added)
Suckler cow activity (3):
Selected basic information

Reference period: national average of 5 years (Austria, 2010-2014)

Calves produced: 0.90 calves (393 days calving interval, 2.5% twin births, 5.0% losses)

Weaning: at 7 months

Calves sold:
- if heifers reared: 0.73 calves (0.45 male, 0.28 female)
- if heifers bought in: 0.90 calves (0.45 male, 0.45 female)

Calf weight, fattening:
- male: 290 kg, female: 270 kg (live weight)

Calf weight, slaughter:
- male: 250 kg, female: 220 kg (slaughter weight)

Cow weight, slaughter:
- 319 kg (slaughter weight)

Cow replacement rate:
- if calves sold for fattening: 16.8% (≈ 5.9 years)
- if calves sold for slaughter: 15.9% (≈ 6.3 years)

Suckler cow activity (4):
Revenues

Revenues:
- for 144 suckler cow activity-attribute combinations,
- in Austria,
- in a single period (avg. 2010-2014),
- excl. tax and CAP payments,
- EUR/cow/year

Source: Own figure, 2016

3 forage mixes:
- Pasture + Grass silage + Hay (50:40:10)
- Pasture + Hay (50:50)
- Pasture + Grass silage (50:50)

Suckler cow activity (5):
Forage costs

Forage costs:
- for 144 suckler cow activity-attribute combinations,
- in Austria,
- in a single period (avg. 2010-2014),
- excl. tax and CAP payments,
- EUR/cow/year

Source: Own figure, 2016

3 forage mixes:
- Pasture + Grass silage + Hay (50:40:10)
- Pasture + Hay (50:50)
- Pasture + Grass silage (50:50)

Suckler cow activity (6):
Gross margins

Gross margins:
- for 144 suckler cow activity-attribute combinations,
- in Austria,
- in a single period (avg. 2010-2014),
- excl. tax and CAP payments,
- EUR/cow/year

Source: Own figure, 2016

Payment for organic farming:
- EUR 225/ha grassland

Source: AMA Merkblatt ÖPUL 2015, 25.03.2015

In this example:
- ca. 1ha/cow

See next slide: time series for 1 specific activity-attribute combination
Summary and discussion

- INCAP provides a high degree of differentiation, i.e.
  - numerous activities accounting for multiple production conditions, management systems and periods.

- INCAP is a data set suitable for a series of agro-economic analyses and modelling tasks, e.g.
  - optimisation problems
  - spatially-explicit economic modelling
  - explicit economic modelling of the impact of climate change, of adaptation and mitigation measures
    - (future periods)
    - (future topics)
INCAP uses a simple and widespread approach, i.e., gross margins.

Only a small number of sources is available for validation, covering only part of the activities, the activity-attribute-combinations or periods of time.

When available/possible, observed data will be used for validation.

- At the ÖGA Annual Conference 2016: presentation regarding validation of INCAP

INCAP will - hopefully - be made available to the public.

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**Dissemination**

**How to work with INCAP?**

Source: Own figure, 2016

**Step 1: Spreadsheet**
- Compile and update data
- Specify scenarios and assumptions
- Define model
- Check model file for accuracy and completeness (automated)
- Export model input file as a text file (automated)

**Step 2: GAMS**
- Import model input file
- Run model
- Generate results file as a text file (automated)

**Step 3: Spreadsheet**
- Import results
- Check imported file for accuracy and completeness (automated)
- Analyse results
- Revise data, scenarios and assumptions
- …

**How to make INCAP available to the public?**
- User interface
- Data protection/anonymity
- etc.