Agronomic and environmental impacts of sheep integration in cover crop management in Wallonia

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Sheep sector in Wallonia – Key figures

Self sufficiency rate ± 13.9%

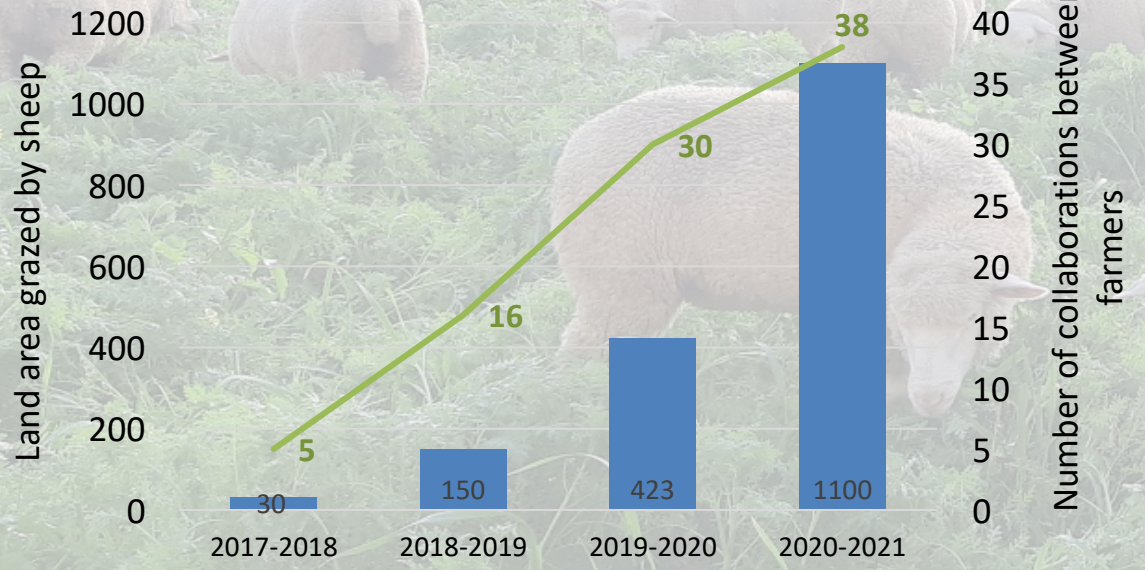
Access to agricultural land

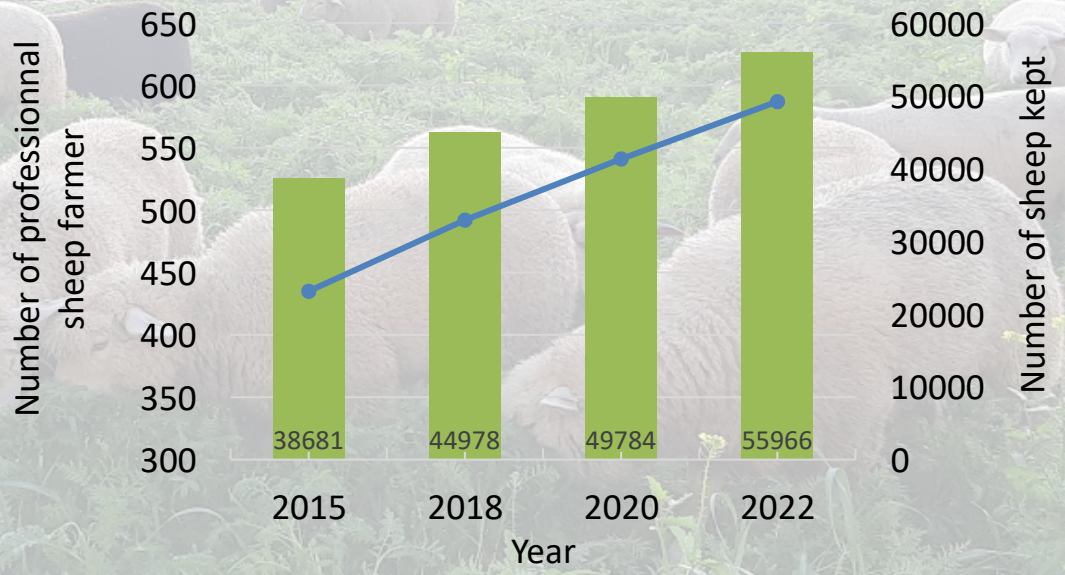
Feed costs

Rentability

SHEEP INTEGRATION IN COVER CROP MANAGEMENT – DIVERSIFICATION OPPORTUNITY ?

Land area grazed by sheep – crops and cover crop





2015 – 2022 : **+ 34.9% of farms & + 44.7% of sheep kept**

A win-win partnership ? What we know

For the farmer

Trampling and compaction

- ✓ After a light tillage for sowing
- ✓ Soil structure (water penetration, aggregates)

Nutrients exportation by sheep

4% of nitrogen, 8% of phosphorus et 0.3% du potassium

Grazing date has a greater impact than cover crop management on leached nitrogen

Diversify the flora of its cover crop for grazing by sheep

Low impacts on pests, slugs, weeds and the following crop

For the breeder

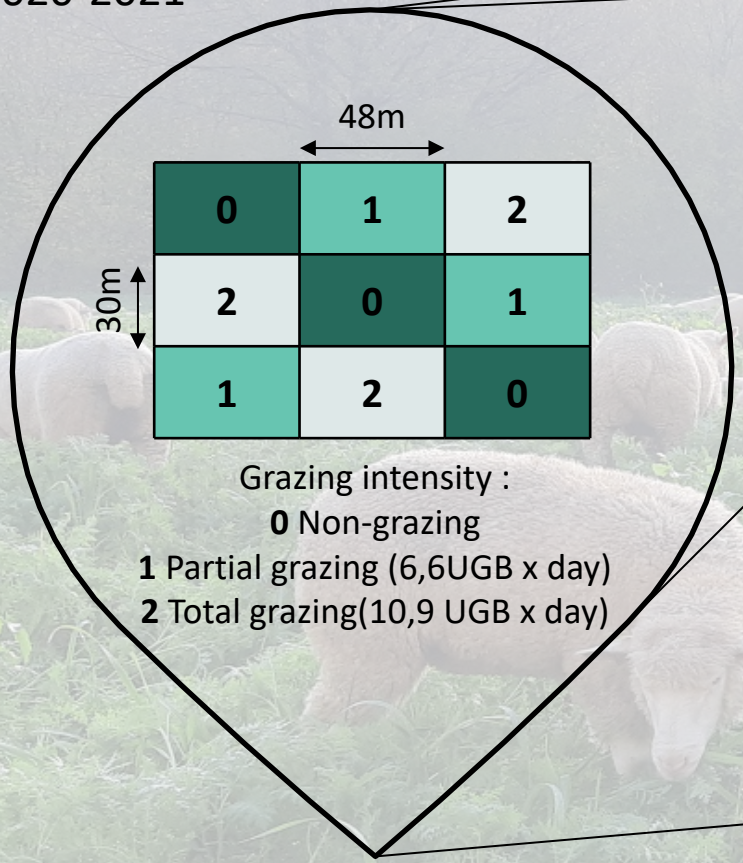
Interesting feed value 0.90 UFL/kg MS and 90g PDI/kg MS

Risk of light lameness if soil is humid with an increase in 1 to 4% of animals

Parasitic health of cover crop for sheep

Experimental set-up

- 5 trials in 2019-2020
- 5 trials in 2020-2021



Crop yield

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Agronomic impact

Grazing and grazing intensity do not negatively influence the yield of the following sring crop

		Non-grazing	Partial grazing	Total grazing	P-value
Average fresh yield (t/ha)	Beet (3 trials, n=3/grazing intensity)	100.4	97.8	102.8	0.29
	Chicory (1 trial, n=3/grazing intensity)	66.5	73.9	68.5	0.16
	Potato (1 trial, n=3/grazing intensity)	55.3	51.1	54.0	0.26
	Pea (1 trial, n=3/grazing intensity)	3.1	2.1	2.8	0.65
Average dry yield (t/ha)	Maize (1 trial, n=3/grazing intensity)	19.9	18.6	19.2	0.61
	Bean (1 trial, n=3/grazing intensity)	1.5	1.4	1.4	0.87

Mineral nitrogen

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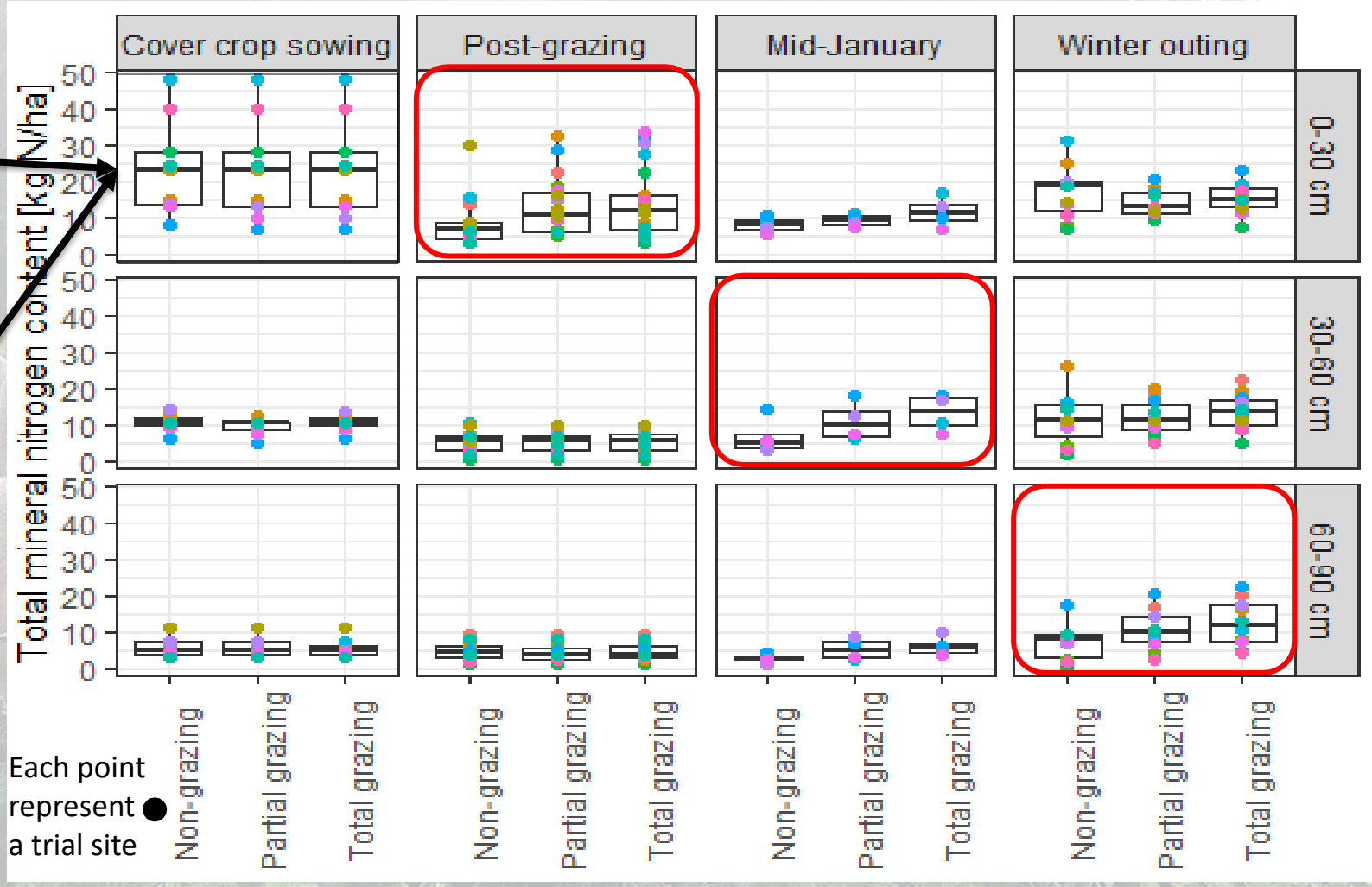
Environmental impact

Great variability in nitrogen residues

No significant difference between plots of the same trial according to the grazing intensity

Evolution of total mineral nitrogen content ($N\text{-}NO_3$ et $N\text{-}NH_4$) according to sampling period and intensity of grazing

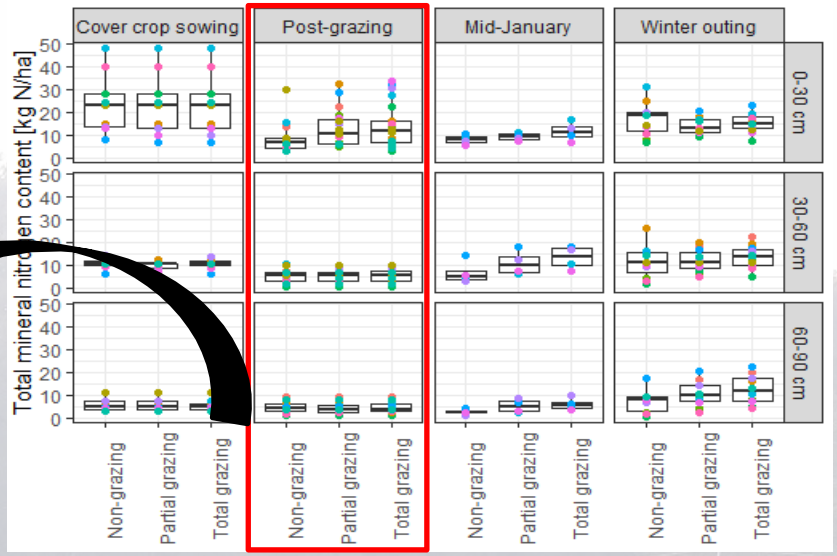


Mineral nitrogen – after grazing

Analysis of the quantity of mineral nitrogen present in the 0-30 cm and 0-90 cm depth after grazing, according to trial site and grazing intensity

Depth	Grazing intensity	P-value
0-30 cm	Non-grazing ***vs*** Partial grazing	* 0.019
	Non-grazing ***vs*** Total grazing	*** 0.00054
	Partial grazing ***vs*** Total grazing	NS
	Trial site effect	***
0-90 cm	Non-grazing ***vs*** Partial grazing	NS
	Non-grazing ***vs*** Total grazing	* 0.011
	Partial grazing ***vs*** Total grazing	NS
	Trial site effect	***

Statistical method significance of the variance comparison test



+11kg N/ha

+13kg N/ha

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Environmental impact

Mineral nitrogen – winter outing

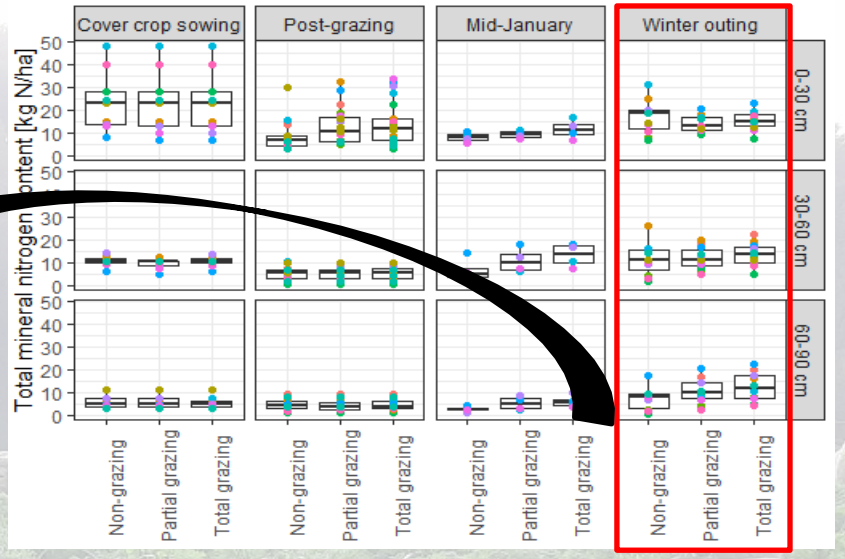
Analysis of the quantity of mineral nitrogen present in the 0-30 cm, 30-60 cm and 60-90 cm depth at winter outing, depending on the trial site and grazing intensity and significance of the variance comparison test.

Depth	Grazing intensity	P-value
0-30 cm	Non-grazing ***vs*** Partial grazing	* 0.03
	Non-grazing ***vs*** Total grazing	NS
	Partial grazing ***vs*** Total grazing	NS

Analysis of the quantity of mineral nitrogen present in the 0-90 cm depth at winter outing, depending on the trial site and grazing intensity and significance of the variance comparison test.

Depth	Grazing intensity	P-value
0-90 cm	Non-grazing ***vs*** Partial grazing	NS
	Non-grazing ***vs*** Total grazing	NS
	Partial grazing ***vs*** Total grazing	NS
	Trial site effect	***
60-90 cm	Non-grazing ***vs*** Partial grazing	NS
	Non-grazing ***vs*** Total grazing	* 0.028
	Partial grazing ***vs*** Total grazing	NS
	Trial site effect	***

Statistical method significance of the variance comparison test



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Life cycle analysis

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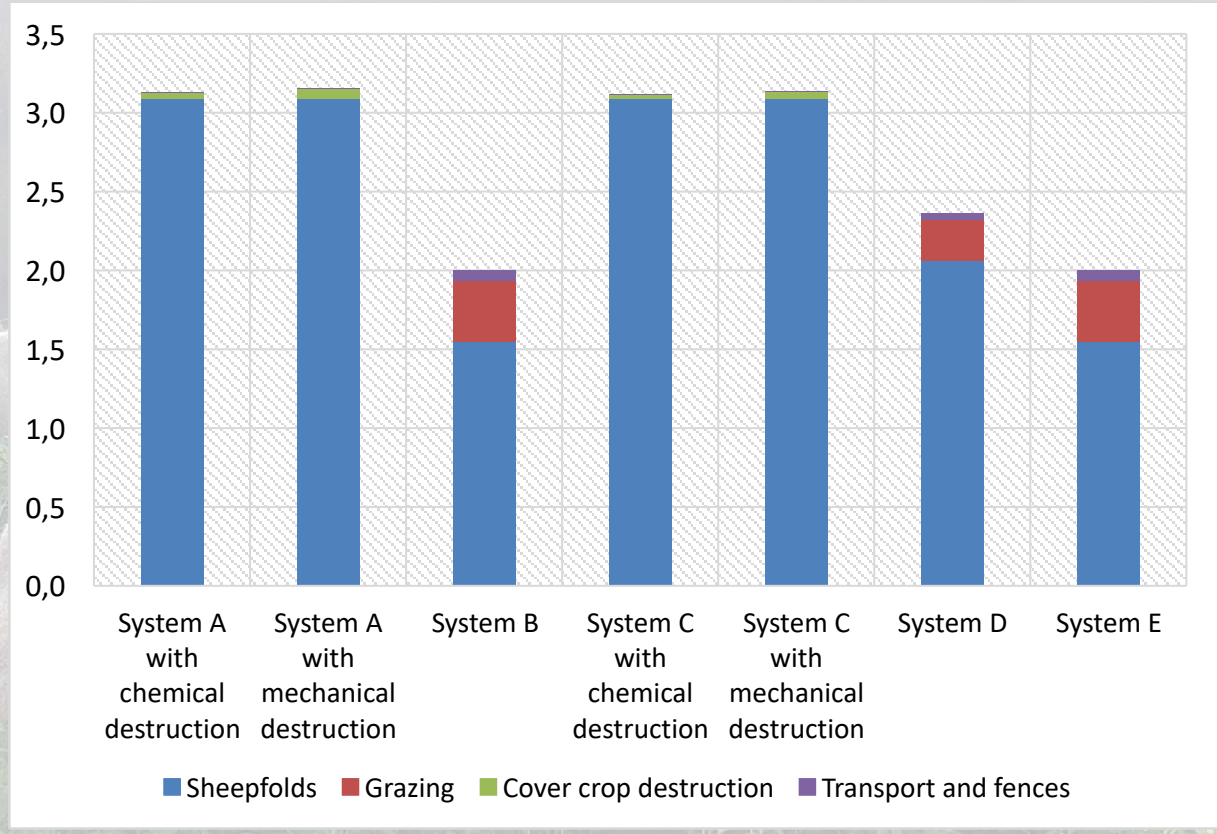
Environmental impact

Distribution of the number of sheep kept between different farming systems

	System A	System B	System C	System D	System E
In sheepfold system	100	50	150	100	100
Cover crop grazing	0	50	0	50	100
Total of sheep kept	**100**	**100**	**150**	**150**	**200**

These different systems are proposed with a view to increasing the size of the exploitation without constructing a new building in the case of systems D and E

Impacts on global warming (kg CO_2eq.) per kg of meat produced



Economic performances

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Economic impact

Partner	Agricultural practices	Global result	Interpretation
Farmer	Mechanical destruction Vs Destruction by sheep	-384 €	Gain
	Chemical destruction Vs Destruction by sheep	73 €	Extra cost
Breeder	System **A** Vs System **B**	-5.154 €	Gain
	System **A** Vs System **C**	-2.147 €	Gain
	System **A** Vs System **D**	-8.225 €	Gain
	System **A** Vs System **E**	-18.983 €	Gain

Economical global result according to the farming system in place and type of cover crop destruction

Conclusion

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Take home messages

Grazing of cover crops by sheep have no significant effect on nitrogen leaching. The nitrogen leaching is more influence by agricultural practices

Yield of the following spring crops is not impacted

Cover crops offer a high quality diet for sheep

The economic and environmental impacts of the practice is attractive for both the farmer and the breeder

➡ **Opportunity to develop the sheep sector**

Partnership

Wallonie recherche CRA-W

UCLouvain

COLLÈGE des PRODUCTEURS

For the financing – Thanks to

SPGE

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