Supplementary Material

In search of sustainable livestock management in the Dry Chaco: effect of different shrub-removal practices on vegetation

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29 Seasonal dynamics of NDVI and phenology

30 We registered the NDVI as a proxy of green biomass (Paruelo et al. 1997). NDVI data were extracted 31 from images provided by the MODIS sensor of the TERRA platform (MOD13Q1 product, temporal 32 resolution: 16 days; spatial resolution: 250m). We selected 12 representatives ("pure") pixels at each 33 site to perform the analysis for the period 2013-2018. The sites for assessing NDVI dynamics were 34 chosen taking into account that they should be located in the same areas as the field transects, and 35 that these areas should be equal to or larger than the pixel size used. We considered as the growing 36 season each period between September and August, taking into account that the minimum NDVI in 37 the Dry Chaco is generally recorded at the end of August (Zerda and Tiedemann 2010).

38 To assess the seasonal dynamics of NDVI, TIMESAT software was used to evaluate time series and 39 estimate phenological attributes (Jönsson and Eklundh 2004). The Savitzky-Golay polynomial filter 40 function was used to fit the growth models and to suppress extreme values. The result was a 41 smoothed function similar to the input data. Thresholds were defined for the beginning and end of 42 each growing season when NDVI reached 20% of the seasonal amplitude. We previously tested 43 images at a larger number of sites in the region to determine the threshold value. We estimated 7 44 attributes that characterise aspects of phenology: date of the beginning of the growing season, date 45 of the end of the growing season, duration of the growing season, date of occurrence of the maximum 46 annual NDVI, maximum annual NDVI value, minimum annual NDVI value, annual NDVI integral 47 (ANDVI, area under the NDVI curve) and amplitude. In the TIMESAT outputs the date format is in 48 Julian days and they are calculated in relation to the beginning of the period analysed (start date of 49 the series analysed: September 2013) and not to the beginning of each year. We also calculated the 50 coefficient of inter-annual variation of NDVI (CV-NDVI) with the following formula:

$$CV - NDVI = \frac{Standard deviation}{mean} 100$$

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56 References

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