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## Why farmers don't always practice 'optimum' management : case study of small stock ranching systems in southern Namibia

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**Note** : this paper could eventually be submitted in the session 20 (markets and marketing) as it is also related

**Key words** : bio-economic modeling , choice experiment , livestock breeds , Namibia , farmers preferences

**Introduction** During more than 40 years , Karakul skin has been the dominating livestock production in arid southern Namibia . Then , following a drop in prices , a massive conversion to Dorper breeding was carried on at the beginning of the 80ties . However , livestock species may also have their specific impact on the range . Many farmers and experts believe that Dorper sheep , farmed for their lambs and meat and with their high feed demand , have a negative impact on rangeland condition and thus are not optimal for breeding when considering both economic and ecological aspects of ranching . Thus , other herd compositions , currently not practiced , might be more sustainable . The objective of this paper is to identify the optimal herd composition considering both economic and ecological aspects and to confront this result with actual herd composition on farms in our study area . Finally , an analysis of farmers' preferences reveals the reasons of the divergence between practice and what we calculate as optimum .

**Material and methods** From 2005 to 2007 we conducted a case study in the area of Keetmanshoop . In 2005 , we collected data relative to farming systems , production and productivity . Based on these data , we designed a bio-economic optimization model with stochastic prices and rainfall . The model represents a typical farm of the area of 10 ,000 ha . Activities in the model included 6 different stocking rates and 4 small stock breeds : Karakul for skin production ; goats , Dorper and Damara sheep for meat production . According to the state and transition conceptual model , we defined 6 states of rangeland condition , characterized by different types of vegetation , overall vegetation cover , biodiversity and productivity . Transitions from one state to the other depend on rainfall , stocking rates and breeds . The model was run for a period of 35 years repeated 100 times with the objective of conserving the range while covering all yearly costs and farmer remuneration . In addition , a choice experiment based on conjoint analysis methods was conducted with 27 farmers in 2007 in order to establish for each farmer a ranking of a selection of 9 possible combination of herd composition (PCHC) . We obtained 2 matrixes : matrix A defines the value of each PCHC for a series of pre-identified attributes ; matrix B shows the ranking of each farmer for the various PCHC . Using an AFC on both matrixes we identified farmer groups and the linked PCHC attributes .

**Results** The optimal herd composition (Figure 1) for conserving the range while ensuring adequate income consisted of Karakul as a main breed before Dorper with a stocking rate of 1 small stock unit (SSU) on 6 ha . On average over the simulation period , this herd composition resulted in more than half of the land being maintained in good condition , while less than 1000 ha were degraded to a poor condition . Considering the erratic rainfalls , this is a good result . Dorper overtook Karakul only when average pelt price reached very low levels (150 NAD per skin) . All breeds are maintained in the optimal solution , with browsers at about 200 SSU which reveals the importance of having a diversified herd . On the other side , our second experiment reveals two main groups of farmers : Dorper farmer and fat tail sheep farmers (Damara and Karakul) . Main results of the AFC are that ecological considerations and flexibility in times of drought is the main reason for keeping fat tail sheep . Dorper farmers seek stability in (and higher) income with low work loads .

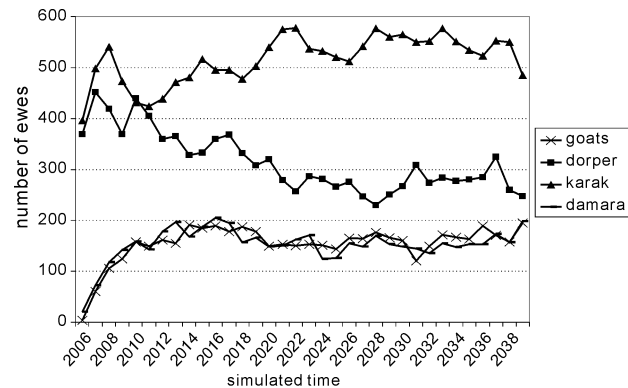


Figure 1 Simulation results for optimal herd composition .

**Conclusions** Work load and fluctuating karakul prices seem to be major determinants in the wide-spread breeding of Dorper sheep . Farms of the study area are characterized by low productivity and large size . Labor is important and skilled labor is scarce . Relationships between farmers and workers are often complex and sensitive . In addition , farm work is under-valued . We recommend training centers , sensitizing around the issue of farm worker-farmer relationship and revaluating the minimum salary of workers . Concerning fluctuating prices of the Karakul skins , much work has been done lately in the marketing area with buyers overseas . It could be interesting to seek (to create) alternative markets and maybe even consider local processing of karakul skin products (South Africa) .