Incidence of silvo-pastoral paddocks on the environmental performances of Sardinian dairy sheep systems

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Introduction

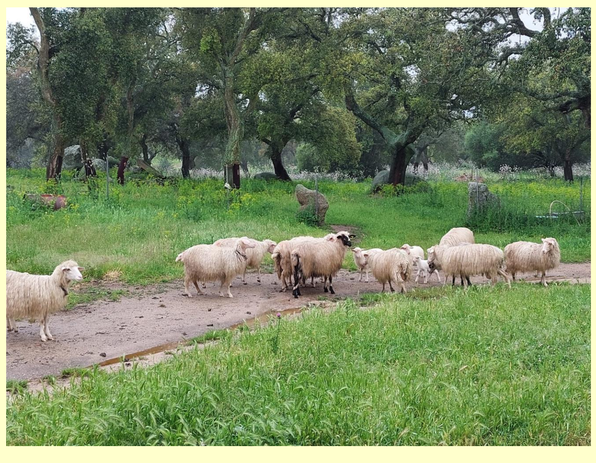
In Sardinia (Italy), silvo-pastoral systems have an important socio-economic role providing rural territories of employment opportunities and a wide range of ecosystem services. The objective of this work was to analyse the relationship between tree coverage level and main productive and environmental performances of Sardinian dairy sheep farms.

Materials and Methods

The study was carried out on twenty-six farms to survey a series of productive and environmental indicators. Farm paddocks were classified in nine different land uses from remote-sensed images. This classification allowed the identification of two farm categories, with 0-50% (G1 farms) or 50-100%(G2 farms) of the farmland area occupied by tree-covered paddocks. Specific farm data were collected in order to determine the Global Warming Potential (GWP), expressed as kg CO_2-eq/ha Utilized Agricultural Area (UAA).

Table 1. Dairy sheep farm characteristics and Global Warming Potential per hectare of UAA. Within rows different letters indicate significant differences at P<0.05.

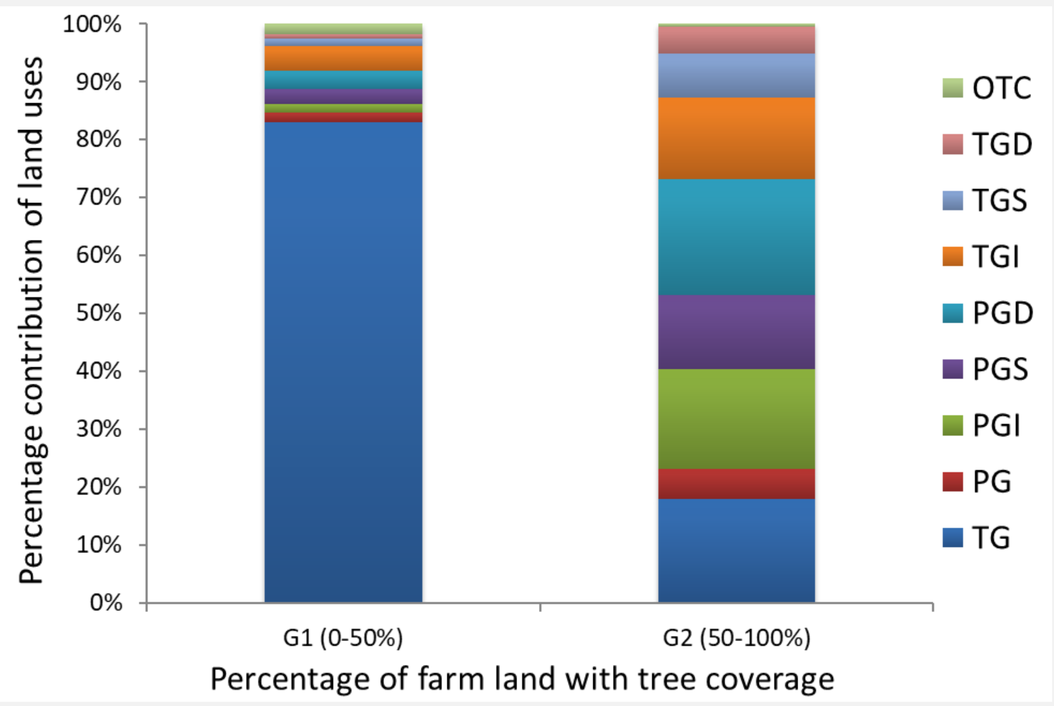
Percentage of farm land with tree coverage	G1 (0-50%)	G1 (0-50%)
Farms, N.	13	13
Ewes, N.	662 (a)	351 (b)
Replacement females, N.	168 (a)	76 (b)
Rams, N.	15 (a)	8 (b)
Utilized Agriculture Area (UAA), ha	100	88
Stocking rate, ewes/ha	6.4	4.6
Milk yield, kg FPCM/yr per present ewe	217 (a)	141 (b)
Global Warming Potential, kg of CO_2-eq/ha of UAA	4,618 (a)	3,350 (b)



Results and Discussion

Figure 1. Land uses in respect to tree coverage of farmland area

OTC: other tree coverage; **TGD**: temporary grassland with dense trees; **TGS**: temporary grassland with scattered trees; **TGI**: temporary grassland with isolated trees; **PGD**: permanent grassland with dense trees; **PGS**: permanent grassland with scattered trees; **PGI**: permanent grassland with isolated trees; **PG**: permanent grassland; **TG**: temporary grassland



i) G1 farms were essentially treeless, with on average 15% of farm surface occupied by tree-covered paddock and predominance of treeless temporary grassland (83%); G2 farms were silvo-pastoral, with on average less than 45% of arable soils (temporary grassland with different level of tree density) and about 50% of permanent grasslands covered by trees (Fig. 1);

ii) G1 farms showed flock size significantly greater than G2 farms, in terms of total mature ewes, replacement females and rams. Also, milk production level was significantly higher in G1 than in G2 (Tab.1);

iii) Global Warming Potential (GWP) per hectare of UAA of the sheep farms with less tree coverage was significantly higher when compared to the farms with more tree coverage, since higher amount of livestock activities were concentrated in these areas (Tab. 1).

Conclusions

This study shows that Sardinian dairy sheep systems characterized by a relevant incidence of tree coverage have significant low intense livestock activities and low Global Warming Potential per ha compared to farms with less tree coverage.

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