Consortium of Forest to Agro-Silvo-Pastoral System -Montado – In Mediterranean environments

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Introduction
The Mediterranean environment is characterized by very marked differences in the different seasons of the year. It is the only climate on the terrestrial globe in which it does not rain in Summer, which is dry, hot and long. On the other hand, the precipitation is quite irregular, both with respect to the intra-annual variation, or in the inter-annual variation. It is concluded, therefore, that the distinguishing characteristic of the Mediterranean climate is the hot, long and dry Summer, which is associated with low atmospheric humidity and very accentuated irregularity of precipitation. These unique climatic specificities are responsible for the impossibility of herbaceous plants to support the rigor of Summer, having evolved to overcome this season on the terms of seeds (annual biennials or perennials). The soils and more recently, one sees with apprehension that they are heading to desertification. The exposure to atmospheric agents after fires or the mobilizations of soils to which they are submitted cause combustion of the soil’s Organic Matter (O.M.) and physical erosion, dragging nutrients and converting them into low productive capacity soils. Taking into account the irregular orography, we conclude that these regions are only able to support low capacity production systems, when compared to other climatic conditions. In these circumstances, it is pertinent to stress that the Mediterranean Environment is characterized by its low primary productivity. Thus, the Mediterranean Forest is formed essentially by tree plants (namely: Guarea) and shrubs (namely, Cistacea) and the forest fires are a natural occurrence, or less extended because, due to the favourable combined conditions: presence of (fuel) shrubs, high temperatures, low humidity and irregular winds that feed any simple ignition. The evolution of Mediterranean Agriculture Systems has always been focused on increasing the productive potential of the soil. It is based on the control of weeds / fuels to prevent fires and improve the productive capacity of soils, and increase productivity through irrigation. The possible application of these principles to the Mediterranean Forest resulted in the creation of agro-silvo-pastoral systems, which justify human intervention to counter natural imbalances.

The stability of the systems depends on the adequate management and they are summarized in the preservation of the tree layer, control of the shrub layer and promotion / improvement of the herbaceous layer (annual grasses and leguminous plants of natural self-reseeding). Consequently, the key factor in the recovery process is the increase in the content of O.M. in the soil, which induces structural improvement, increases the content of nutrients (Soil Exchange Complex) and the storage of water. As the pasture is the most efficient way to achieve this goal and the animal is the sine qua non condition for its maintenance, the objective of this paper is to demonstrate how an abandoned Mediterranean Forest farm can be recovered, converting it into an agro-silvo-pastoral Mediterranean system, which in Portugal known as Montado.

Results
The natural condition of the examined areas, combined with the various cartographic elements, orthophotomaps and maps of cultural distribution resulted in the repackaging plan to apply and implementing the Montado Crop Rotation, considering a cycle of 5 years, since the cleaning of the shrub area was recently carried out, Control of Shrubs has been suppressed and so pasture will last for 4 years (n=4), for calculating feeding availability and infrastructure investment plan. Table 1 shows the distribution of paddocks by the Rotation parcels, with respective areas and excluded forest stands and the valley.

The Mixed Grazing Scheme was made from data collected in published works (Potes, 2011). For calculation of feeding availability and plan of investments in infrastructures was built Table 2. It is also possible to quantify the application of the risk coefficient and the evolution in the use of different livestock species according to the improvement process.

*The Serpentina Breed goat needs approximately 750 Kg of O.M./head/year.
** The Merino Breed sheep needs approximately 675 Kg of O.M./head/year
***In the first year Montanhas was calculated for 200 heads of Montanhas Breeds and 90 days of duration (need of 5.4 Kg O.M./day per head) and the rest of the years 600 heads.

The explorative of the various business areas that can potentially be carried out on the farm require basic investments, namely the fencing of the perimeters, creation of a water supply network for the various parcels and creation of livestock management parks.

Implementation to be measured – The implementation of the Agro-Silvo-Pastoral model in Herdade Cavreira and Herdade da Ervideira implies the initial creation of conditions, namely in what regards livestock farming. It is necessary to invest in 3 main items: placing fences, namely in the outer perimeter of the property and also to protect the agricultural zone and complementing the different paddocks, make water available in the different areas of the farm, which implies the placement of pipes, pumping systems and reservoirs; creation of livestock management parks.

A preliminary analysis allowed us to reach an investment value in these items around 350,000€.

Revenue – According to the preliminary analysis carried out, the farm has the potential to obtain revenue through exploitation: Forest – the production (cork) can be valued through a gross revenue calculation of 2,600€/ha/year x 22,54€/ha = 58,500 €/year; Agriculture – Valued by area of the valley (agricultural area). A value of 300 € /ha / year x 77 ha (utilizable and with available crops), totaling 23,100 € /year; Livestock – Starting with the first cycle, revenues may come from Montanhas pigs, valued at 60 €/head and small ruminants (goats and sheep) valued by leasing 40 €/ha/year x 575 x h = 12,000 € + 23,000 € /1st cycle.

Costs – The implementation of the Agro-Silvo-Pastoral System presented is based on the creation of a set of partnerships that allow the reduction of operating costs and risk mitigation. It is in this perspective that the exploration of the agricultural area is proposed to be carried out by a third party (the revenue being the lease) and that the livestock exploitation is also done in a partnership system (the entities that install the animals and are responsible for their exploration, or for paying for the fattening period on the holding). We therefore expect the following operating costs (Personnel Expenses and Supplies and External Services per year): Accounting – 2,400€/year; Office – 2,400€/year; Administrator Salary – 43,312,50€; Employee salary – 13,860,00€; Vehicle renting – 5,000€/year; Fuel – 2,940,00€; Communications – 1,200,00€; Repairs and Maintenance – 6,000€/year, making a total cost of 77,112,50€. The analysis makes possible to estimate Operational Result before Taxes (EBITDA) at 39,487,60€.

Discussion (Conclusion / Implications)
Valuing only the products of Agro-Silvo-Pastoral exploration, the technical, economic and environmental analysis provides economic and social feasibility.