

Determinants of the utilization of desho grass (*Pennisetum pedicellatum*) for multiple-purposes in Ethiopia

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Introduction

In the densely populated, humid highland and midland regions of Ethiopia, the green canopy of desho grass (DG), local varieties of *Pennisetum* sp., spread across the escarpments. Planting of DG is an example of a locally tried and tested land management technique documented by the Ethiopian Ministry of Agriculture and Rural Development as a successful technology to mitigate land degradation. This technology is in response to cropland encroachment onto communal grazing areas and overstocking of livestock that has led to overgrazing, causing further land degradation and serious pasture shortages. DG is used for multiple purposes in Ethiopia. It is mainly grown on small home plots and used for soil conservation practices, as livestock fodder and sold for income generation. Despite desho having alternative uses, there are no reported studies that have tried to understand the implications of these multiple uses in the predominant mixed crop livestock systems. The objective of this study was to characterize DG utilization by smallholder farmers in Ethiopia and explain the determinants of alternative and competing uses of the grass (as a feed, soil conservation or sold as fodder for income generation).

Materials and Methods

To estimate the effect of socio-economics factors, agro-ecology and farmers perceptions on DG, data from 240 DG producing households was collected using semi-structured questionnaire from midland (2091 m.a.s.l) and highland districts (2748 m.a.s.l) of Burie Zuria, Amhara Region and Doyogena, Southern Nations, Nationalities, and Peoples' Region respectively in December, 2014. The dependent variables tested were the extent of use of DG as a feed (use as a feed, 1=yes, 0=no if it is used for others purposes), multi-purpose aspect of DG (0= one use, 1= multiple uses) and livestock preference (fed to lactating cattle, 0=no, 1=yes; fed to small ruminants, 0= no, 1=yes; fed to all livestock species: 0=one species, 2=all livestock species). The dependent variables were binary in nature and independent. The factors tested (explanatory variables) were household characteristics (head's age, education level, sex and experience in DG utilization, land holding, distance of the land from the homestead) agro-ecology and feed accessibility (midland vs highlands), herd structure and training access. To test the effect of the explanatory variables on the dependent variables, separate univariate Probit models were used.

Results and Discussion

The average DG producing farmer in the sample owns 0.95 ha of farmland and 3.56 livestock units and comprises 6.5 people with a household head who is typically male (91% of households). The proportion of farmers who use DG as a feed are 60% and 35% use it for more than one purpose. 42 % of the farmers reported that they feed DG to lactating cattle, while only 3% of them feed DG to small ruminants. 53% of the farmers feed DG to all livestock species. On average, the farmers have no more than 3 years of experience in DG production. Table 1 presents the coefficient estimates and probability of the determinants of DG utilization. There is a negatively significant correlation between experience in production of DG and it's utilization as a feed. The more the experience in DG, the higher the likelihood of the farmer to use DG for purposes other than feed. 43% of the farmers have received training on DG production. Farmers, who have received training in DG production, tend to use it to a lesser extent as a feed. Training on the use of DG is important to promote DG production as an avenue to generate income (near effect) and for soil conservation. This highlights the potential for capacity building which would contribute to the sustainable use of DG in the future. The households in the highland areas tend to use DG as a feed for their livestock more than those in the midland area. The higher the dependence

on grazing, the greater the likelihood of DG being used as a feed. The low accessibility to feeds in the highlands (possibly due to limitations of grazing), vulnerability of soil towards erosion, high density of livestock per household, DG might have a higher potential to be utilized as fodder and for soil conservation in the highlands. As accessibility to feed increases, the number of livestock species which are fed on DG increase. When there is pressure on the feed resources, farmers prefer to feed the cattle. The more educated farmers show preference towards feeding DG grass to the lactating cattle. However, more than 50% of the farmers do not have priority when feeding DG. It may be important to explain the importance of DG as green forage to increase milk production and quality (Hunduma, 2012; Solomon, 2006). However, it may be difficult to convince the farmers to expand DG plot size due to their small land holdings.

Table 1: Determinants of desho grass utilization by smallholder farmers in Ethiopia

Explanatory variables	Use of desho as a feed Coef. (Std. Err.)	No. roles Coef. (Std. Err.)	Targeted livestock species		
			Large cattle Coef. (Std. Err.)	Small ruminants Coef. (Std. Err.)	All species Coef. (Std. Err.)
District (BurieZuria)	-1.34(0.40)***	-0.94(0.34)	0.64(0.39)	-36.37(4.35)***	-0.82(0.4)*
Household head age:					
18-30	-0.55(0.53)	-0.43(0.48)	-0.38(0.48)	31.28(1.98)***	0.16(0.49)
31-40	-0.16(0.48)	-0.18(0.44)	-0.28(0.43)	32.37(3.51)***	0.32(0.44)
41-50	-0.55(0.44)	-0.36(0.40)	-0.28(0.40)	28.17(1.40)***	0.26(0.40)
51-60	-0.61(0.47)	0.24(0.43)	-0.76(0.44)	25.79(2.53)***	0.59(0.44)
Education level:					
Illiterate	0.58 (0.36)*	0.34(0.35)	0.42(0.37)	7.38(1.81)***	-0.65(0.37)*
Read and write	0.86(0.39)*	0.23(0.36)	0.56(0.38)	6.91(1.66)***	-0.75(0.38)*
Elementary school	-0.10 (0.34)	-0.06(0.33)	0.45(0.35)	3.95(2.90)	-0.55(0.36)
High school	-0.29 (0.42)	-0.23(0.41)	-0.20(0.44)	11.47(4.15)***	0.03(0.43)
Experience in desho grass (years)	-0.20 (0.08)**	-0.13(0.08)*	-	-	-
Active labors (numbers)	-0.03 (0.06)	-0.01(0.06)	-0.3(0.06)	-0.30(0.84)	0.16(0.09)*
Feed shortage (yes)	-	-	5.85(0.32)***	-0.93(0.26)***	-1.48(0.52)***
Farmland size (ha)	0.28(0.26)	-0.01(0.2)	-0.11(0.25)	-1.52(3.95)	0.14(0.25)
Backyard (yes)	-	0.17(0.30)	-0.05(0.30)	-1.80(2.42)	0.00(0.30)
Distance from household (far-away)	0.29(0.32)	-	-	-	-
Access to training (yes)	-0.93(0.26)***	-	-	-	-
Total livestock units (number)	0.04(0.06)	0.03(0.06)	-0.14(0.06)*	-2.37(2.42)	0.25(0.07)***
Feeding system (grazing)	0.98 (0.36)***	-	-	-	-
R²	0.37	0.12	0.24	0.99	0.31
No. of observations	240	240			

Conclusion

Nevertheless, it can be concluded that extension service and years of experience are important determinants of the use of DG for multiple purposes.

References

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