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Determination of the socio-economic factors that affect the sustainable pasture management in Central Anatolia region of Turkey

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Abstract. According to the pasture law and regulations, the responsibilities of the farmers on pasture management have increased since 2004. Therefore, the farmers' attitude and behavior in this subject have gained importance on pasture management. The aim of this study is to present the pasture management methods of farmers in the pastures areas where rehabilitation and amelioration process are completed, and to present the factors that affect farmer's behavior on sustainable pasture management. The data used in the study were obtained by a survey among 271 farmers who live in 18 villages of 3 provinces (Ankara, Kayseri and Konya). The chi square, regression analysis and multiple correspondence analysis methods were used in evaluation of the data obtained. The significant variables that come from 40 variables used in the study were subjected to multiple correspondence analyses. As a result of the regression analysis, it is found that there is a significant relationship ($p<0.05$) between the sustainable use of the pastures and: the educational level of farmers, their living places, the use of fodder seeds that are provided for them, the participation in pasture rehabilitation activities, the utility found on the rehabilitation activity, the sustainability of the increase in fodder quantity obtained from the rehabilitation project, the use of the pastures out of purpose, whether or not the farmers are willing to rent pastures, the complying with the plan of grazing and the willingness to belong to a pasture management union. To define which categories of the variables found statistically significant in regression analysis were effective, a multiple correspondence analysis method was used. As a result of this analysis it was found that there is a significant relationship between the variable groups that comply with the grazing plan, use of fodder crops seeds, declare willingness to participate in pasture management unions and rehabilitation activities and the sustainable pasture management.

Keywords. Pasture – Rehabilitation and management – Sustainable – Socio-economic factors – Adoption.

Détermination des facteurs socio-économiques qui affectent la gestion durable des pâturages dans la région centrale d'Anatolie de la Turquie

Résumé. *Selon la loi et les règlements concernant les pâturages, les responsabilités des agriculteurs sur la gestion des pâturages a augmenté depuis 2004. Par conséquent, l'attitude des agriculteurs et son comportement vis à vis ce sujet a gagné en importance sur la gestion des pâturages. Le but de cette étude était de présenter les méthodes de gestion de pâturages dans les zones où leur processus de réhabilitation et d'amélioration est accompli et de présenter les facteurs qui affectent le comportement des agriculteurs sur la gestion durable du pâturage. Les données employées dans l'étude ont été obtenues à partir de 271 fermiers dans 18 villages de 3 provinces (Ankara, Kayseri et Konya) en employant une enquête. L'analyse chi carré, la régression et les méthodes d'analyse de correspondances multiples ont été employées dans l'évaluation des données obtenues. Les variables trouvées significatives sur un total de 40 variables utilisées dans l'étude, furent soumises à l'analyse de correspondances multiples. En raison de l'analyse de régression, on a constaté qu'il y a un rapport significatif ($p<0,05$) entre l'utilisation durable des pâturages et : le degré d'instruction des fermiers, leurs lieu de résidence, l'utilisation des semences fourragères livrées par les projets d'amélioration, la participation dans les activités de réhabilitation des pâturages, le niveau d'utilité trouvé dans l'activité de réhabilitation, la durabilité de l'augmentation de la quantité de fourrage obtenue par le projet de réhabilitation, l'utilisation des pâturages hors du but, la disposition à louer des pâturages, l'acquiescement au plan du pâturage, et la volonté de participer dans des syndicats de gestion. Pour déterminer quelles catégories des variables sont efficaces d'entre celles qui ont été trouvées statistiquement significatives dans l'analyse de régression, une analyse de correspondances multiples fut employée. En raison de cette analyse on constate qu'il y a un rapport significatif entre les groupes qui se conforment au plan de pâturage, qui utilisent des semences de fourrages, qui sont disposés à participer*

dans des syndicats de gestion et dans des activités de réhabilitation des pâturages et la gestion durable des pâturages.

Mots-clés. *Pâturage – Réhabilitation – Gestion – Durabilité – Facteurs socio-économiques – Adoption.*

I – Introduction

Turkey must manage pastures, hayfields, mountain pastures and grasslands in terms of sustainable agriculture. These areas are main elements for developing animal husbandry and producing agricultural products with lower costs. Sustainable development should be based on the economical and ecological factors. Therefore, pastures must not be seen only as a soil protection element. However, pastures have to be developed, protecting them on account that they have many benefits for country development and be evaluated as a producing area since they are the source of animal feed. Turkish Republic has the proprietary right of pastures in Turkey. The usages of pastures belong to one or more than one municipality. 33% of pastures are in Central Anatolia region. The activities of pastures rehabilitation and amelioration are main subjects dealt with in the region agricultural development plans: 18 projects out of 79 are integral pasture rehabilitation and amelioration projects. The present project has been promoted by Republic of Turkey Ministry of Food, Agriculture and Livestock (Project number: **TAGEM/TA/11/11/03/001**). The aim of this study is to present the pasture management methods of farmers in the pastures areas where rehabilitation and amelioration process are completed, and to present the factors that affect farmer's behavior on sustainable pasture management. The project duration is 22 months.

II – Materials and methods

The farmers who live in the villages where a pasture rehabilitation project is carried out are the subjects of the study. The farmers who live in 18 villages in Ankara, Kayseri and Konya provinces where rehabilitation projects are carried out were stratified into layers according the area sizes. Sample size was determined taking into account farmers' land size. The sampling volume was calculated by using Neyman method. As a result of this calculation 271 farmers were selected (Esin *et al.*, 2010). The survey form consisted of 40 questions. Sustainable pasture management (grazing adjusted to the amount levels of forage provided by pasture lands) was the dependent variable in the study. The independent variables are characteristics of individual farmers, agricultural enterprise characteristics, the sustainability of pastures and communication behaviors of farmers. Regression analysis and (logistic) correlation coefficient are used to determine the structural relationship between dependent and independent variables. Logistic regression analyses are carried out by using *Eviews* and *MiniTab* package programs. As a result of these analyses, a multiple correspondence analysis method is used to determine which categories of the variables are found significant statistically.

III – Results and discussion

72% of farmers has a degree of primary education, 8.8% of them middle school and 19.2% of them high school and above. 88.2% of the farmers live in rural areas and 11.2% of them in cities. 21.3% of farmers live in Konya province, 9.5% in Ankara and 7.8% in Kayseri. In the project framework, it is aimed to increase fodder crops production in order to reduce grazing pressure on pastures. In this context fodder crops seeds are provided for farmers. 16.2% of the total farmers use these seeds. When carrying out pasture rehabilitation activities, the participation of farmers is intended to be assured. 60.9% of the farmers directly participated in pasture rehabilitation activities and 39.1% of them did not. It was asked to the farmers what the

benefits of pasture rehabilitation activities are in the region. 79.7% of the farmers answered to this question "our animals feed better", 11.4% of them "they contributed to prevent soil and water erosion" and 8.9% of them "we learned the pasture rehabilitation process". In the case that government lease out its lands for farmers, 57.9% of the total farmers will not rent land because they think the lands belong to the village so they must be in the hands of all farmers. 42.1% of farmers stated that they wanted to rent the pasture. The ratio of the farmers that graze according to the plan for pastures is 53.1%; the other 46.9% of farmers stated that they did not want to graze according to the grazing plan. According to the 11th code of Turkish pasture regulation, members of pasture management unions are chosen from the farmers who live in the concerned villages. In this context, it was asked to farmers who live in the region whether they want or not to participate in pasture management unions. 61.6% of the total farmers stated that they would participate and 38.4% of them that they would not.

1. Results of the regression analysis

In the regression analysis, the dependent variable and the indicator of sustainable pasture management was whether or not the present rough feed quantity in pasture areas is sufficient. The independent factors were related to the individual characteristics of farmers, farm infrastructure, the farmer's behavior of pasture use, and the farmer's behavior related to pasture management and rehabilitation issues. Data of the regression analysis are given in Tables 1, 2, 3 and 4.

Table 1. The results of logistic regression for individual characteristics

Variables	Coefficient	St. Error	Z- Value	P value
Age	-0.121411	0.121326	-1.000.700	0.3170
Education	**-0.393461**	**0.174470**	**-2.255.176**	**0.0241**
Living Place	**1.190.082**	**0.436537**	**2.726.189**	**0.0064**
Having off-farm job	-0.084004	0.290123	-0.289546	0.7722
Income level	0.174250	0.241616	0.721186	0.4708
Membership for Non-Governmental Organizations	0.345013	0.256858	1.343.205	0.1792
Whether or not dealing with animal breeding	0.417760	0.280063	1.491.664	0.1358
Log likelihood		-178.7558		

Table 2. The results of logistic regression for pasture areas improvement

Variables	Coefficient	St. Error	Z- Value	P value
The factors for increasing productivity of pastures	-0.667761	0.196137	-3.404.566	0.0007
Demanding for pasture rehabilitation activity	0.143344	0.396531	0.361495	0.7177
Taking fodder plant seeds distributed	1.056.498	0.427548	2.471.062	0.0135
Grazing after producing fodder crops	0.108519	0.184006	0.589757	0.5554
Participation in pasture rehabilitation activity	0.851985	0.301185	2.828.782	0.0047
The utility with pasture rehabilitation activity	-0.498524	0.250608	-1.989.255	0.0467
The success of pasture rehabilitation activity	0.600309	0.335863	1.787.362	0.0739
Factors that affect sustainability	-0.393781	0.274781	-1.433.070	0.1518
Factors that ensure sustainability	0.338070	0.170910	1.978.065	0.0479
Rough feed increase after pasture rehabilitation	-0.058764	0.102274	-0.574573	0.5656
Log likelihood		-155.5617		

Table 3. The results of logistic regression for the use of pastures

Variables	Coefficient	St. Error	Z- Value	P value
Using pastures out of purpose	**-0.222504**	**0.081686**	**-2.723.885**	**0.0065**
Willingness of farmers to rent pasture	**-0.599086**	**0.263375**	**-2.274.649**	**0.0229**
Renting pastures for Non Governmental Organizations	-0.848560	0.540162	-1.570.937	0.1162
Complying with pasture grazing season	**1.100.566**	**0.263259**	**4.180.544**	**0.0000**
Participation in pasture management union	**0.496199**	**0.270334**	**1.835.505**	**0.0664**
Who must make pasture management	0.071833	0.116767	0.615184	0.5384
Log likelihood		-169.2527		

Table 4. The results of logistic regression for communication behaviors

Variables	Coefficient	St. Error	Z- Value	P value
Knowing about pasture regulation	0.123284	0.301915	0.408341	0.6830
Information level about pasture	-0.135635	0.203678	-0.665930	0.5055
The importance of pasture for animal breeding	-0.363718	0.413978	-0.878593	0.3796
Participation in pasture training activities	0.630502	0.429105	1.469.342	0.1417
Satisfaction from pasture training activities	0.284993	0.268255	1.062.398	0.2881
The frequency of purchasing newspaper	-0.050175	0.049692	-1.009.726	0.3126
Solving the problems faced with pasture	-0.094189	0.230269	-0.409037	0.6825
Taking information from agricultural advisors	0.514890	0.298312	1.726.010	0.0843
Log likelihood		-183.3536		

From Table 1 it is determined that there was a statistically significant (significance level of 5%) relationship between farmers education level and place of residence and the sustainable use of rangelands.

It was determined that there was statistically significant relationship among the sustainability of pastures and the factors: taking fodder plant seeds distributed, the participation in pasture rehabilitation activity, the utility with pasture rehabilitation activity and the factors that ensure sustainability.

It was determined that there was statistically significant relationship among the sustainable use of rangelands and the factors: using pastures out of purpose, the willingness of farmers to rent pasture, the complying with pasture grazing season and the participation in pasture management unions.

It was determined that there was no significant relationship among variables in Table 4 with sustainable use of rangelands.

2. The result of multiple correspondence analyses

In this chapter, the level of relationship between the variables of farmer's education level, their living places, the compliance with the grazing plan, the willingness to rent pastures, the participation in pasture management unions and the sustainable pasture management were analyzed by the multiple correspondence analysis method.

It was pointed that there was a relationship among the sustainable use of the pastures and the subjects who take forage plant seeds, not rent pastures and accept the grazing plans (Fig. 1).

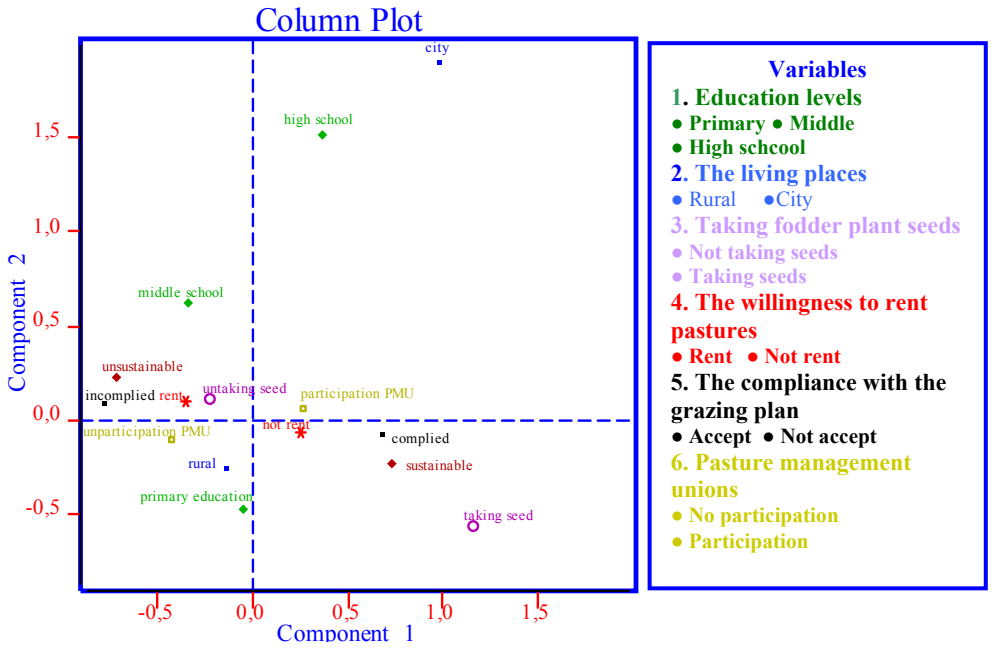

Fig. 1. The relationship between variables of sustainable use of pastures, level of education, living place, complying with grazing plan, whether or not farmers are willing to rent pastures, and participation in pasture management union.

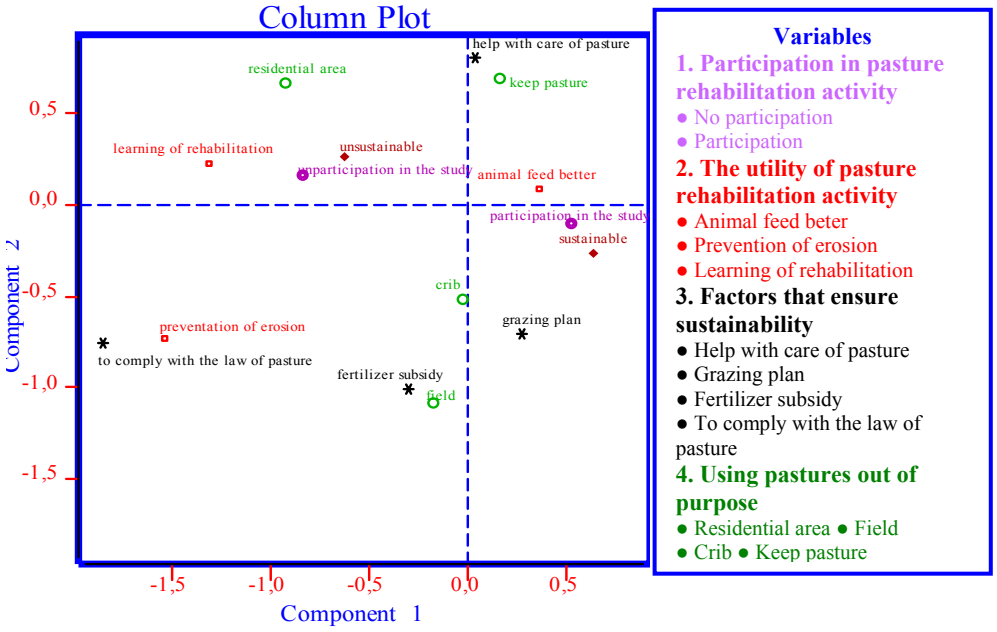

Fig. 2. The relationship between the variables of using pastures out of purpose, the utility level of pasture rehabilitation activity, participation in pasture rehabilitation activity, the factors that ensure sustainability, and sustainability of pastures.

As seen in Fig. 2, the farmers that are for sustainable pasture management are the ones who participate in pasture rehabilitation activities, who state that they comply with the grazing plan and that their animals feed better in the pastures.

IV – Conclusion and recommendations

In the study, the factors that affect sustainable pasture management are analyzed by multiple correspondence analysis method. It is determined that most of the individualistic and farm characteristics of farmers or pasture use practices and communication behavior are not factors affecting effectively the adoption of sustainable pasture management measures by the farmers. On the contrary, farmers participation in rehabilitation activities, use of offered forage seeds, and the compliance with grazing plans are factors having a relation with the sustainability of pastures use. The results of multiple correspondence analysis show that the extension services working on fodder crops cultivation should continue. It should be ensured that farmers who have already participated in pasture rehabilitation activities, adopt grazing plans and use the given fodder crops seeds are the target group for the extension activities. The studied area has a rich crop production pattern, an soils with low slopes an good productive characteristics. In this area, fodder crops production was increased by irrigation and by using fertilizers in pasture rehabilitation programs. The active farmer participation in the programs was significant.

References

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