

Harvesting wetland biomass: specifying costs and benefits on company level



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Foto: S. Wichmann

Why to use wetland biomass?

Paludiculture

i.e. peat preserving agriculture on wet / rewetted peatlands
to open up new renewable resources (energy + material use)

→ Profitability on company level?

Management of natural / constructed wetlands

- nutrient removal
- restricting expanding reeds
- combating invasive species
- improving habitat conditions for target species

→ Ameliorating cost benefit ratio of measurement?

1) Adapted grassland machinery



2) Small + light machinery



Suitability of machinery

3) Seiga: balloon tyres



4) Tracked vehicles



Economic feasibility?

- Wetland adapted machinery -> mostly prototypes
- Acreage performance -> ground conditions + biomass amount
- Efficiency of logistic chains -> to be optimised
- Reasonable processing avenues -> only partly existing markets

→ Lack of reliable data

→ Little large scale + long term experience

→ Dependence on best guestimates + model calculations

Accuracy versus precision

- precise figures are demanded
- at our state of knowledge they get easily wrong
- aiming at accuracy in a first step

		Imprecise	Precise
Inaccurate			
Accurate			

(after Quantis)

“It is better to be vaguely right than exactly wrong.”

Carveth Read (1848–1931)

Method: Monte Carlo simulation

- accounting for uncertainty
- reflecting existing range of input data

Fixed data	- e.g. costs for labour (12€/h) and fuel (1,15€/l)
Variables	<ul style="list-style-type: none"> - e.g. yield/ha, revenues, costs for machinery - probability: triangular or uniform distribution - maximum, minimum, (modus)
Correlations	<ul style="list-style-type: none"> - e.g. yield/ha and harvesting costs/ha - positive or negative factor
Simulation	<ul style="list-style-type: none"> - combinations of different variable values - 10,000 iterations

Calculations for three harvesting regimes

- Vegetation: reed (*Phragmites australis*) dominated stands
- Machinery: tracked vehicles large scale harvest
- Equipment: adapted to respective biomass utilisation

1) Summer harvest → chaff for biogas

2) Winter harvest → bales for combustion

3) Winter harvest → bundles for thatching

Data: - own field tests in VIP-Project
- interviews with practitioners
- literature research



1) Summer harvest → biogas

1. Mowing -> swath



2. Chopping + transport



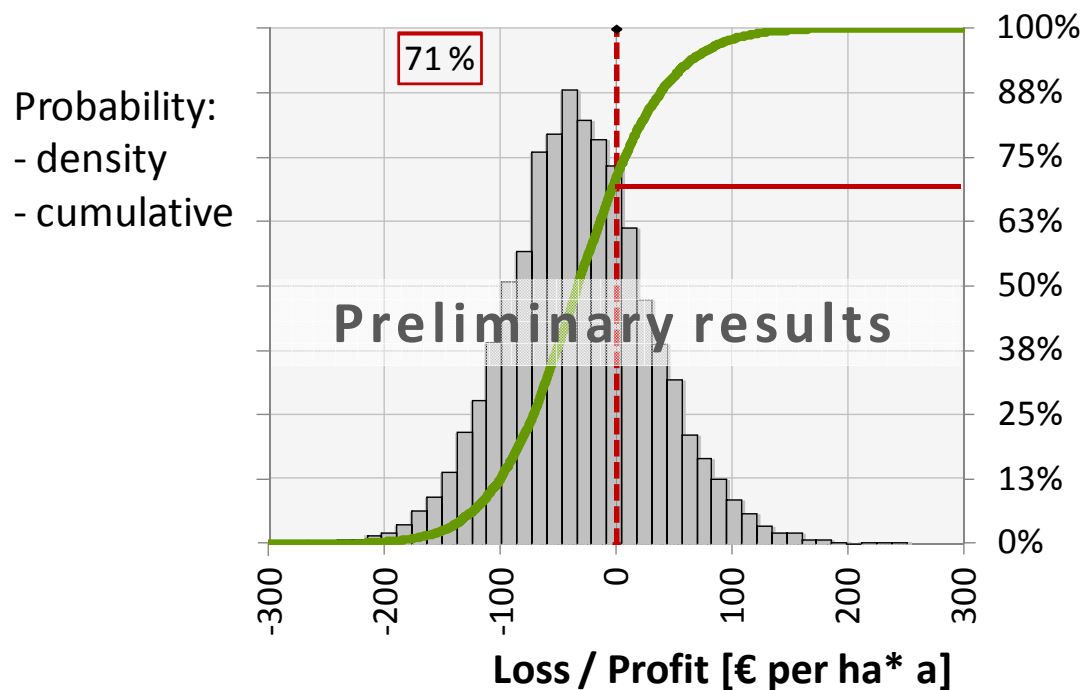
Advantage

- long harvesting season
- combinable with nature conservation aims

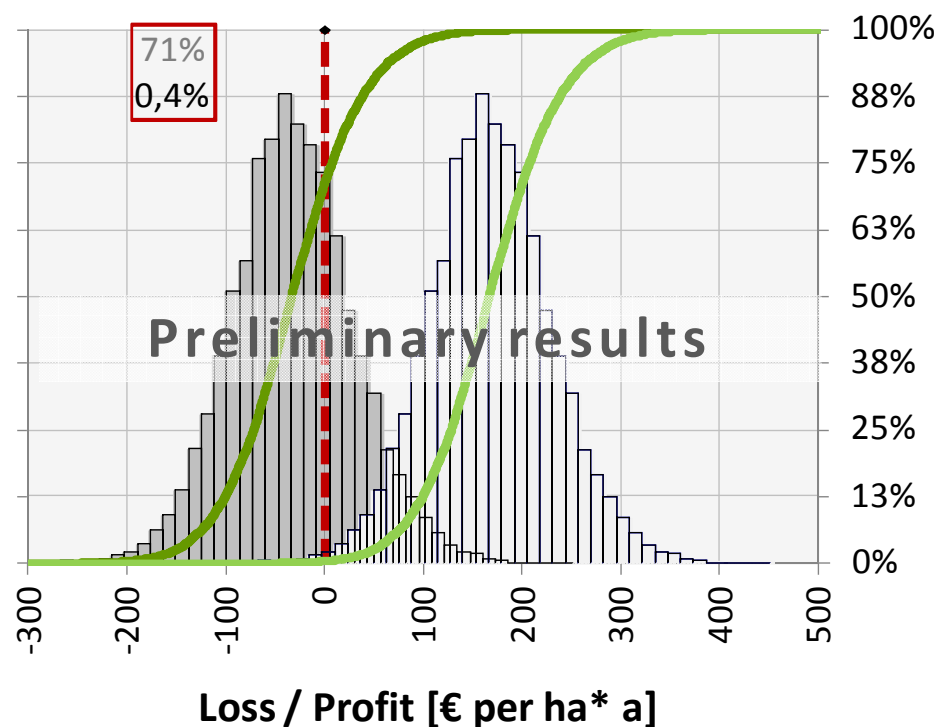
Disadvantage

- limited suitability for biogas
- little revenues

1) Summer harvest → chaff for biogas



Without and with agricultural subsidies



2) Winter harvest → bales for combustion

1. Mowing + baling



2. transport



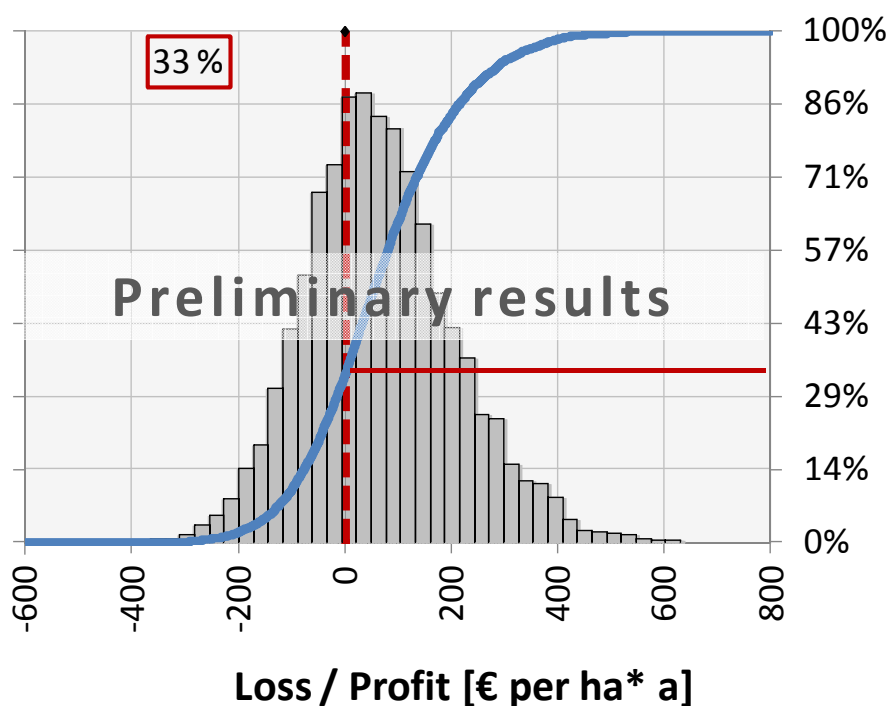
Advantage

- harvesting dry material
- suitability for combustion: comparable with straw

Disadvantage

- limited harvesting days
- machinery development still in progress

2) Winter harvest → bales for combustion



3) Winter harvest → bundles for thatching

1. Mowing + cleaning + bundling



2. Transport of big bundles



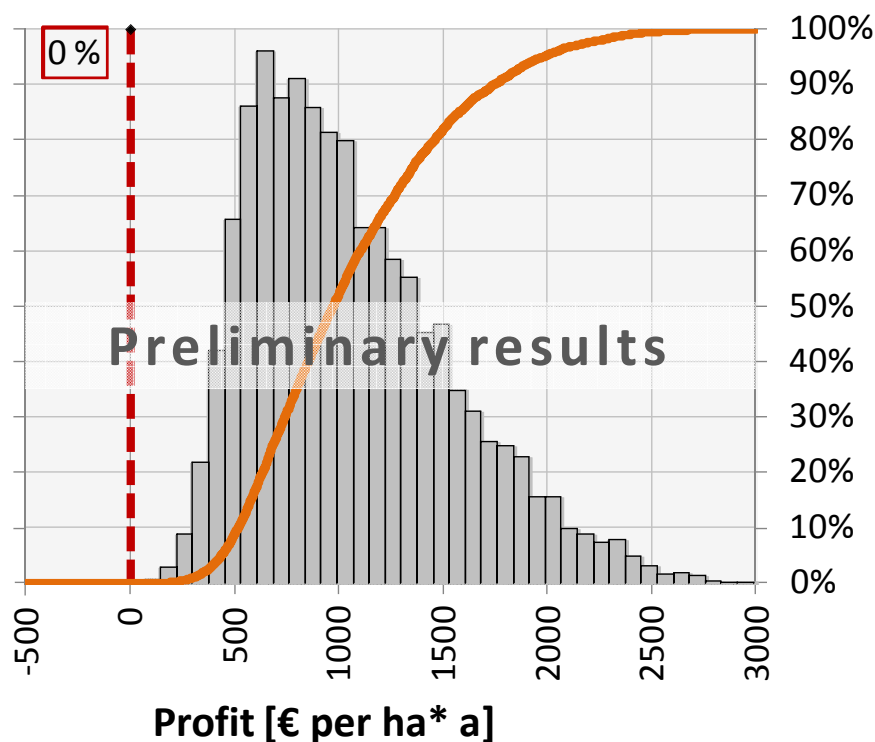
Advantage

- high quality product
- established machinery and logistic chain

Disadvantage

- limited harvesting days
- legal limits (nature conservation)

3) Winter harvest → bundles for thatching



Conclusions

- economic feasibility:
chaff/biogas < bales/combustion < bundles/thatching
→ probability not to cover harvesting costs: 71%, 33%, 0%
- long term and large scale experience is lacking for summer & winter harvesting of energy biomass
- Precision: smaller output range for specific situations feasible (e.g. investments for machinery, size of harvesting site)
- Large influence of agricultural and legal framework



Thank you for your attention!

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