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CONCEPTUAL FRAMEWORK FOR DEFINING OPTIONS OF CROPS-LIVESTOCK INTEGRATION UNDER CONSERVATION AGRICULTURE USING FARM DESIGN MODEL

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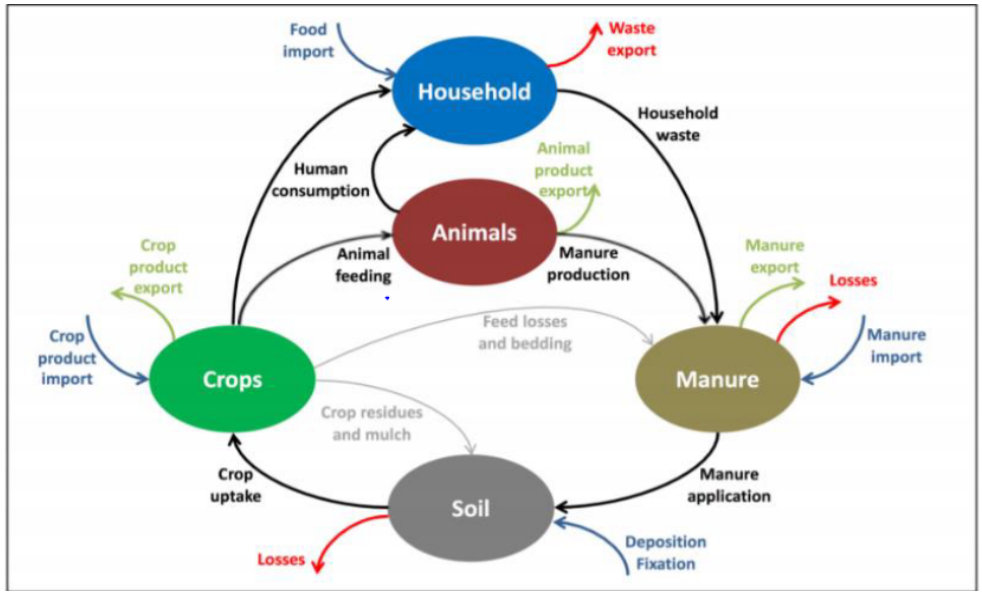
OBJECTIVES AND CONCEPTUAL FRAME WORK

Exploring the concept of crop livestock integration in dryland cereal sheep systems and showing farm configuration that aid sustainable and profitable integrated systems in Zaghouan.

- Analyze the performance of the current situation per farm type using FD modelling.
- Explore general trends between objectives.
- Finding optimal management configurations per farm type.



Using of a bio-economic model

- ✓ The level of integration of the farming system
- ✓ Simulation of trad-offs and
- ✓ scenarios

RESULTS AND PATHWAYS

Typology

+

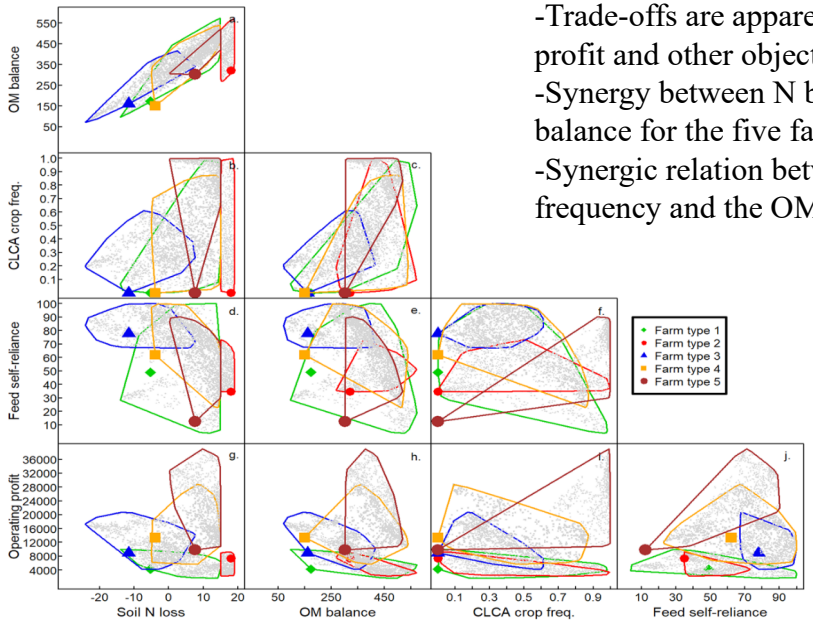
Farm Design Model

- **FT 1** • Small and low integrated farms: 24.2% of farmers of our sample. The average of farm size is about 1.75ha, 53% of which is cultivated by barley, characterized by the lowest number of livestock in the farm.
- **FT 2** • Relatively large and well-integrated farms: formed by 19.2% of farmers. The average farm size of 6.3 ha, characterized by a high number of sheep and chicken and the lowest number of days of grazing in the common pasture.
- **FT 3** • Large farms dominated by crop production: include 12.1% of farmers. The average of farm size is about 9.9 ha, 40% of which is cultivated by barley, 24% is cultivated by wheat, 18.4% is cultivated by other fodder crops other than barley and 15.2% is cultivated by olive trees. Farmers in this group use relatively a medium quantity of concentrate, barley and bran as feed for their livestock.
- **FT 4** • Intensive integrated farming system dominated by sheep breeding: formed by 24.7% of farmers. The average farm size of this group is about 5.1 ha, have the highest average of number of sheep about 34 head. The concentrate, bran, straw, hay, and barley constitute the main source of feed.
- **FT 5** • Extensive farming system with medium level of integration: this group of farms contain 19.7% of farmers. The average of farm size is 1.7 ha, 40% of which is cultivated by barley. Farms have the highest number of goats, chicken, and number of days of grazing on the common pasture.

✓ Trade-offs and synergies are different across farm types.

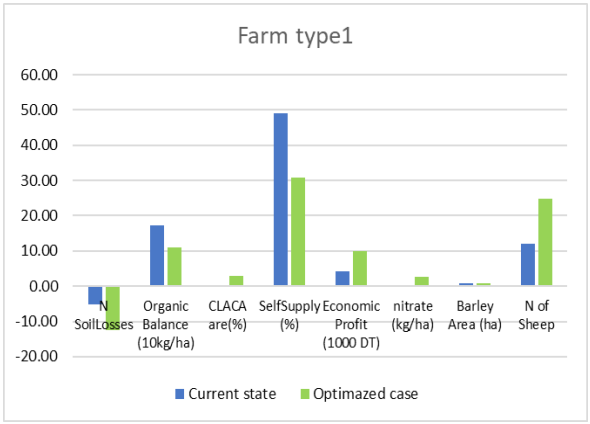
✓

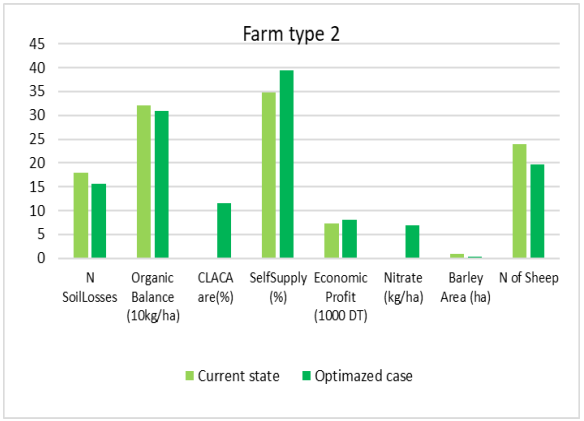
Give insights and pathways for improvements.

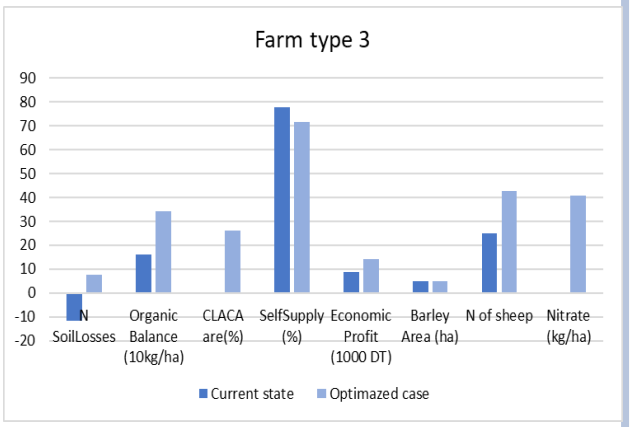


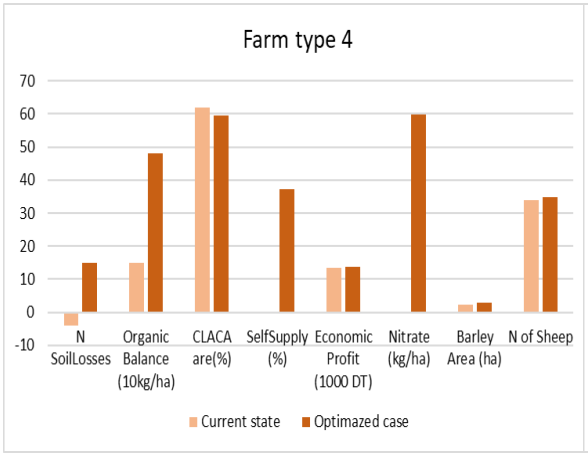
-Trade-offs are apparent between operating profit and other objectives.
-Synergy between N balance and soil OM balance for the five farm types.
-Synergic relation between CLCA crop frequency and the OM balance

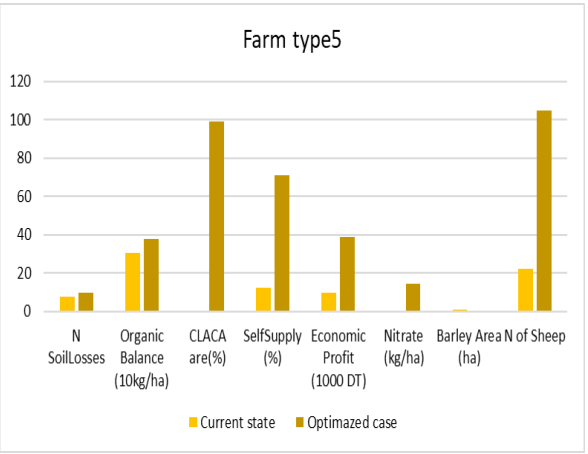
OPTIMIZED CASE-STUDY FARMS











CONCLUSION

Integrating crops and livestock has potential for the improvement of profitability and sustainability of cereal-sheep farming in Zaghouan.

- ✓ Soil N mining
- ✓ Increase in fertilizing inputs may boost productivity and biomass cycling
- ✓ Fodder mixture integration promising