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Producing lambs while limiting concentrates in various pedoclimatic contexts: which performances?



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Background

Decrease in European sheep production

- **Profitability** / Production cost, in particular **feed** and **equipments**
- Workload

Global stakes

- Livestock contribution to **Climate change**
- **Energy** consumption
- **Feed-food** competition

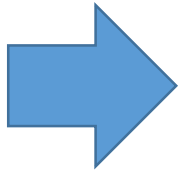
Great variability

- In farm performances (technical and economic)
- Pedit-climat contexts
- Breeds

Aims

In a **large diversity of context**

For **optimized sheep farming systems** (output/input)

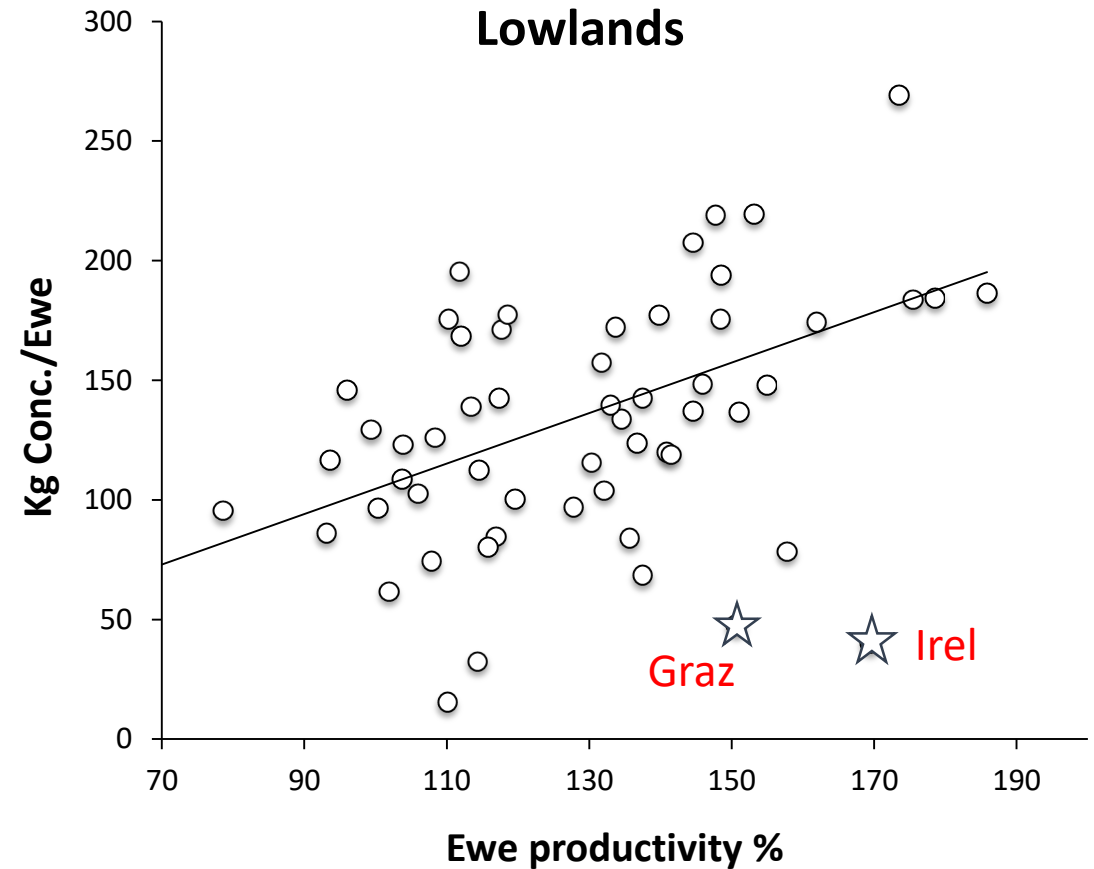
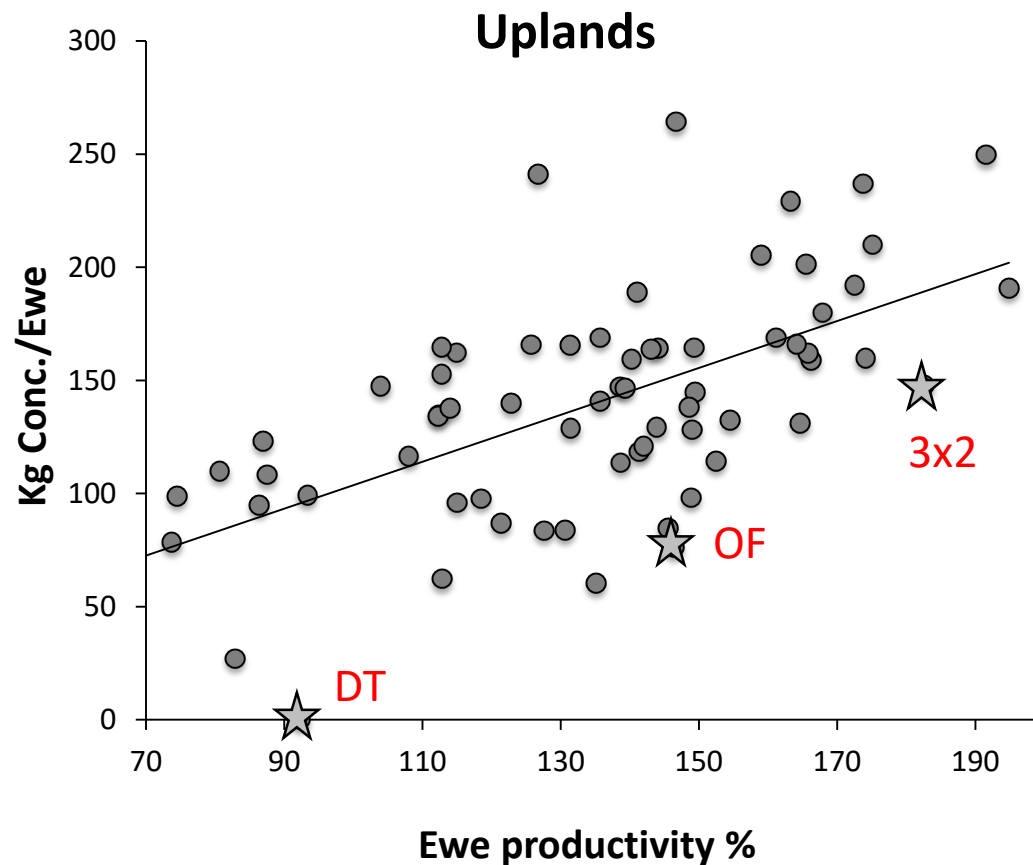


- What strategies?
- What results? Technical, economic, environmental, feed-food
- What consequences?

Choice of 5 farming systems

Ewe productivity : **Major impact**
Concentrate use

1482 years- farms (1987-2016) - 118 farms (12 years in average)



5 contrasting farming systems 1/2



Irel Belclare



Graz

Mouton Vendéen
Texel



3x2

Rava x Ile de France

MARC BENOIT – Efficient sheep farming systems

OF Limousine



DT Mourerous



Simulation tool and performance indicators

OSTRAL (simulation tool)

- **Standardisation**
 - Economic situation (2015)
 - Adequation of equipments
- **Extrapolation for Irel. System**
(60 → 420 ewes)
- **Indicators calculation**

[Technical indicators (flock perf.; feeding; ...)]

- **Feed/food competition**
(protein) (*Ertl et al 2015, Wilkinson 2011...*)
- **Economics**
 - Net Income /worker
 - Added value /worker
 - Net Income/assets
- **Environment**
 - N balance
 - Gross and Net GHG emissions/kg carc (LCA)
 - MJ/kg carc (LCA)
- **Market adequacy**
 - Lambs selling Regularity
 - Lambs Conformation

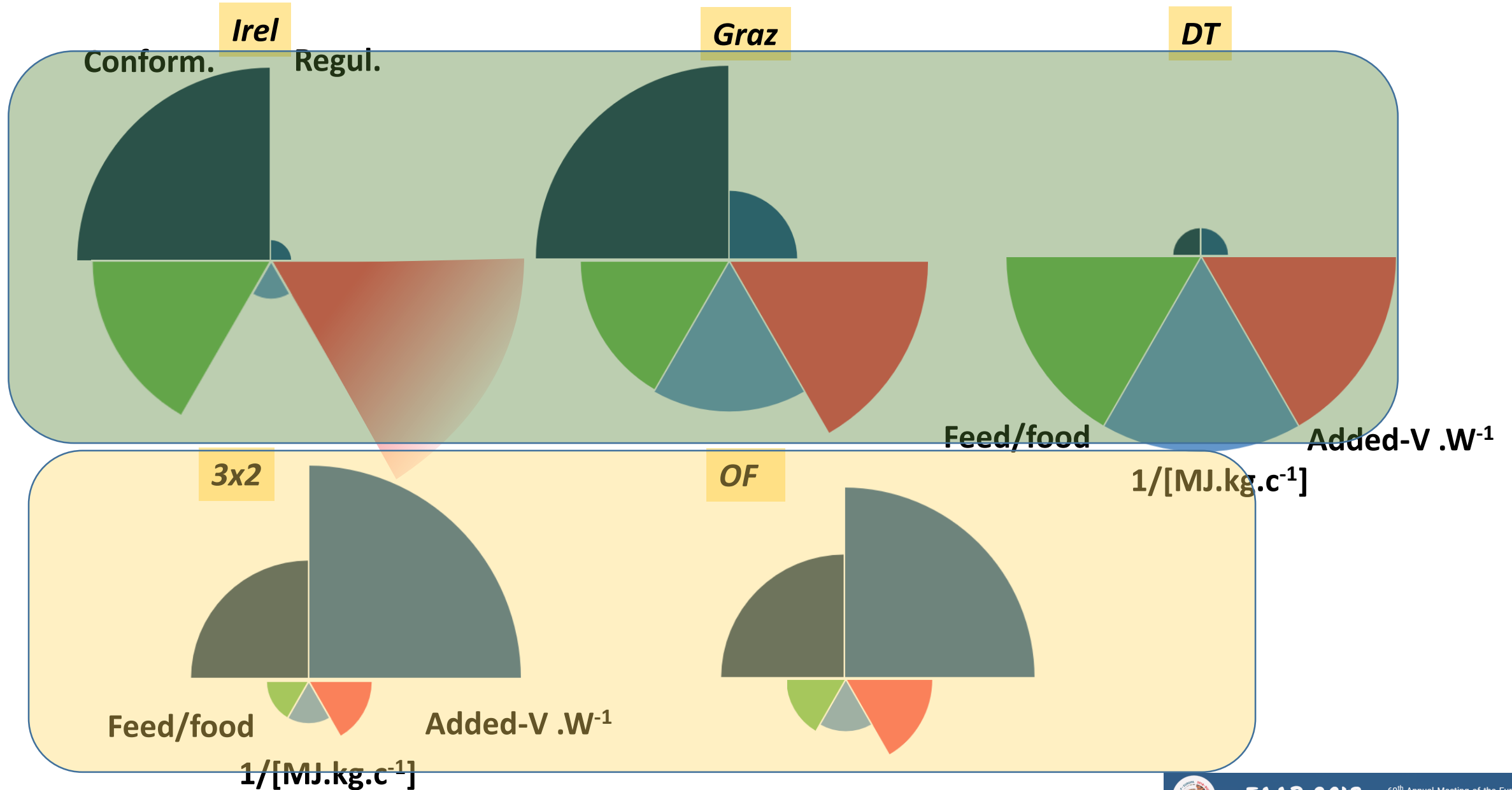
Main characteristics and performances

	Irel	Graz	3x2	OF	DT
No ewe (>6 mths)	420	541	470	405	2105
Stocking rate (ewe/ha Fodder Area)	11.4	6.6	8.7	4.4	0.5

Ewe productivity (+6mths) (%)	154	133	166	132	82
Ewe mortality (%)	8.3	3.3	5.8	4.8	18.9
Concentrates (kg.kg carc ⁻¹)	1.22	1.55	5.24	3.41	0.00
Fodder self-sufficiency (%)	95	94	78	88	100

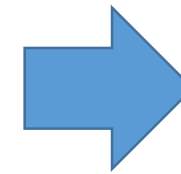
Added value (€·W ⁻¹)	21400 (44000)	31700	19800	22500	31900
Gross GHG emissions (EqCO ₂ .kg carc ⁻¹)	21.7	18.3	22.5	24.8	28.6
Net GHG emissions (EqCO ₂ .kg carc ⁻¹)	19.2	13.7	16.6	8.5	-130.0
Total MJ Non Renew. Energy (MJ.kg carc ⁻¹)	50.6	31.4	50.9	47.6	22.7
Effic. conversion of edible proteins (%)	158	125	33	51	∞

Synthesis of overall performance

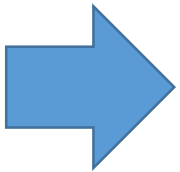


Discussion

- Fodder self-sufficiency
→ **high seasonality** of reprod. & fattening
- Harsh environment and resources
→ rustic breed → **low lamb conformation**



Low market compliance



- Cross organisation between territories ? (regularity)
- Consumers education? ...in relation with labelling, certification and specificities
- Specific markets/consumers (ex: DT lambs for Muslims)

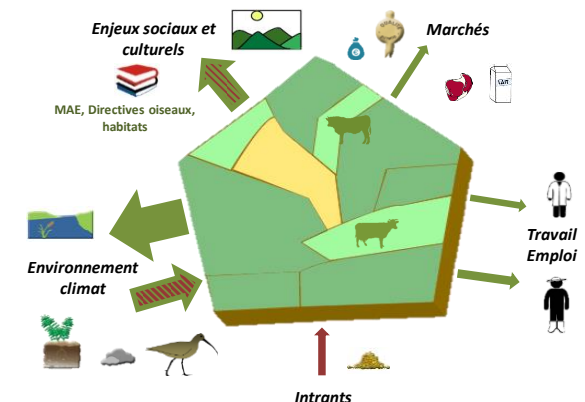
Conclusion

Very high use of fodder resources
// Farm sustainability

Sheep industry standards

Other services and impacts must be studied
Socio-economics, patrimonial aspects, nutritional quality, biodiversity, landscape

→ *Use of Conceptual framework*
(Dumont et al, Animal 2018)



Thank you for your attention



5 contrasting farming systems 2/2

Irel	Graz	3x2	OF	DT
Plain	Plain	Mountain	Mountain	Mountain /pastoral
Oceanic climate	Temperate	Continental	Continental	Mediterranean
Grass-based Intensive pastures (experimental device)	Grass-based system	Intens. Repro. Syst High ewe product	Grass-based Organic farming	Double transhum. 0 → 2500m alt. Harsh conditions
One lambing period (end winter) High meat and N/ha	One lambing period ; grass- fattened lambs No N fertilis.	3 lambing period Lambs indoors	2/3 spring lambings (grass- fattened lambs); 1/3 in autumn	Two lambing periods (March - October) No concentrate

Main characteristics and performances

2015
42 farms (Inra)

	Irel	Graz	3x2	OF	DT	Average (High lev.)
Total Agricultural Area (ha)	36.8	81.9	53.9	91.9	4463	110
Stocking rate (ewe/ha Fodder Area)	11.4	6.6	8.7	4.4	0.5	5.3
No ewe (>6 mths)	420	541	470	405	2105	556
Work productivity (eq.Livestock Unit.W ⁻¹)	66.3	54.6	46.0	59.7	72.5	61.5
Ewe productivity (+6mths) (%)	154	133	166	132	82	126
Ewe mortality (%)	8.3	3.3	5.8	4.8	18.9	6.3
Concentrates (kg.kg carc ⁻¹)	1.22	1.55	5.24	3.41	0.00	7.5
Fodder self-sufficiency (%)	95	94	78	88	100	71
Added value (€.W ⁻¹)	21400 (44000)	31700	19800	22500	31900	19900
Gross GHG emissions (EqCO2.kg carc ⁻¹)	21.7	18.3	22.5	24.8	28.6	30.1
Net GHG emissions (EqCO2.kg carc ⁻¹)	19.2	13.7	16.6	8.5	-130.0	20.1
Total MJ Non Renew. Energy (MJ.kg carc ⁻¹)	50.6	31.4	50.9	47.6	22.7	71
Effic. conversion of edible proteins (%)	158	125	33	51	∞	30 ??