



Hans H. Ruthenberg-Graduierten-Förderpreis 2016/

Hans H. Ruthenberg Award for Graduates 2016

Mareike Aufderheide-Voigts “Reproductive performance and modelled herd development of cattle kept by Borana pastoralists in Southern Ethiopia”

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Summary

Pastoral production in arid and semi-arid regions is determined by spatial and temporal variability of pasture resources. Therefore mobility, daily as well as seasonal, is a vital precondition for successful livestock management. In addition to allowing pastoral households to persist, transhumant livestock systems can deliver significant ecosystem services by imitating the former herds of wild herbivores, with which the ecosystem has evolved, but which have disappeared in most arid and semi-arid areas. Through this, pastoral herds can contribute to maintaining and enhancing biodiversity. In Southern Ethiopia the Borana pastoralists are the dominating ethnic group. They focus on keeping Boran cattle. In recent times also an increasing number of camels are kept in addition to small ruminants. However, cattle are still the main species (Megersa *et al.* 2014). The milk and meat provided by the animals are a main factor for local food security in the area, since climatic conditions in most of the Borana areas do not allow arable land cultivation. The livestock also provides financial security to the pastoralists. By herd growth an increase of the initial asset is provided, comparable to the interest on a bank deposit. From this asset, financial needs of the livestock owner can be accounted for (Tache & Sjaastad 2010). To ensure sustainable production and sufficient offtake from the herds in order to provide food as well as financial means, reproductive performance of the cattle is a trait of great interest to pastoralists, since these factors determine herd growth. Especially age at first calving, calving interval and mortalities determine herd development. The potential productive offtake is also of interest to the pastoralists, since it forms the income from their production system. Herd development modelling can be applied to calculate potential herd growth from the combined parameters.

Borana pastoralists have employed mobility over centuries to take their animals to the best grazing resources available at a time. They divided their pastures into key and non-key resources. Key resources were areas of vital importance for grazing in dry seasons, whereas non-key resources were utilised during wet seasons and allowed quick recovery of the animals from times of climatic stress, due to their rapid plant growth after the first rains (Angassa & Oba 2007). In recent years the use of Borana rangelands has changed gradually but considerably. Due to population growth, privatisation of rangelands, national and regional policies and bush encroachment, pasture resources are declining (Kamara *et al.* 2004) and a severe reduction of seasonal mobility has been observed (Homann 2005). In some settlements

almost sedentary lifestyle is now practiced. This decrease of mobility has led to a considerable change in land utilization. Grazing of a specific area takes place more frequently and/or over a longer time period (Wario et al. 2016).

Since reproductive performance is a determinant for herd development, assessing these parameters can reveal a trend for the impact of the recent changes of management. It is hypothesised that recent changes in the environment and management lead to a reduction of reproductive performance and a decline in herd growth of Borana cattle herds. By comparing different areas within the Borana system a further differentiation is aimed for. In this study the hypothesis is that in regions of severe restrictions on seasonal mobility reproductive performance and herd growth are hampered more decisively than in regions with more possibilities of movement.

Three regions within the Borana rangelands were included in this study to find variations within the system. To gain information on performance of the animals, data from progeny history questionnaire based interviews obtained in another study were used (n = 169 Dirre, n = 126 Malbe and n = 110 Golbo). The information on performance parameters, such as age at first calving, calving interval and others was obtained by using the software LiDaSt combined with Excel. Statistic analysis was done with SPSS. Calculations with the bio-economic herd model PRY HerdLife yielded information on potential herd development of the three different herds.

The results of this study show that there are significant differences between the regions. There is a consistency of the data that the most viable population of cattle of the three regions is in Malbe compared to Golbo as a medium and Dirre as the most difficult area of livestock keeping. While the differences between Malbe and Golbo are in most cases minor, their difference to Dirre is much more decisive. Age at first calving is 54.2 ± 0.7 months (LSM \pm S.E.) over all regions (Dirre: 55.9 ± 0.9 months; Ma/be: 52.0 ± 1.8 months; Golbo: 52.8 ± 1.4 months). Average calving interval over all regions is 18.5 ± 0.3 months (Dirre: 19.3 ± 0.4 months; Ma/be 17.1 ± 0.6 months; Golbo 18.3 ± 0.5 months). Pre-weaning mortality tends to be highest in Dirre (22.4 %), followed by Golbo (17.5 %) and Ma/be (12.6 %). The most prominent cause of death for offspring up to 36 months was malnutrition (75 %) and most disposals occurred to cover basic needs (64 %). Herd development modelling revealed the same trend and showed a potential annual herd expansion rate of 8.5 % for Dirre, 11.4 % for Golbo and 13.4 % for Malbe. Altogether reproductive performance has decreased compared to earlier findings from other studies (e.g. Nicholson & Cossins 1984, quoted by Cossins & Upton 1987; Cossins & Upton 1988). Since mobility is most restricted in Dirre due to high population density and regulations it is concluded that the reduced seasonal mobility has a decisive share in the decrease of reproductive performance and potential herd growth. However, the expected result, that the herds in the area with least restricted mobility, Golbo would show the most favourable reproductive performance, was not confirmed. Instead the region of Ma/be significantly showed more favorable figures. In this region a system is practiced where families are split up between two grazing areas and the cattle are seasonally moved between these areas. Therefore, the families practice an almost sedentary lifestyle, while the animals are still managed somewhat mobile. By practicing this management strategy, which was shown to increase food security compared to the other regions, Millennium Goals, such as school education for children, provision of clean drinking water or availability of medical services are not compromised. This system also seems to be well adapted to the ecosystem, since areas are utilized and then have time to rest, which is the typical kind of utilization in these areas.

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