General introduction

Conservation of natural resources and wider implementation of biodiversity-targeted production means to facilitate environmental sustainability, are main goals of current farming systems (de Bello et al. 2010). In this regard, grassland greatly contributes to ecological conservation since this area comprises about of forty percent of the earth surface (Lemaire et al. 2005). However, commonly managed high productive grasslands contain a relatively low plant species number. The main focus is on the production of animal feed to achieve a high livestock performance on the expense of other ecosystem services (Sanderson et al. 2007). In contrast, on more diverse grasslands, the herbage production could be generally lower; however, in adverse environments plant diversity may have a production advantage combined with additional ecosystem services (Isbell et al. 2011; Wrage et al. 2011). As farming management influences grassland plant diversity and thereby affecting further complementary ecosystems services, farming practices aiming at the maintenance and enhancement of grassland diversity are to be developed (Dumont et al. 2011; Metera et al. 2010).

An important issue for diversity conservation includes the study of herbivores. Domestic ruminants are able to change botanical composition and and structure of the sward by herbage selection, trampling trampling, nutrient recycling and manure deposition (Soder et al. 2009; Dorrough et al. 2007; Rook et al. 2004). Different grazer species may have greater influence that only one herbivore species, i.e. co-grazing of two or more grazer species is expected to have additional effects on swards botanical composition than mono-grazing. In these conditions, grazing may increase rare or endangered plant species and maintain more productive species in stable abundance (Pykälä 2005; Isselstein et al. 2007).

Besides, complementary use of resources by co-grazing might result in improvements in the performance of single animal species or at best even of all species (Benavides et al. 2009; Animut and Goetsch 2008). Therefore, to obtain reasonable herbage productivity and consequently positive animal response; strategies aiming at matching both herbage production and herbivore feed requirements are mandatory.

So far, precise knowledge on potential interactions between sward diversity and co-grazing is not available. A better understanding of how plant and herbivores operate in the grazing process, would allow to design better grazing schemes to augment pasture-animal welfare and productivity. Thus, this study aim at contributing to a better understanding of the behavior patterns and forage selectivity of cattle and sheep, as well as the relationship between plant diversity and herbage-animal responses.

In the **first chapter**, we analyzed the interaction between botanical composition (diverse or grass dominated swards) and animal species [(co-)grazing cattle and sheep], in terms of main (grazing, walking and ruminating) and secondary (bites per minute, steps per minute and bites per step) behavior patterns of cattle and sheep.

In the **second chapter**, the study deals with the intake preferences for six main forage species of (co-)grazing cattle and sheep on diverse or grass dominated swards.

In the **third chapter**, we discuss the relationships between plant diversity and herbage productivity. Later, we explain the viability to use grazing as an instrument to enhance or recover grasslands botanical composition and plant diversity. Further, we underline the importance of interdisciplinary research groups to obtain productive and ecological benefits from grasslands.