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# Evaluation of subsidies for rangelands in development of sheep and goat farming

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**Abstract.** The production of sheep and goat is heavily dependent on grazing for feed needs of livestock in Turkey. This requires that the yield of fodder has to be increased to the level of meeting the livestock's needs. For this reason, rangelands are improved and put into service for breeders by government. It is aimed to provide a sustainable fodder yield on these rangelands. The effects of the improvement works on breeders and rangelands should be studied. This research is conducted in 11 villages where the most improvement works are carried out and implemented. The breeders who produce sheep and goat in villages are the population of the study and the sampling volume is determined according to these numbers. The sampling volume is fixed by 89, according to the Stratified Sampling Method. The data obtained are analyzed by Chi-square test and evaluated with regard to the analysis results. According to the study results, the correlation between the breeders' view about finding rangelands improvement works successful and their age, level of education, land size and forage crops production are found statistically significant ( $p < 0.05$ ). In respect to sustainability, according to the analysis results; the correlation between the demand for the sustainable rangeland use and the variables of rangelands improvement works, producing forage crops and the low feed cost is found statistically significant ( $p < 0.05$ ). According to the analysis and evaluations, it is found that rangelands improvement works carried out in the study field are not successful and sustainable use of rangelands will not be realized in respect to socio-economic factors.

**Keywords.** Rangeland improvement and management works – Sustainability in rangelands – Rangeland supports – Turkey.

## I – Introduction

Even though the rangelands in Turkey have been grazed for centuries, so far any planned management and improvement works have not been carried out. Moreover, they have not been considered as lands where forage crops grow and supply constant feed source for livestock. That's why, they have been and are being destructively used. This has led to the destruction of the forage crops and loss of yield in the rangelands. The destructive use of rangelands has had a damaging impact not only on livestock breeding and agriculture in Turkey, but also the general economy and the future of Turkey. There are six main reasons why meadows and rangelands in Turkey have been seriously damaged; namely, over grazing, early grazing, drought, uncontrolled grazing, burning and weed invasion. Through the scientific research and test carried out in agriculturally developed continents and countries such as Europe, United States of America, Australia and New Zealand for many years, the main principles that can easily be used in other parts of the world have been established (Ekiz *et al.* 2001). Small livestock production in Turkey highly depends on small family businesses that prefer to graze their livestock in rangelands. That's why, it is imperative to increase productivity of the forage crops in rangelands. Within this scope, rangelands are given priority when determining the rural improvement policies. It is crucial to render rangelands productive in order to protect the natural resources and the environment in rural areas, increase the

standard of life and foster livestock breeding. Small livestock production in Turkey highly depends on grazing in rangelands, which make it essential to increase the yield of forage crops in the rangelands so much that it meets the demand. Therefore, rangelands are improved and given to the use of breeders through government funding. Rangeland improvement efforts are expected to prevent breeders' immigration from rural areas to cities and increase the standard of life in rural areas. Rangelands in Turkey are fully owned by the state and the right to use them is allocated to multiple villages and municipalities. In addition to this, the rangelands that are in surplus are rented out to either private businesses or corporations breeding livestock.

Sheep and goat production is the cheapest way of livestock breeding in Turkey. Small livestock breeding has an important place in Turkish economy. Sheep and goats supply 24.75% of the overall meat production, 12.35% of milk production, and 63.18% of the leather production in Turkey. Even though Turkey has a remarkable potential for small livestock breeding, it is not properly fulfilled. As it is looked at the historical improvement of sheep and goat production in Turkey, it is seen that it has considerably shrunk since 1980 (Anonymous, 2012). Small livestock breeding is vital in meat, milk, wool, goat's hair and leather production, not to mention the ice cream and textile sectors. Sheep and goat based products are vitally important for human beings' diet. This sector is extremely important in terms of not only the affordability and availability of animal protein, but also communities' balanced diet. Small livestock breeding, which is known to have been one of the sources of income of human beings, has historically had a significant place in agricultural economies and always provides millions of people around the world with employment. Sheep and goats are highly adaptable to poor rangeland and weather conditions. This characteristic is particularly important for developing countries. Sheep and goats that can take best out of rangelands all year round are extremely favorable to Turkey's geographical features. Sheep and goats' high adaptability to poor rangeland conditions helps breeders to turn this disadvantage into a big advantage. Considering its geographical features and large rangelands, Turkey has the potentiality for affordable and quality breeding. The majority of the meadows and rangelands in the country are underproductive and mostly appropriate for small livestock breeding (Anonymous, 2012).

One of the major problems of Turkish agriculture is the insufficient production of quality roughage. Therefore, it is essential to improve the conditions in the meadows and rangelands so as to upgrade breeding and increase the employment in the country. Considering quality roughage deficit in the country and the objectives particularly set for small livestock breeding, rangelands should be hastily improved and given to the use of breeders.

The social, environmental and economic aspects of sustainable improvement have their own important subtopics such as social needs, biological diversity, production and cultural heritage. It would be more appropriate to analyze the interaction among these aspects, instead of examining them independently. At this point, it is strictly necessary to handle this issue as a serious project that not only improves Turkey's limited and non-renewable sources, but also protects them. Therefore, some rangeland improvement works are being carried out in order to optimize the sustainable income flow in small livestock breeding in Turkey. Moreover, breeders are informed about these efforts through publications. Between 1998 and 2016, 1083 projects were carried out in the rangelands as large as 5.065.601 decare and more studies are still being done (Anonymous, 2016). Therefore, it is now essential to analyze the effects of these studies made in the rangelands on their users' point of view. The study of these effects is expected to provide information about the characteristics of the target group that uses the rangelands. To achieve this, in this study, the existing uses of the completely managed and improved rangelands have been analyzed and the effects of these studies on breeders have been determined.

## II – Materials and methods

The scope of this study is the villages of 11 provinces that have the highest areas of rangeland improvement works. The statistics regarding the villages was obtained from the Plant Production General Directorate of Ministry of Food, Agriculture and Livestock. The sample unit was the agricultural farms doing small livestock production in those villages. The data were collected through face to face interviews with 89 randomly selected breeders. To analyze the sustainable rangeland use and determine how successful the works are, chi-square test was used. The analysis results are significant at the  $p < 0.05$  level.



Fig. 1. Photographs in the study area.

## III – Results and discussion

The ages of small livestock breeders participating in the study are between 23 and 81, with an average of 50.36. It is found that 77.5% of the breeders are either primary school graduates or have a lower education level. Table 1 displays the socio-economic characteristics of the breeders attending the study, the results regarding the level of achievement and sustainability in the fully improved rangelands. When the table is analyzed, it is seen that 47.4% of the breeders that produce small livestock for the markets find rangeland improvement works unsuccessful, while 52.6% of them think they are successful. 69.7% of the breeders in the same group indicate that the sustainable plant productivity will decrease in time. 69.2% of the breeders who produce only for the consumption of their families state that rangeland improvement efforts are unsuccessful while 30.8% of them think they are victorious. 46.2% of the breeders in the same group state that the sustainable plant productivity in the completely improved rangelands will not last long. On the other hand, 53.8% of them believe that sustainable plant productivity will be consistent. According to the data obtained, the breeders who produce for livestock markets find rangeland improvement works more successful than the breeders producing solely for their families do. One of the main reasons for this could be the fact that the breeders in the former group have participated in the rangeland improvement efforts more.

63.2% of the small livestock breeders state that they have no source of income other than breeding and plant production. Moreover, it is found that 85.4% of the breeders produce for the livestock markets. As for the land size, 55.1% of the breeders have less than 61 decare and 61.8% of them have more than 10 livestock per breeder. It is found that although they have been using rangelands for years, 62.9% of the breeders do not know anything about what pasture law is. Furthermore, this study is expected to shed light to find out what rangelands mean to breeders. The breeders' responses show that 30.4% of them think rangelands are important to prevent erosion, while 59.6% of them state they are crucial for livestock reproduction. In this study, it is also determined to what extent users have an effect on the choice of rangelands improvement works carried out in the research area. According to the results, it is found that 52.8% of the breeders have voluntarily wanted

the improvement works to be made in their villages. It is also found that 44.9% of the breeders had the training on meadows and rangelands before the rangeland improvement works were initiated. In the research area, the amount of roughage grown to ease off the need to graze in rangelands is important, as well. That's why, the breeders were asked whether they produce roughage or not. The results indicate that approximately 50% of the breeders grew fodder crop before the rangelands improvement works. User participation in rangeland improvement works is among the outstanding factors in terms of success, sustainability and preserving rangelands. In the research area, it is found that 73% of the breeders took part in the rangeland improvement works. This study also aims to display the benefits of the improvement works to both the breeders and the rangelands. On breeders' side, rangeland improvement works ensure that livestock are better fed (58.9%), natural habitat looks much better (44.9%) and fodder crop costs are lower (56.2%). As per the pasture law, the village rangelands that are in surplus could be rented out by Provincial Directorates of Agriculture to be used as rangelands again. The rate of breeders that would like to rent out the rangelands in surplus is found 43.8%. In order to preserve rangelands and organize the improvement works, in accordance with the pasture law, Rangeland Management Unions are being founded. 70.1% of the breeders interviewed state that they are willing to join these unions.

When Table 1 is analysed, it is seen that age and total land size are significant variables in the breeders' views about the success of rangeland improvement works ( $P < 0.05$ ). As far as distribution of age is concerned, it is found that the rate of finding improvement works successful is higher among the breeders who are 50 years of age or younger. As for the total land size, the breeders who own 61 decares of land or more have a higher rate of finding improvement works successful. It is seen that the correlation between the view about the importance of rangelands in terms of livestock reproduction and breeders' finding improvement works successful is statistically significant, as well ( $P < 0.05$ ). As the rate of breeders thinking that rangelands are important for livestock reproduction increases, the rate of breeders' finding improvement works successful decreases. The correlation between the view about the rangelands helping livestock feed better and breeders' finding improvement works successful is statistically significant, too ( $P < 0.05$ ). The breeders who state that rangelands feed livestock better have a lower rate of considering rangeland improvement works successful.

As far as the views about sustainability are concerned, the correlation between the view about the importance of rangelands in terms of preventing erosion and the view about the sustainability is statistically significant. ( $P < 0.05$ ). The breeders who hold that rangelands are important to prevent erosion have a higher rating of sustainability, compared to the breeders who don't. The correlation between the breeders' demand for rangeland improvement works and the view of sustainability is considered significant statistically, too ( $P < 0.05$ ). The breeders demanding improvement works in the rangelands they use have a high opinion of sustainability. Similarly, the breeders who indicate that rangelands make natural habitat look better maintain higher rates for sustainability. The correlation between the view about decrease in fodder crop thanks to rangelands and sustainability is statistically significant, as well. Accordingly, it can be said that the breeders emphasizing that thanks to rangelands, fodder crop consumption has decreased have a higher approval rating of sustainability.

**Table 1. Distribution of opinions of breeders on the success and sustainability of rangeland improvement works by socio-economic characteristics**

| Variables  | Rangeland Improvement Works are Successful |           |           | Are Rangeland Improvement Works Sustainable? |           |           | T       |
|--|--|-----------|-----------|--|-----------|-----------|---------|
|  | No   | Yes       | $\chi^2$  | No   | Yes       | $\chi^2$  |         |
| Age  | ≤50  | 20 (40.0) | 30 (60.0) | 5.09*  | 29 (58.0) | 21 (42.0) | 3.51    |
|  | >50  | 25 (64.1) | 14 (35.9) |  | 30 (76.9) | 9 (23.1)  |         |
| Education Level                                  | ≤Primary                                   | 37 (53.6) | 32 (46.4) | 1.15   | 46 (66.7) | 23 (33.3) | 0.20    |
|  | ≥Secondary                                 | 8 (40.0)  | 12 (60.0) |  | 13 (65.0) | 7 (35.0)  |         |
| Non-Agricultural Income Source                   | Yes  | 17 (54.8) | 14 (45.2) | 0.35   | 21 (67.7) | 10 (32.3) | 0.05    |
|  | No   | 28 (48.3) | 30 (51.7) |  | 38 (65.5) | 20 (34.5) |         |
| Total Land Size                                  | ≤ 61                                       | 34 (69.4) | 15 (30.6) | 15.46**                                      | 35 (71.4) | 14 (28.6) | 1.29    |
|  | >61  | 11 (27.5) | 29 (72.5) |  | 24 (60.0) | 16 (40.0) |         |
| Small Livestock Count                            | ≤10 Animal Unite                           | 13 (38.2) | 21 (61.8) | 3.34   | 24 (70.6) | 10 (29.4) | 0.45    |
|  | >10 Animal Unite                           | 32 (58.2) | 23 (41.8) |  | 35 (63.6) | 20 (36.4) |         |
| Purpose of Breeding                              | Livestock Market                           | 36 (47.4) | 40 (52.6) | 2.12   | 53 (69.7) | 23 (30.3) | 2.76    |
|  | Family Consumption                         | 9 (69.2)  | 4 (30.8)  |  | 6 (46.2)  | 7 (53.8)  |         |
| Aware of Pasture Law                             | Yes  | 15 (45.5) | 18 (54.5) | 0.55   | 21 (63.6) | 12 (36.4) | 0.17    |
|  | No   | 30 (53.6) | 26 (46.4) |  | 38 (67.9) | 18 (32.1) |         |
| Rangelands are Important to Prevent Erosion      | Not Important                              | 13 (56.5) | 10 (43.5) | 1.53   | 16 (69.6) | 7 (30.4)  | 12.33** |
|  | Quite Important                            | 21 (53.8) | 18 (46.2) |  | 32 (82.1) | 7 (17.9)  |         |
|  | Important                                  | 11 (40.7) | 16 (59.3) |  | 11 (40.7) | 16 (59.3) |         |
| Rangelands are Important to Reproduce Livestock  | Not Important                              | 2 (22.2)  | 7 (77.8)  | 4.63*  | 5 (55.6)  | 4 (44.4)  | 4.08    |
|  | Quite Important                            | 12 (44.4) | 15 (55.6) |  | 22 (81.5) | 5 (18.5)  |         |
|  | Important                                  | 31 (58.5) | 22 (41.5) |  | 32 (60.4) | 21 (39.6) |         |
| Demand for Rangeland Improvement Works           | Yes  | 21 (44.7) | 26 (55.3) | 1.39   | 25 (53.2) | 22 (46.8) | 7.65*   |
|  | No   | 24 (57.1) | 18 (42.9) |  | 34 (81.0) | 8 (19.0)  |         |
| Being Informed on Rangelands                     | Yes  | 17 (42.5) | 23 (57.5) | 1.89   | 24 (60.0) | 16 (40.0) | 1.29    |
|  | No   | 28 (57.1) | 21 (42.9) |  | 35 (71.4) | 14 (28.6) |         |
| Fodder Crop Production                           | Yes  | 21 (47.7) | 23 (52.3) | 0.28   | 26 (59.1) | 18 (40.9) | 2.02    |
|  | No   | 24 (53.3) | 21 (46.7) |  | 33 (73.3) | 12 (26.7) |         |
| Participation in Rangeland Improvement Works     | Yes  | 31 (47.7) | 34 (52.3) | 0.79   | 41 (63.1) | 24 (36.9) | 1.16    |
|  | No   | 14 (58.3) | 10 (41.7) |  | 18 (75.0) | 6 (25.0)  |         |
| Rangelands are Important to feed Livestock       | No   | 22 (41.5) | 31 (58.5) | 4.29*  | 35 (66.0) | 18 (34.0) | 0.04    |
|  | Yes  | 35 (46.1) | 41 (53.9) |  | 48 (63.2) | 28 (36.8) |         |
| Rangelands Make Natural Habitat Look Better      | No   | 27 (55.1) | 22 (44.9) | 0.90   | 38 (77.6) | 11 (22.4) | 6.19*   |
|  | Yes  | 18 (45.0) | 22 (55.0) |  | 21 (52.5) | 19 (47.5) |         |
| Rangelands Decrease Fodder Crop Costs            | No   | 25 (50.0) | 25 (50.0) | 0.01   | 37 (74.0) | 13 (26.0) | 3.03    |
|  | Yes  | 20 (51.3) | 19 (48.7) |  | 22 (56.4) | 17 (43.6) |         |
| Renting Out Rangelands in Surplus                | Yes  | 19 (48.7) | 20 (51.3) | 0.09   | 25 (64.1) | 14 (35.9) | 0.15    |
|  | No   | 26 (52.0) | 24 (48.0) |  | 34 (68.0) | 16 (32.0) |         |
| Willingness to Join Rangelands Management Unions | Yes  | 30 (47.6) | 33 (52.4) | 0.75   | 41 (65.1) | 22 (34.9) | 0.14    |
|  | No   | 15 (57.7) | 11 (42.3) |  | 18 (69.2) | 8 (30.8)  |         |
| Decrease in Fodder Crop                          | I don't agree                              | 23 (59.0) | 16 (41.0) | 1.96   | 34 (87.2) | 5 (12.8)  | 13.55** |
|  | I agree                                    | 22 (44.0) | 28 (56.0) |  | 25 (50.0) | 25 (50.0) |         |
| Aware of Grazing Plan                            | Yes  | 33 (49.3) | 34 (50.7) | 0.19   | 42 (62.7) | 25 (37.3) | 1.58    |
|  | No   | 12 (54.5) | 10 (45.5) |  | 17 (77.3) | 5 (22.7)  |         |
| Complying with Grazing Plan                      | Yes  | 33 (49.3) | 34 (50.7) | 0.19   | 42 (62.7) | 25 (37.3) | 1.58    |
|  | No   | 12 (54.5) | 10 (45.5) |  | 17 (77.3) | 5 (22.7)  |         |

\* P<0.05; \*\* P<0.01.

## IV – Conclusions

It is aimed that plant productivity is sustained in the completely developed rangelands used by breeders. To achieve this, the impact of the breeders on the rangeland improvement works has been evaluated. In this study, the correlations among the socio-economic characteristics of the breeders, their points of view about the state of sustainability of rangeland improvement works and the level of achievement have been analyzed and evaluated. According to the results, it is found that age, land size, the importance of rangelands for livestock reproduction and the view that rangelands feed livestock better are correlated with the view about achievement in rangeland impro-



vement works. 60% of the breeders under the age of 50 think that rangeland improvement works are a success. This rate is reduced to 35.9% among the breeders who are older than 50 years of age. It is seen that 72.5% of the breeders owning over 61 decares of land find improvement works successful. While 53.9% of the breeders that think rangelands feed livestock better consider improvement works a success, this rate is 58.5% among other breeders. 59.3% of the breeders who feel that rangelands are important to prevent erosion find improvement works sustainable. 47.5% of the breeders who indicate rangelands make natural habitat look better think that improvement works are sustainable. This rate is reduced to 22.4% among other breeders. The half of the breeders who say that thanks to rangelands, fodder crop consumption has decreased find improvement works sustainable. According to the results, it can be said that the breeders who actively participated in the rangeland improvement works by providing manpower, tools and equipment find improvement works more successful than other breeders surveyed in this study.

As a result, small livestock production in Turkey highly depends on meadows and rangelands. Therefore, they need to be thoroughly improved and turned into more productive source of roughage for livestock. By intensifying the improvement works and ensuring sustainability, it is highly probable to meet the demand for red meat, enhance small livestock breeding, prevent breeders' immigration to cities and maintain sustainability in livestock breeding in Turkey. That's why, subsidies for rangeland improvement should be continuously paid. According to the results obtained in this study, it is essential to prioritize to increase breeders' participation in the future rangeland improvement works and carry out these works in the areas where the breeders producing livestock for the markets are densely found. If all these objectives are achieved, the success in rangeland improvement works and the level of sustainable rangeland use are expected to considerably improve.

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