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► To cite this version:

Cyrille Rigolot, P. de Voil, Sabine Douchamps, Di Prestwidge, Mark van Wijk, et al.. Additive impacts of climate-smart agriculture practices in mixed crop-livestock systems in Burkina Faso. Climate Smart Agriculture 2015, Mar 2015, Montpellier, France. hal-01195408

HAL Id: hal-01195408

<https://hal.science/hal-01195408>

Submitted on 3 Jun 2020

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16:45 Additive impacts of climate-smart agriculture practices in mixed crop-livestock systems in Burkina Faso

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Smallholder farmers of Northern Burkina Faso have important development opportunities, but they will have to cope with the effects of climate variability and change. In four farms representative of the area, crop and animal production, income and food security indicators have been simulated, with all combinations of four interventions: i) Optimized crop residue collection; ii) Improved allocation of existing feeds, iii) Crop fertilization; iv) Animal supplementation. The modeling framework we used is based on three existing dynamic livestock (Livsim), crop (Apsim) and household (IAT) models. To assess the impacts of climate variability, a 99 years current climate series has been generated with the climate generator Marksim. The simulations show that collecting crop residues improves significantly the food security indicator (FS) in one farm because it enables the development of cattle production (FS +135%), whereas the effects are moderate in the three other farms (FS <10%). Low amounts of fertilizer have a significant effect (FS +15%), but the simulations show decreasing yield returns and the higher downside risk in the bad years. Improved feed allocation strategies with available resources have a positive effect (FS +9%), which is as important as supplementation with additional feeds. The impacts of the tested interventions are additive and synergistic, because increased crop residues production with fertilization creates opportunities for optimized feeding. As a consequence, in the four farms, the highest income and kilocalorie production (up to 53% compared to current farmer practices) are obtained with a combination of interventions enhancing synergies between the crop and the livestock systems. The household yearly probability to be food secure also increases by up to +26%, suggesting an increased resiliency toward climate variability. We conclude that the best options for adapting mixed crop-livestock systems might be found in the synergies between their components, rather than in single interventions.