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'Index-based costs of agricultural production in Austria' (INCAP) – A new risk analysis tool for Austria

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Focus and contents of presentation

- **Focus:**
  - **Index-based costs of agricultural production (INCAP) – an comprehensive Austria-specific cost data set**

- **Contents:**
  - **Study background**
  - **Introduction to the Index-based Costs of Agricultural Production (INCAP)**
  - **Case study: Wheat production in Gänserndorf, Eastern Austria**
  - **Validation**
  - **Discussion**

Study background

Study background (1): Research objectives and approach

Study title:

- 'Adaptation in Austrian Cattle and Milk Production'

Among the research objectives:

to better understand and communicate …

- the potential costs of climate change and mitigation measures
- at the micro-economic level in specific regions and production systems
- at the macro-economic level (spatial impact, trade)

Approach:

- scenario analyses ← risk analyses
- mathematical modelling,
  using a composite of bio-physical and bio-economic models

Study background (2): Task and work steps

Our task:

Our contribution to the knowledge base

Develop a cost data set:

- **accounting for …**
  - **a wide variety of activities in Austria's agriculture**
  - **specific attributes of each activity (production characteristics, management variants)**
  - **an extended period (from the past into the future)**
- **suitable for mathematical modelling**

Work steps:

Define scope and structure*

Review available data

Select data and develop INCAP

Replace explicit data by functions

(where possible)

Testing and validation

Dissemination

*** activities, cost components, attributes, time**

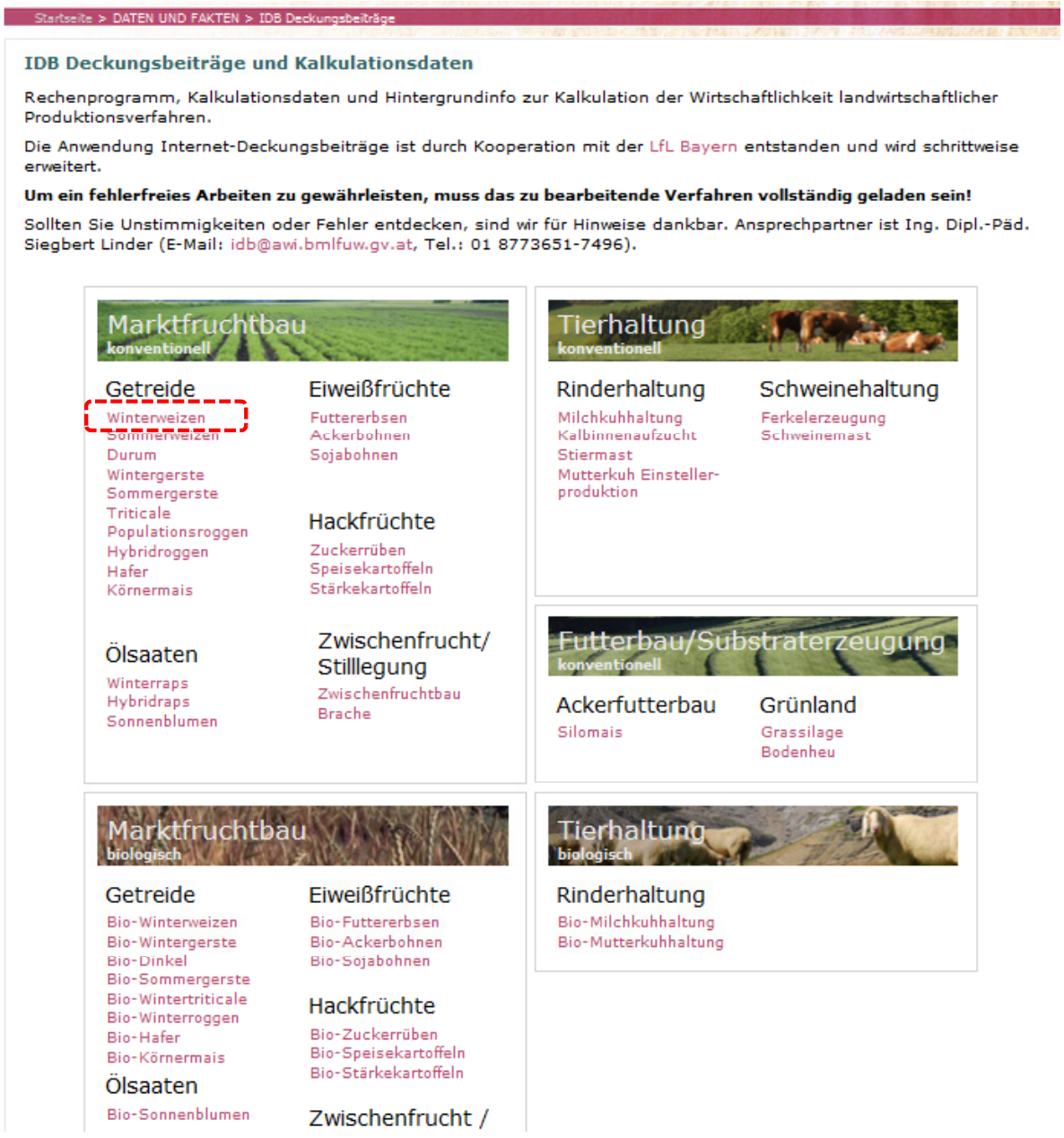
Introduction to INCAP

‚Index-based Costs of Agricultural Production‘

INCAP and the concept of gross margins

- **Concept:**
  - Revenue – variable costs = gross margin
  - Amount available for covering fixed costs + income
- **Advantages:**
  - common usage
  - farm managers keep 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
  - understanding of the underlying system required to allow benchmarking
  - detailed data required

Primary data source for INCAP: 'Internet Gross Margins'



Startseite > DATEN UND FAKTEN > IDB Deckungsbeiträge

IDB Deckungsbeiträge und Kalkulationsdaten

Rechenprogramm, Kalkulationsdaten und Hintergrundinfo zur Kalkulation der Wirtschaftlichkeit landwirtschaftlicher Produktionsverfahren.

Die Anwendung Internet-Deckungsbeiträge ist durch Kooperation mit der LfL Bayern entstanden und wird schrittweise erweitert.

Um ein fehlerfreies Arbeiten zu gewährleisten, muss das zu bearbeitende Verfahren vollständig geladen sein!

Sollten Sie Unstimmigkeiten oder Fehler entdecken, sind wir für Hinweise dankbar. Ansprechpartner ist Ing. Dipl.-Päd. Siegbert Linder (E-Mail: idb@awi.bmlfuw.gv.at, Tel.: 01 8773651-7496).

Link to Internet Gross Margins application (publicly accessible): http://www.awi.bmlfuw.gv.at/idb/default.html

Scope and structure (1): Activities

INCAP

INCAP consists of 2 activity groups.

Plant production activities (INCAP.p)	**Livestock activities (INCAP.l)**	← **Activity groups**
Cereals, oilseeds, protein crops, root crops, catch crops, fallow land, silage, hay	Dairy cows, heifer rearing, bull fattening, suckler cows and beef calf production, piglet production, pig fattening	← **Activity types***

* More activities will be added in the future.

Scope and structure (2): Dimensions

Activity

Each activity has at least 3 dimensions.

Cost items	**Attributes**	**Time**	**Area**	← **Dimensions**
Seeds/prop. material Fertiliser Plant protection Machinery Cleaning Drying Storage Insurance	<u>Attribute types:</u> Field size Slope Farming system Tillage system Labour type Climate type Plant prot. intens.	Past Present Future	Austria Provinces Communities	← **Examples for INCAP.p**
Capture heterogenous production conditions and management	Capture heterogenous production conditions and management	Capture development over time	Allow spatially-explicit analyses	← **Purpose**

Scope and structure (3): Unique combinations

Note the high degree of differentiation.

Example:

Combining activities

30 plant production activities

with some of the attribute groups [no. of attributes] mentioned above:

field size [2],
farming system [2],
tillage system [2],
labour type [2],
climate type [2],
plant protection intensity [3]

equals a large number of unique activity-attribute combinations.

2,880 unique combinations of plant production activities ***in a single period.***

Example:
Quality wheat, average 2011-2013

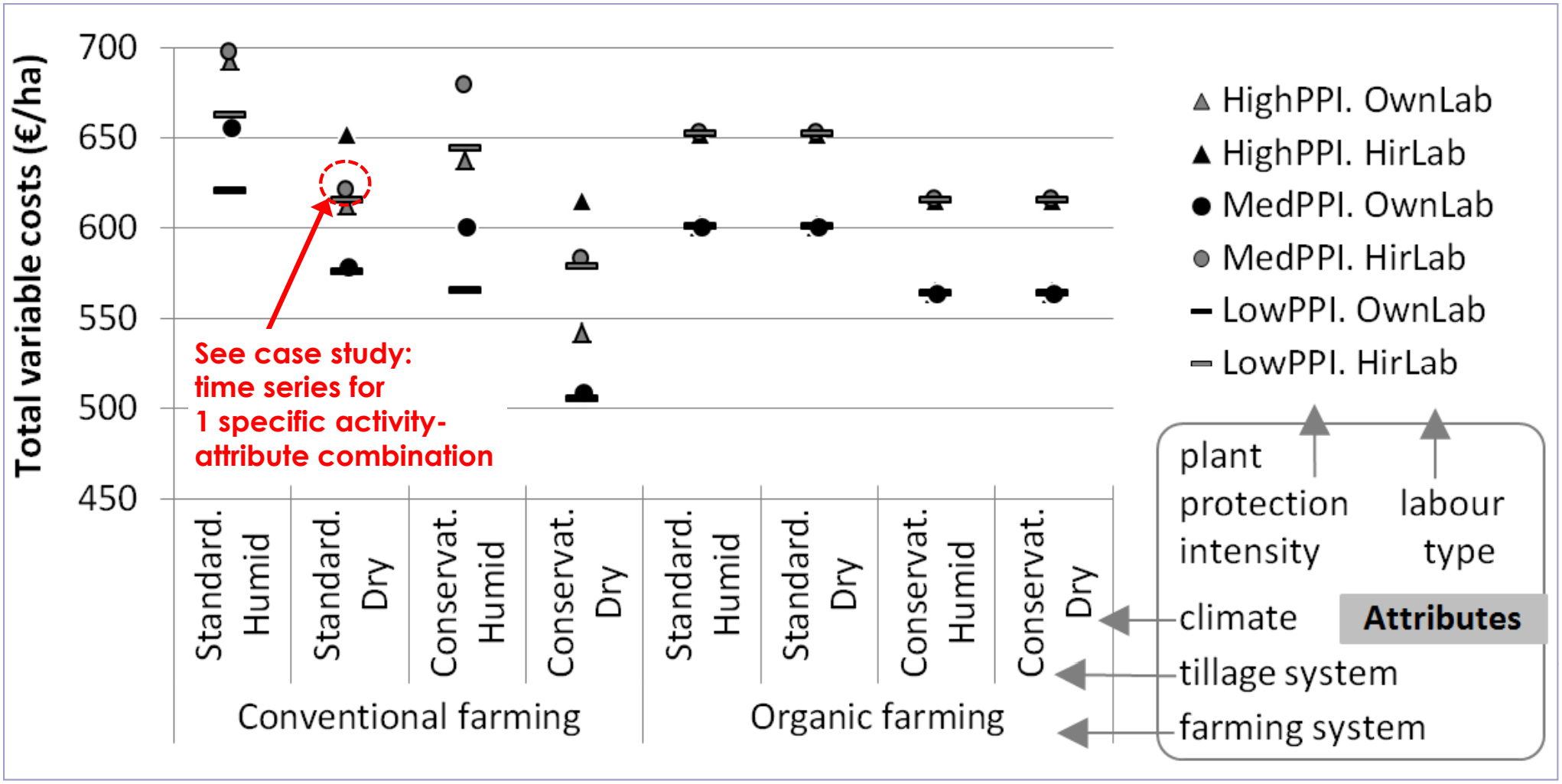


Fig. 1: Variable costs for 48 combinations of quality wheat, no straw recovery, cropland, field size: 2ha, tax excluded) in the reference year (average 2011-2013), €/ha.

Source: Own figure, 2015

Scope and structure (4): Time series

A time series is generated by:

1. **Compiling a gross margin calculation for each activity in the reference period**
   - **e.g. 3-year average**
2. **Developing indices for**
   - **yield**
   - **output prices**
   - **input prices**
3. **Imposing indices on reference period (yield, output price, individual costs items)**

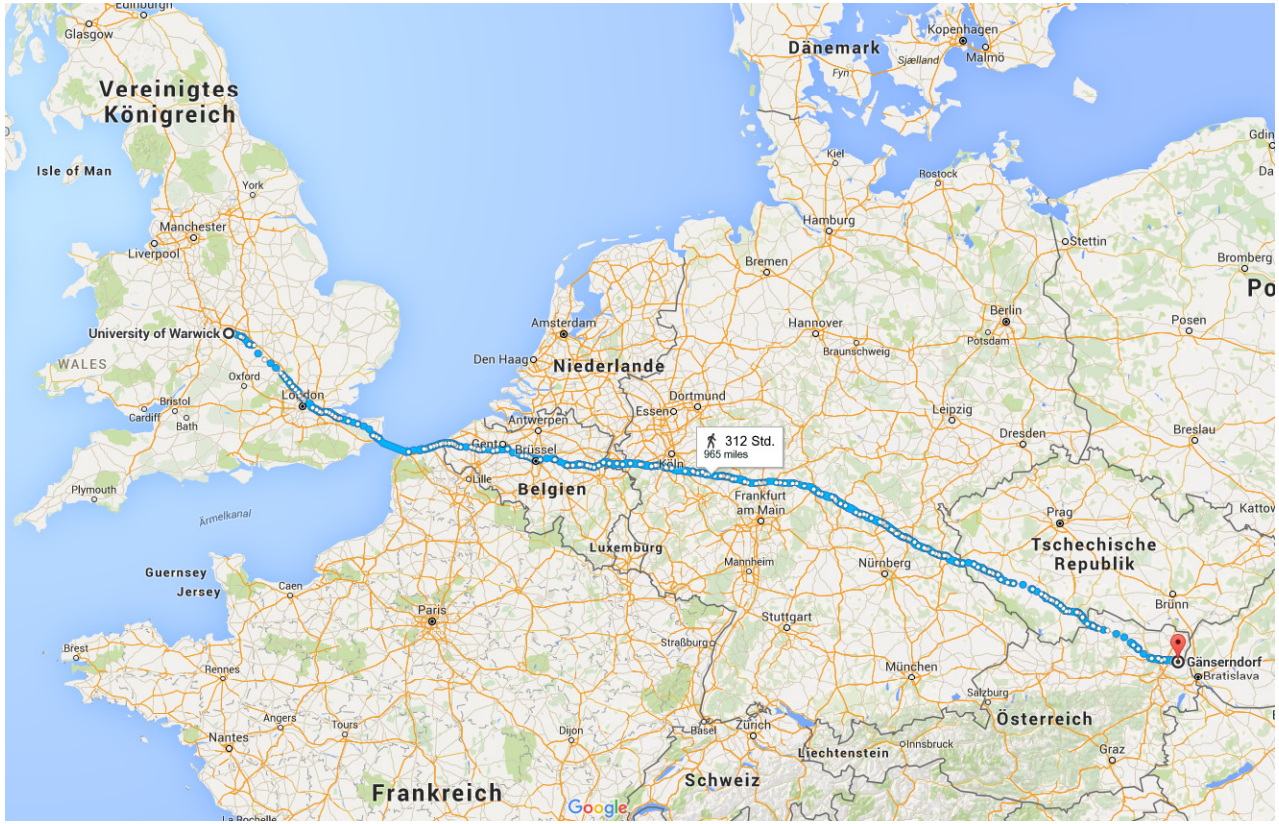
Possible applications

INCAP can be used for analyses regarding:

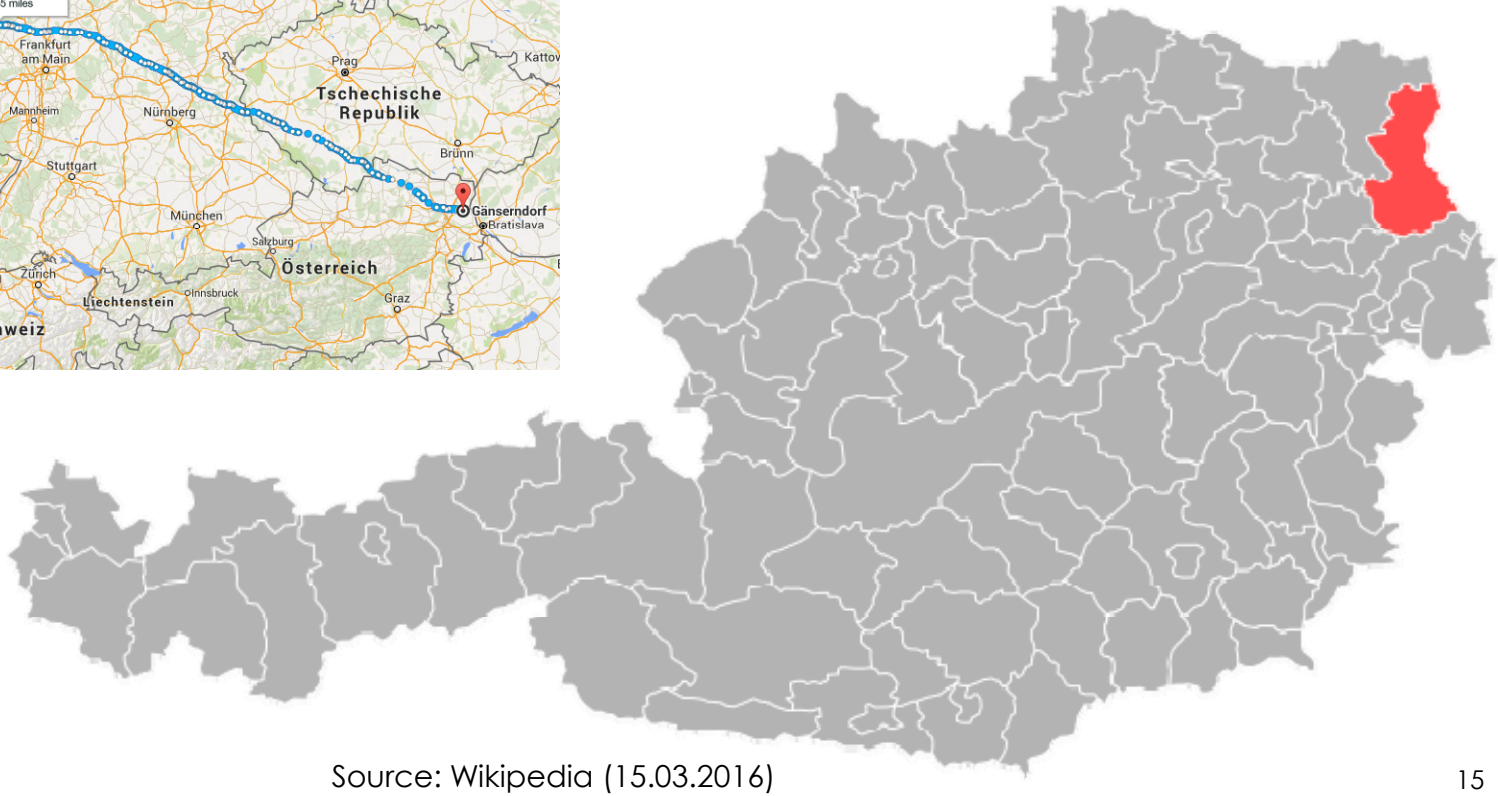
- **Farm business strategy**
  e.g. identify the cost-minimising or gross margin-maximising activity mix; identify the upper limit for payable land rent for future business years
- **Risk** **e.g. identify the income foregone due to a price decline or extreme weather conditions**
- **Policy** **e.g. identify activity mix with minimum amount of greenhouse gas emissions or maximum amount of consumable calories**
- **Regions** **e.g. compare activity mixes and economic indicators of different regions**
- **Changes over time**
  e.g. production options change by year and/or region

Case study:
Wheat production in Gänserndorf, Eastern Austria (Preliminary results)

Case study (1): Gänserndorf, a district in Lower Austria



Source: Google Maps (05.04.2016)

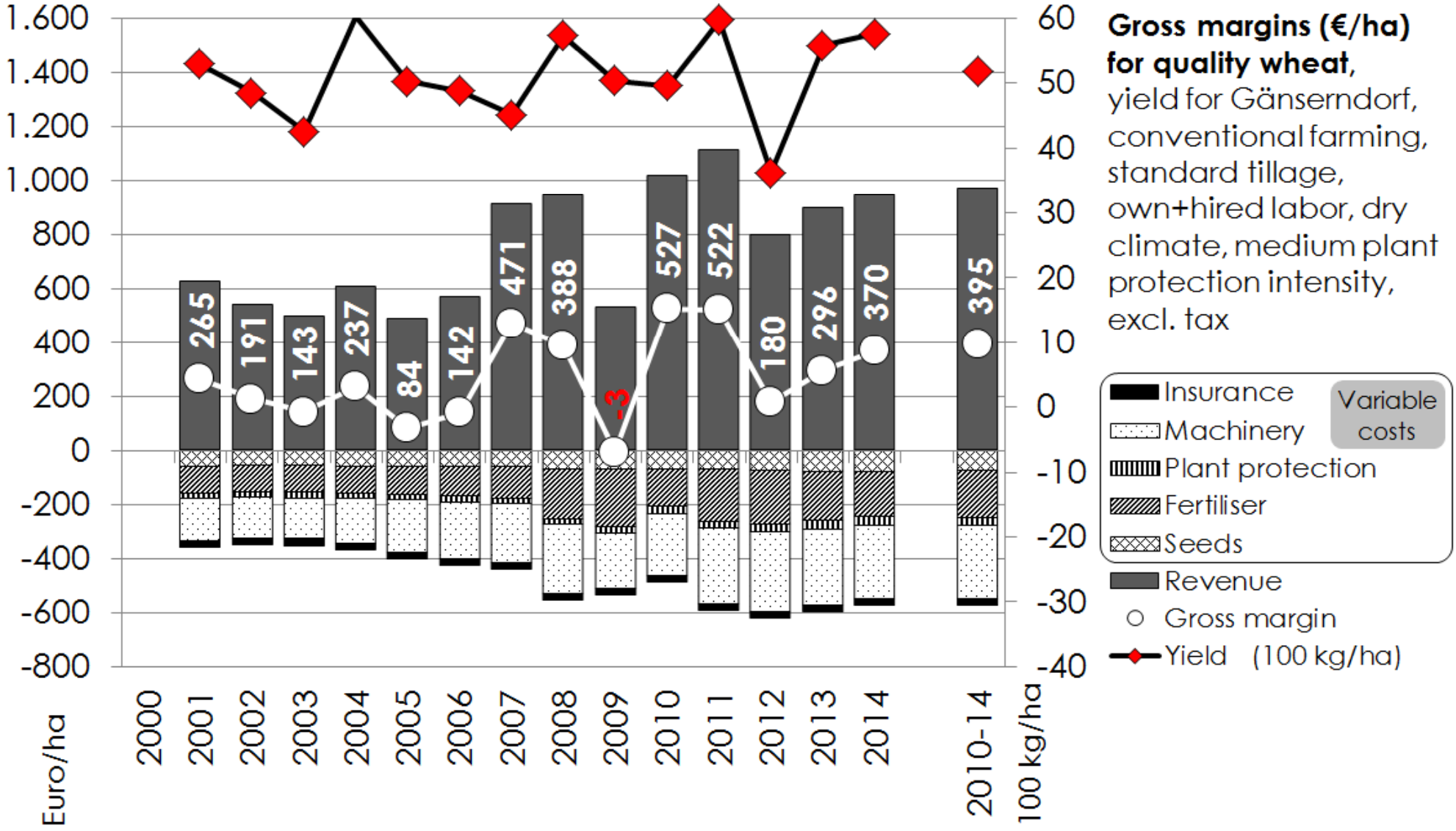


Source: Wikipedia (15.03.2016)

Case study (2): Gänserndorf, a district in Lower Austria

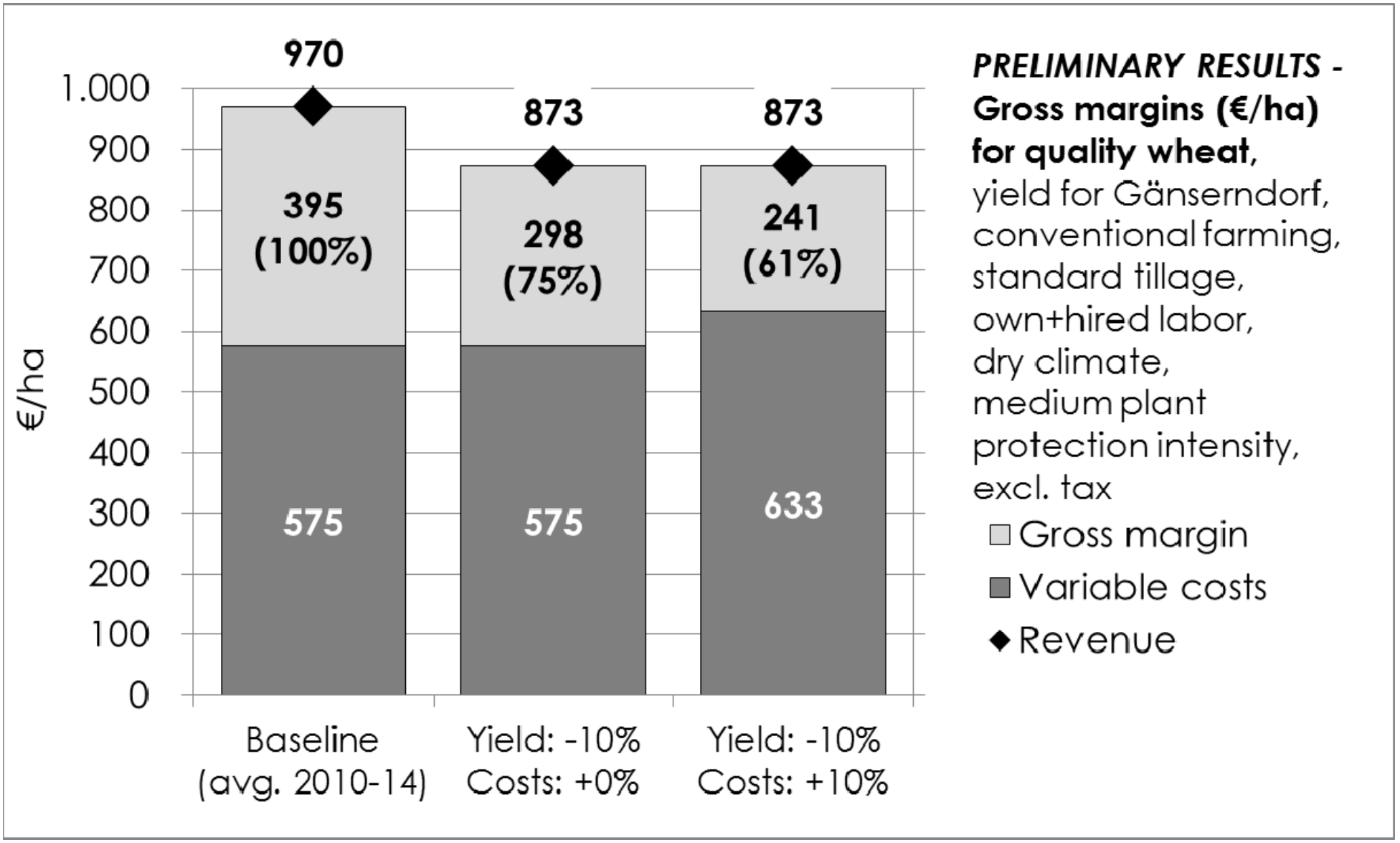
Source: Google Maps (05.04.2016)

Case study (3): INCAP results for quality wheat production



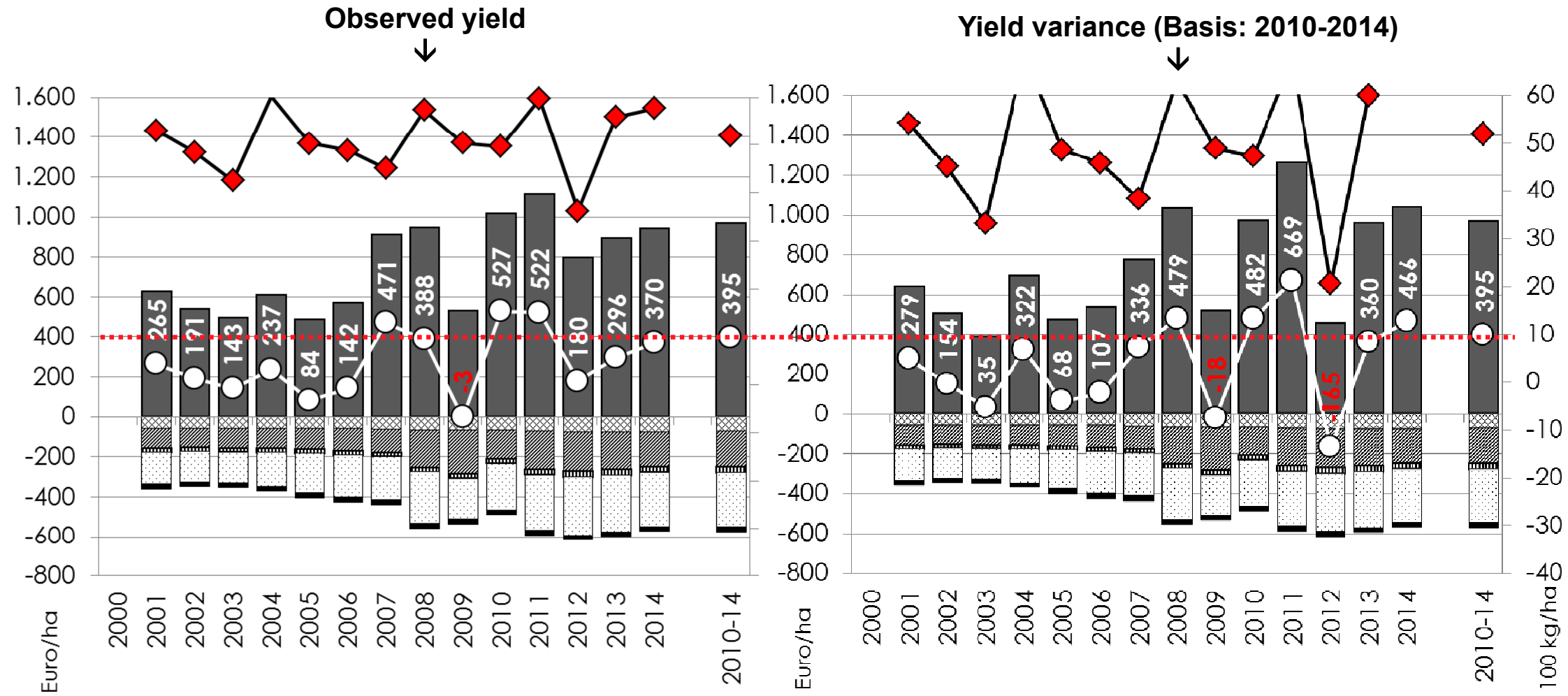
Source: Own figure (2016)

Case study (4): Changing yield and/or costs



Source: Own figure (2016)

Case study (5): Comparison



Source: Own figures (2016)

Validation

Validation (1): Aspects and approach

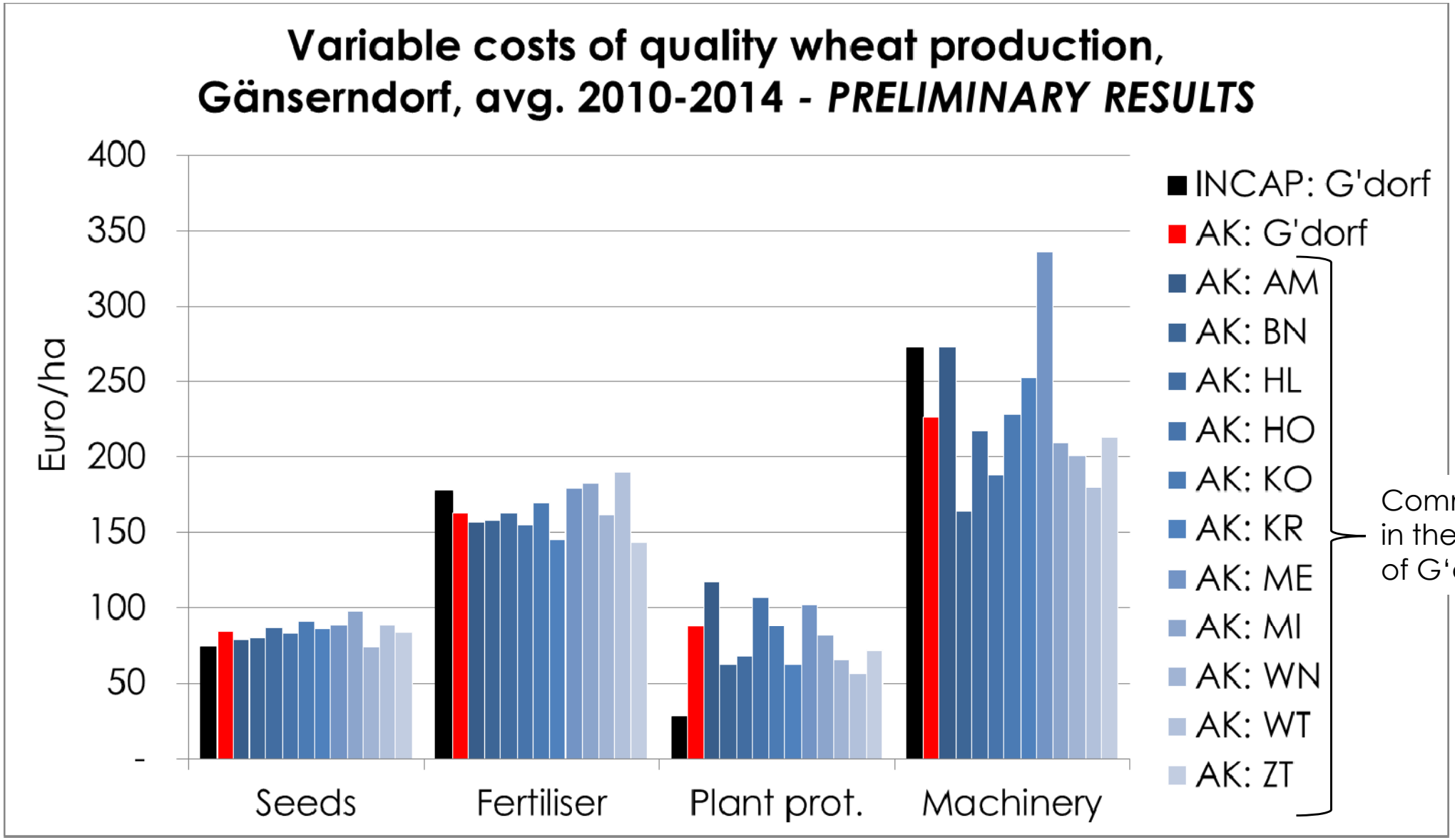
- Aspects to be validated:
  - Activities considered
  - Cost items considered and numeric level of costs
  - Attributes considered and numeric level of costs
  - Cost development over time
  - Consider differentiation by area?

- Approach:
  - Observed data
  - Farm records
  - Functions
  - Planning data
  - Expert opinion
  - Other?

Validation (2): Difficulties encountered

- Few suitable (published) sources available
- Data issues:
  - missing data (e.g. no reliable producer prices for organic crops, no Austria-specific data)
  - data quality (e.g. methodical changes such as change in time series)
- High level of aggregation in most sources
  - e.g. regarding production conditions, management variants, areas
- Differing approaches/breakdown of costs
  - e.g. variable machinery costs in the Internet Gross Margins (= principal source used for INCAP)
- Technical issues

Validation (3): INCAP and working groups results



Source: Own illustration based on INCAP and records from working groups (AK) of the Chamber of Agriculture

End of presentation
&
Discussion