IAK AGRAR CONSULTING

Resilience in agri-food supply chain exemplified for sunflower oil production

Data Week Leipzig, 06.07.2022 - Johann Lömpcke und Dr. Martin Schneider

IAK Agrar Consulting GmbH – introduction

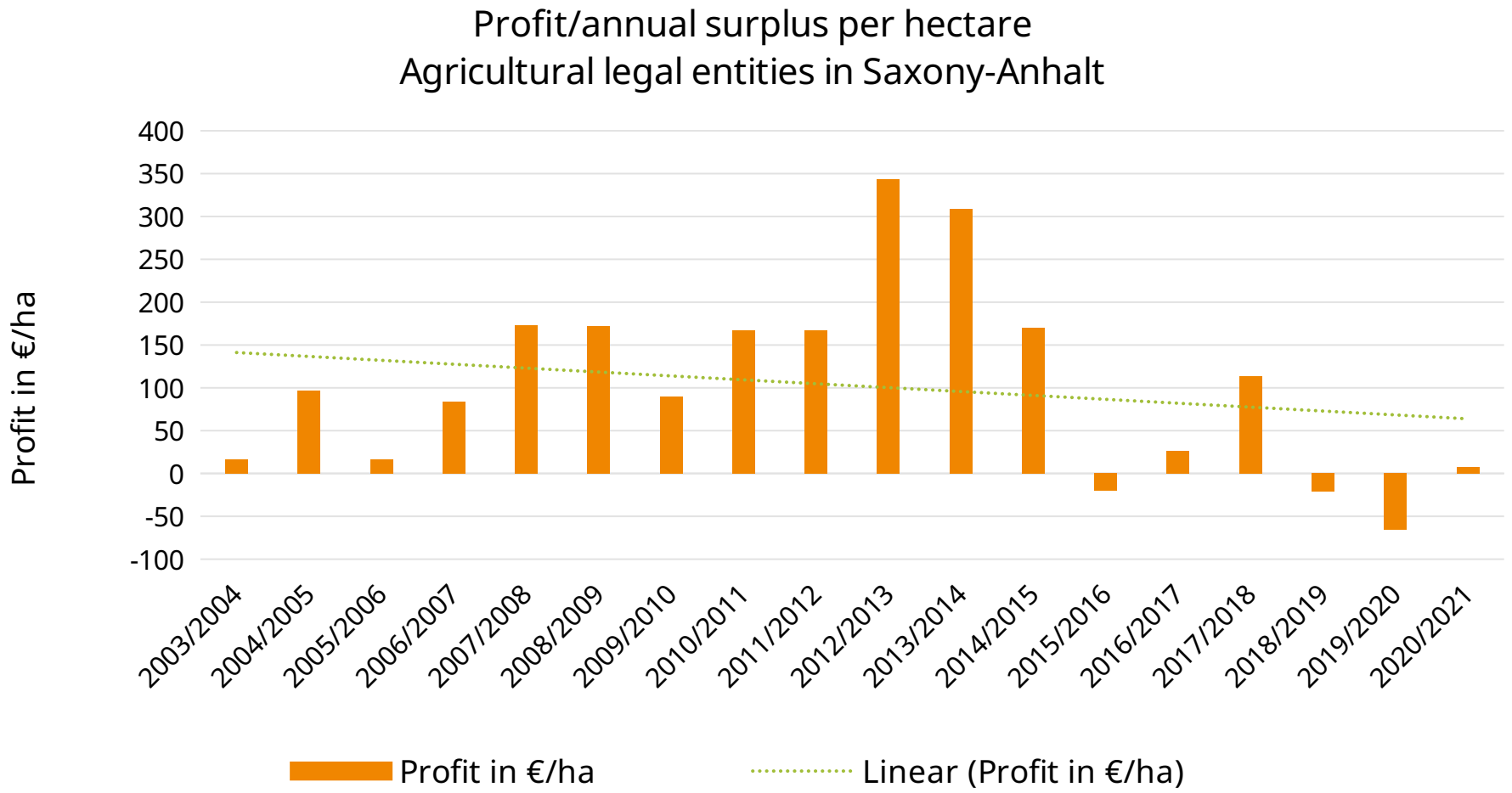
- Independent agricultural consultancy
- Initially founded in 1981
- Operating under the name of IAK Agrar Consulting GmbH since 2001
- Two business areas:
  - Management consulting agriculture in Germany
  - International cooperation
- Headquarters in Leipzig, Saxony, Germany

Outline

1. Motivation
2. Characterization of the value chain: agricultural primary production and vegetable oil production
3. Uncertainties on the income side
4. Uncertainties on the expense side
5. Summary

Perspective on agricultural production rather than computer science

1. Motivation (1/2)

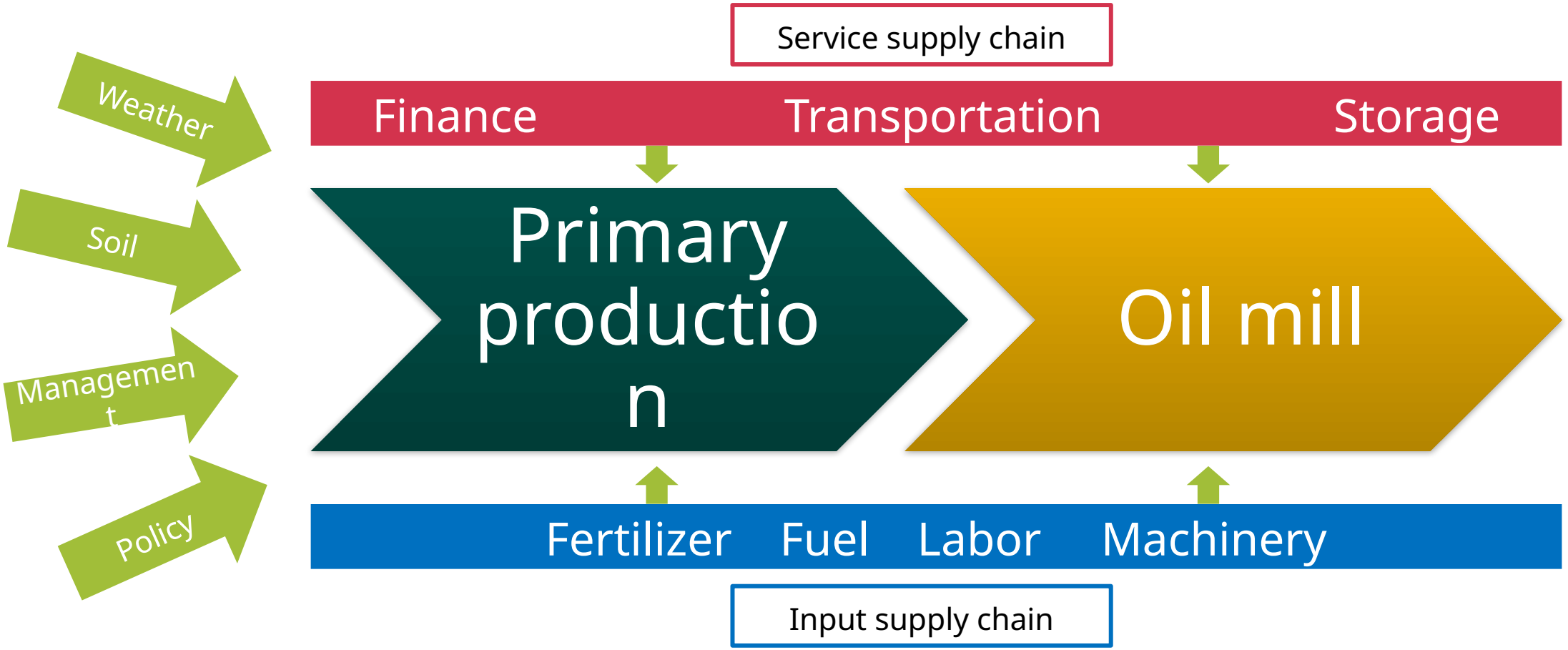


Source: Own calculation based on LLG.

1. Motivation (2/2)

- Agricultural companies in central Germany could not make profit
- Reasons are:
  - Extremely dry weather during the growing season
  - Weak price level
  - Previously unused potential for increasing production efficiency
  - Skyrocketing input prices
- Need to sensitize agricultural enterprises to the situation
  - Early indicators for the occurrence of particular risks must be shown

2. Characterization of the value chain: agricultural primary production and vegetable oil production



3. Uncertainties on the income side (1/3)

Agricultural primary production

Position	Direct Factors	Indirect Factors	Influence intensity	Variability
Market price	Market mechanism	Globally estimated harvest and stock volume	High	High
	Amount traded	Export restrictions, USD currency rate, Financial crisis	Low	High
Field's yield	Precipitation	Long dryness for ripening and harvesting	High	High
		350-450 mm / year	High	High
	Soil type	Depending on precipiation		
	Temperature	Average temperature from May to September above 15.5 °C	High	High
		Daily mean temperatures above + 6 °C		
		Temperature sum from April to harvest of 1,500 °C	High	Medium
Grants and subsidies	Common Agricultural Policy (CAP) by EU	Public debate	Low	Medium
	Gasoil aid			

Oil mill

Position	Direct Factors	Indirect Factors	Influence intensity	Variability
Revenues	Market price	globally estimated harvest and storage volume	High	High
		Mineral oil price	Medium	High
	Yield	Oil content of seed	Low	Low

3. Uncertainties on the income side (2/3)

World Sunflower stocks

Forecasts depending on...

- weather phenomena --> *e.g. web scrawling for news about weather phenomena*
- geopolitical issues --> *e.g. food export restrictions tracker*
- energy prizes --> *e.g. oil/gas future price*
- ...

Source: NSA World Supply & Disappearance.

3. Uncertainties on the income side (1/3)

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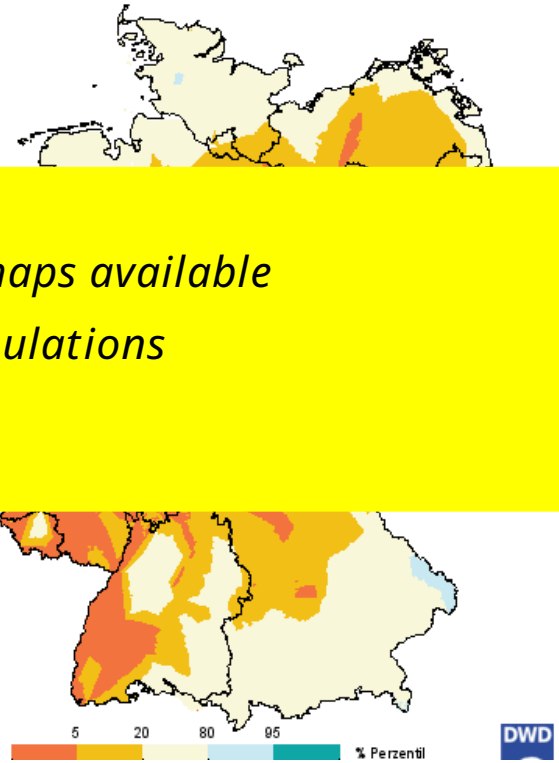
3. Uncertainties on the income side (3/3)

- Yield depends on temperature and soil moisture
  - Soil moisture depends on precipitation
  - plant
  - At other times, they have negative effects

Forecasts depending on…

- subsoil moisture conditions after wintertime --> *maps available*
- weather forecasts--> *e.g. usable field capacities simulations*



Mean soil moisture under grass in June 1-20, 2022, percentile distribution compared to past 40 years

Source: DWD (created 21.06.2022).

4. Uncertainties on the expense side (1/2)

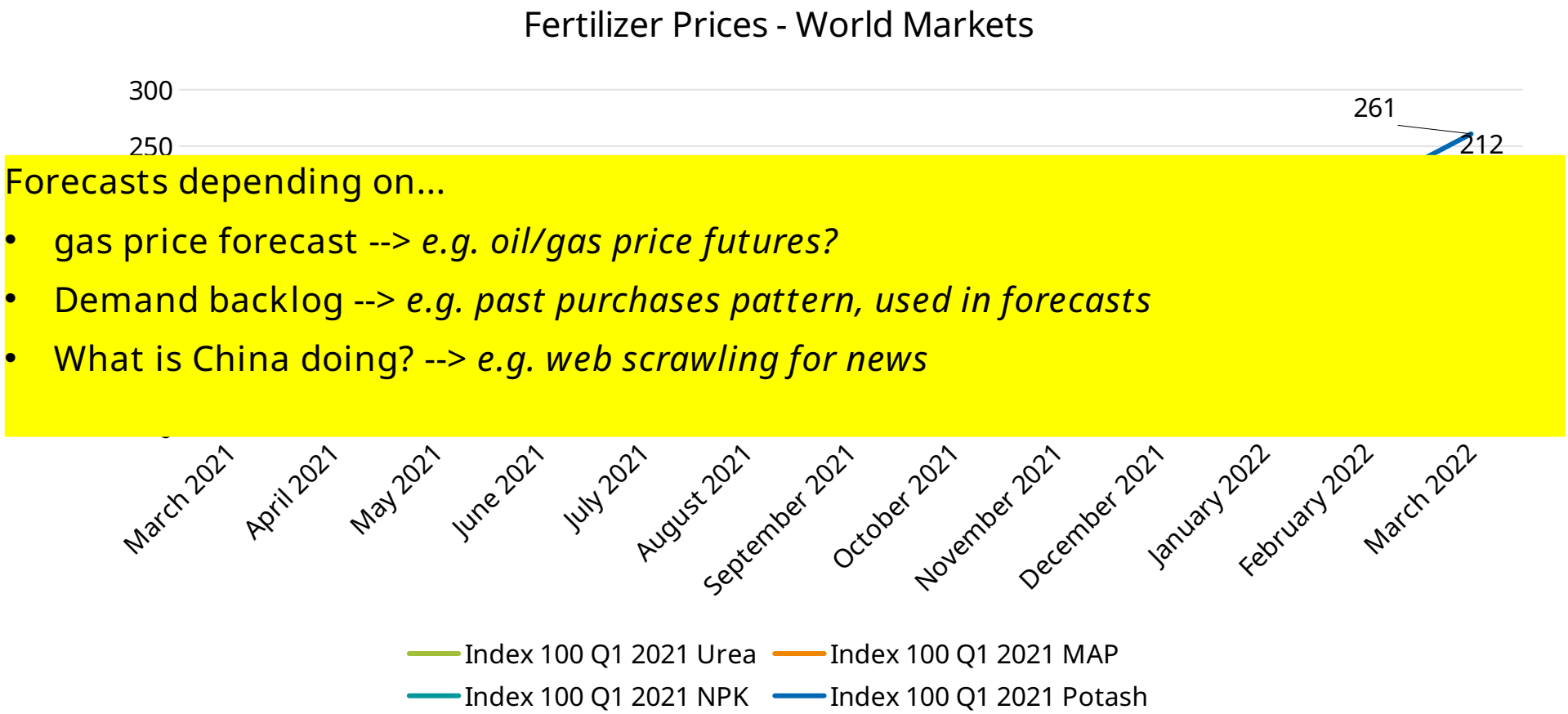
Agricultural primary production

Position	Direct Factors	Indirect Factors	% share of cost center in total costs	Influence intensity	Variability
Material expenses	Fertilizer prices (NPK)	Oil/Gas price	9 %	Medium	High
		Export restrictions			
	Pesticide price	Production disruptions	7 %	Medium	High
		Shipping costs and delay			
		Administrative rules			
		Weather			
	Seed price	Yield of previous year	13 %	High	High
		Global volume of cultivation		High	
Personnel expenses	Wage cost	Alternative employment opportunities	11 %	High	Low
Insurance	Damage of past	Trained staff		Low	Low
		Climate			
Rent	Market price	Interest rate level, inflation rate	35 %	High	Low
Repair and maintenanc	Wage cost				
	Supply				

Oil mill

Position	Direct Factors	Indirect Factors	Influence intensity	Variability
Material expenses	Oilseed price	Globally estimated yield volume	High	High
	Energy prices	Oil/gas price	High	Low
		Power price	High	High
Personnel expenses	Wage cost	Alternative employment opportunities	High	Low
Insurance	Damage of past	Trained staff	Low	
Depreciation	Prices for machinery	Freight costs/ supply chain	High	Low
		Raw material prices	Medium	High
Repair and maintenance	Wage cost	Alternative employment opportunities	Medium	Low
	Supply chain			
Neutral expense	Interest expense	Equity ratio	High	Medium
		Interest conditions	High	High

4. Uncertainties on the expense side (2/2)



Forecasts depending on…

- gas price forecast --> *e.g. oil/gas price futures?*
- Demand backlog --> *e.g. past purchases pattern, used in forecasts*
- What is China doing? --> *e.g. web scrawling for news*

Source: Fertilizer Dashboard.

5. Summary

- Uncertainties are of global origin
- Price volatility for inputs has increased
- Weather-related risks severely endanger yield
- Grants and subsidies as unconditional income to be diminished
- Farms need to rethink and eventually reorganize production/management – good decision support systems necessary (dashboards?)
- Future-oriented farm management urges farms to expand expertise and deal with new issues
- Crucial for prevention of and reaction to stress and shock is precise knowledge of:
  - possible risks
  - use of analysis tools
  - knowledge of mitigative measures