Sustainable pasture management with high resolution location and behavioural data of farm animals

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Abstract

As a consequence of the agro-structural adjustment process Southern Bavaria's pasture regions in the mountains, in the hilly landscapes as well as steep slopes are being taken away from intensive agricultural utilisation. However, aspects of conservation and protection of species and the preservation of the cultivated landscape argue for a further use of these regions. The latter is particularly necessary for tourism and to provide recreation areas. Large-area extensive pasture systems with cattle, sheep or goats are considered as adequate to sustain the landscape and to assure the ecological potentialities of such regions [1]. In the area of hill farming, regions with low earning capacity have to be advanced and shall be provided for a site-specific and environmentally sound utilisation. This requirement is based on the management of the agreement of the alpine-convention in 1991. Against the background of computer aided systems in Precision Livestock Farming the impact of approaches of information technology will play a decisive role for extensive regions in the near future as well. Especially sensor technology, robotics and positioning techniques will gain in importance. To protect cultivated pasture land and to sustain it at the same time, the integration of modern technologies is needed. This enables a new kind of land use management which is able to deal with or avoid damage caused by grazing animals, over-fertilisation, under-fertilisation, the load due to animal steps, erosion and up to including mudflow generation. Telemetric systems provide the opportunity to measure various behaviour patterns and to utilize them for the pasture management.

Objective of the project which is supported by the "Deutsche Bundesstiftung Umwelt" (DBU) is to observe and collect behaviour patterns and positions (with ETHOLOG II+ collars and GPSplus collars) over a certain period based on a reference implementation with sucking cows (Limousin) and meat-goats (Burenziege). Furthermore these data should be analysed for the formulation of possible grazing management tools. Furthermore an approach should be presented how such a system can be implemented in alpine farming.

Until now, behaviour of wildlife and farm animals has been simply analysed by data collection via telemetries using (very) low sample rates e.g. 30 minutes for position and behavioural data. The animal-specific (regarding behaviour pattern) collected data is quite different to other trials. Data is different between the two species because of the different feed and movement pattern. In this project, which is going to start in the grazing period 2006, two types of collars will be used. One type is the ETHOLOG II+ collar (Greenway-systems GmbH) with a sampling interval of 5 minutes for the GPS-coordinate and the behaviour pattern [2]. The other type GPS plus collar, developed and distributed by Vectronic-Aerospace, features a higher resolution, namely a sampling interval of 15 seconds for the GPS-coordinate and 64 seconds for the behaviour. Sample rates are considered to be adequate because the average period for one behaviour pattern is not briefer than the sampling interval. In different test series the technique should be fixed onto 5 sucking cows and onto 5 goats. In the first grazing period animals are tracked in a continuous grazing. In the following year studies will be conducted on hill pastures. The data should be analysed site-specifically and geostatistically by the means of ArcGIS 9.1 (ESRI). Based on the derived parameters for pasture quality and growth mapping studies, preferred zones can be aligned and standardised behaviour patterns can be worked out. Answers to questions about group-dynamic effects, the role of the leader and species-specific, individual behaviour patterns are expected as main results. Based on this data, strategies for pasture management can be deduced. In addition useful means for pasture documentation and herd management could be given to the farmers (e.g. automatic door opening and closing procedures, attractants or luring voices by remote control) [3].

References

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