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## **Modelling the effect of rangeland management on livestock production system of nomads in southern Iran**

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**Key words** : rangeland management ,nomads ,sustainable livestock production system ,southern Iran

**Introduction** Nomads and their belongings, as sub-systems, are the main part of the highland range production system and cropland production system. System dynamics and modelling are used to assess these complex systems. Pastoral nomadism is a form of living that is ecologically adjusted at a particular technological level for utilization of marginal resources (Emadi, 1995). The overall objective of the research was to study the nomads as the major (applier) of a Nomadic Production System (NPS) in the Bakkan region and to identify their sub-systems and components.

**Materials & Methods** To achieve results and answers to some questions based on the objective, a district located on the north of the Fars province in the south of the country, namely Bakkan, the first governmental site for nomads settlement and a NPS was selected for study. The main contributing factor for integrating the livestock production system is the availability of herbage in rangeland that is directly grazed by animals and the availability of forage in a cropland production system that directly (grazing on crop residues) and indirectly (by gathering the crop residues as part of a concentrate) provide animal feed. These sub-systems are linked together by grazing energy intake models for sheep and goats. The output of the NPS or energy consumption is measured by animal production, such as live body weight (meat production). In this study, validation of some components in the feeding sub-systems was conducted based on observations of Torki Ghashghaii (TG) sheep, the main breed raised in Bakkan. The herd was weighed monthly, and data such as the feeding calendar for ewes, rams and lambs, monthly body weights, pregnancy rate, lambing rate, body characteristics of lambs, ewes and rams, and mortality were available (Eilami, 1999). General information on seasonal grazing patterns was obtained from institutions and specific information was obtained during field interviews. Each system has its own feed quality and feeding system, which can influence the feed and energy intake of the sheep and goats. The environment, management system, and socio/economic living of the nomads also affect the NPS (Badjian, 2005).

**Results and Discussions** Sheep, ages 6 to 12 months were weighed monthly during the three year trial period; measured data were used to compare with simulated data. Results show that the simulated growths of male and female lambs are in close agreement with the actual growth of the TG lambs used for comparison. The simulated average daily gain (ADG) of the male lamb was 0.03 kg/day whereas the actual mean ADG of TG male lambs at ages between 6-12 months old were 0.02 kg/day. The simulated ADG of female lambs was 0.02 kg/day, whereas the actual mean ADG of TG female lambs at a similar age was 0.01 kg/day. No significant differences were observed between the mean values of the actual and simulated live weights of ewes and lambs (male and female) when tested with the Student t-Test, showing that the models used are well fitted to the real conditions of the system. Based on the actual data of TG ewes at an age of 3.5 years, the initial body weights were considered at the beginning of three stages, a) only lactation (111 days), b) dry period (103 days), and c) pregnancy (151 days).

**Conclusions** TG sheep used to provide the actual data in this study is the same breed that is used by nomads in their herds. The Student t-Test was used to analyze and compare the actual and simulated live body weight changes of the male and female lambs and ewes. The results showed no statistical difference between the actual and simulated data. Differences at specific points did occur, but the magnitude of the differences was not large. More importantly, the simulations followed the trends of the actual data, describing the effects of the various physiological stages of the animals and the effects of the different feeding systems. These results validate the generalized structure of the energy utilization models of grazing sheep under production sub-systems of NPS. These results will enable the prediction of carrying capacities in any given situation under conditions similar to those in Bakkan.

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