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Impact of Young Farmer Support Program for Livestock Enterprises

Duygu Çitak Birol[1*], Ferit Çobanoğlu[2], Halit Ahmet Akdemir[3], Halil İbrahim Yilmaz[4]

[1] General Directorate of Agricultural Research and Policies, Fig Research Institute, Department of Agricultural Economics, Aydın, Türkiye

[2] Adnan Menderes University, Faculty of Agriculture, Department of Agricultural Economics, Aydın, Türkiye

[3] General Directorate of Agricultural Research and Policies, Fig Research Institute, Department of Agricultural Economics, Aydın, Türkiye

[4] Adnan Menderes University, Faculty of Agriculture, Department of Agricultural Economics, Aydın, Türkiye

HIGHLIGHTS

- This project is supported by the General Directorate of Agricultural Research and Policies named "Impact Analysis of the Grant Program for Supporting Young Farmer Projects within the Scope of Rural Development Supports" and numbered TAGEM/TEPAD/G/18/A8/P3/001.

Abstract

It is indispensable for young farmers to remain in agriculture and/or to sustain farm holding operations. In this study, the impact of the Young Farmer Support Program (YFSP) implemented in Turkey is tried to be define by the counterfactual impact assessment methodology in holdings with livestock such as cattle, sheep/goat. The study was conducted throughout Turkey, the questionnaire with the farmers was completed at the end of 2018. The data obtained intended for the YFSP, which was used in 2016, was taken as basis for the impact assessment. Considering the distribution and number of project subjects from each region, the provinces that would represent the region in terms of its differences were purposefully selected and sample selection was made. The focus is on two important outputs, machine equipment purchased value per livestock unit (LSU) and average income value of cattle and sheep/goat sold per LSU in the last three years which are important in the study. As explanatory variables, age, gender, marriage, educational status, number of family members, non-agricultural income, etc. are employed in the models. According to the two important indicators, Average Treatment Effect (ATE) and Average Treatment Effect on the Treated (ATET), it is revealed that YFSP has positive effects on the dependent variables examined in cattle and sheep / goat farms. This knowledge and accumulation of experience can be transferred to other main components of rural development programs.

Keywords: Treatment effects; impact evaluation; young farmer; sustainability; counterfactual framework

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Correspondence: duygu.birolcitak@tarimorman.gov.tr

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1. Introduction

The unique importance of the sustainability of agricultural production has been more pronounced during the covid 19 pandemic. If humanity exists, it is inevitable that there will be agricultural production. Ensuring food supply security can only be achieved if the farmers, who are the most important actors, can continue their activities. For the farmers to continue their activities with pleasure, they and their first-degree family members should continue their lives as happily as possible. Especially for the future, the continuation of the agricultural production activities of young farmers can only be guaranteed by the opportunities, advantages and rural development supports that can be offered to them. At this point, young farmers exit from agriculture is seen intensely in Turkey, as in the world. Lack of motivation tools for young people to farming, negative developments in agricultural input and output prices, attractiveness of city life for households, etc. Such factors appear as the most important constraints encountered by young people in farming. Accordingly, aging in the agricultural population manifests itself as an important problem.

The fact that approximately half of the population of Turkey is under the age of 30 requires the employment opportunities of young people to be further increased and to be sustainable. Young people are moving away from agriculture due to reasons such as insufficient income, limited social opportunities in villages, fragmented or very small lands, and lack of alternative job opportunities in rural areas. The divergence of young people from agriculture brings along problems such as the aging and decline of the rural population. In Turkey, the general employment level in agriculture has been decreasing in recent years, and it is seen that the separation of the young population from the agricultural sector has gained an important momentum as in many other countries.

In addition to the low yield of agriculture in rural areas, the inadequacy of education, health, transportation services and the lack of social opportunities, which are the problems experienced in the past, push the youth to leave the countryside and agriculture. Due to all these reasons, migration from rural areas to urban areas is increasing and the population in the villages is getting older. Apart from these known problems, the problems of the changing century also affect the villages. The inability of young people in the villages to make use of internet facilities, the problem of young male individuals of marriageable age not to find a spouse to live in the village environment is seen as a reason for young female individuals to think that living in the village and working in agriculture requires heavy physical strength, and to abandon village life and agriculture. This circumstance is reported extensively in many studies in developed countries such as the United States of America (USA), Europe and Asia (Mills-Novoa 2011; Chen et al. 2014; Mihi-Ramirez and Kumpikaite 2014; Zagata and Sutherland 2015; Bednaríková et al. 2016; Duesberga et al. 2017; Leonard et al. 2017; Morais et al. 2017; Faysse et al. 2019).

This rapid aging problem in the villages is getting more and more attention and raises concerns for the sustainability of agriculture. In addition, due to the migration from the village to the city, the population pressure in the cities makes urban life difficult. This situation experienced in agricultural areas regarding sustainability, which is one of the most important issues on the world's agenda, is one of the priority issues that need to be resolved. On the other hand, young farmers who continue agriculture have a lack of knowledge about entrepreneurship, adaptation to new techniques and technologies, business planning, marketing, risk management, organization, and environmentalist agricultural approaches in terms of the sustainability of agriculture. Within the framework of all these problems, young people should be supported in terms of not leaving agriculture and increasing the awareness of those who remain in agriculture.

Zagata and Sutherland (2015) brought up the debates on the definition of the young farmer. Under the concept of young farmers, they have focused specifically on the concepts being applied and / or the content of which is being discussed in the European Union. These concepts; new entrant and retirement schemes, young sole holder, farm-decision maker, multifunctionality, succession. While they defined under 40 as both young sole holders and farming successors, they considered the age of 65 and over as 'older farmers'. As a result, the following conclusions are drawn. (i) The concept of young farmer should be conceptualized based on Eurostat data. (ii) The issue of old age is examined in a social and economic framework. (iii) It is stated that it would be

beneficial to fill the content of young sole holders' concept according to agricultural management practices according to farm structures. (iv) It is recommended to address the 'young farmer problem' by region, according to mountainous areas. (v) It is suggested that the terms new entrant and young people should be evaluated within the framework of sociology based on agricultural literature. (vi) It is emphasized that small-scale farming should be considered in a separate status.

Hamilton et al. (2015) stated that young farmers are better motivated and devised business plans than older ones. At the same time, it was emphasized that they are more open to innovations, take more risks, and use more loans to grow their business. It is also declared that young farmers are more sensitive to food security and global warming issues and can take on more important tasks (EC 2013; Davis et al. 2013). On the other hand, Katchova and Ahearn (2016) notified that due to factors such as high land prices, difficulties in accessing loans, support policy tools, young people do not continue their activities as farmers in the agricultural sector and / or cannot enter the agricultural sector.

In the EU, it is reported that since the 1980s, young farmer support is offered through various support policy tools. Some of these instruments are listed below. Measure 12 'Setting up of young farmers' (Kontogeorgos et al. 2017), Measure 6 'Business start-up aid for young farmers' (Zagata and Sutherland 2015), early retirement motivations to provide farm succession (Mazorra, 2000), Measure 113 'Early retirement scheme' (Zagata and Sutherland 2015) and finally Young Farmer Payment (Zagata and Sutherland 2015). However, some criticisms are brought in terms of the effectiveness of these policy tools. For example, when the applications of Measure 112 support for the period 2007-2012 are examined, it is stated that there is an imbalance in the number of young farmers supported in the EU and that new entrants are given lower priority to the sector. Again, it was emphasized that Measure 113 does not provide inter-generational transfer (Davis et al. 2013; Zagata and Sutherland 2015).

May et al. (2019) explored the effectiveness of young farmer payment to prevent young farmers from quitting farming using a behavioral approach. According to the study findings, a clue is obtained that the Young Farmers' Motivation structure corresponds to a mediating variable between the payment and the thoughts of young farmers to leave the farm, and it is emphasized that the effectiveness of this support could be potentially strengthened by adding motivational meanings to the payment. This is stated to indicate that the farmers who received the payment gained recognition and prestige compared to the control groups and therefore are less likely to abandon the farm. It is notified that the purpose of these strategies is to prevent pessimism, to support community and family integration, to facilitate the participation of young farmers in the decision-making process of the enterprise, and to link the payment to the idea that this is not only an economic incentive but also a tool, can facilitate the achievement of motivational goals. The main obstacles to address to provide a strategy package of this nature are identified as problems of farm succession and lack of access to credit to young farmers.

Faysse et al. (2019) analyzed policy tools for supporting young farmers in Thailand. They stated that a workshop was held on access to land, capital and markets, capacity building and what should be done to make farming a more attractive profession. Emphasis was placed on the need to prioritize subsidies for starting farming and land lease agreements. In Thailand, as in many other countries, it is stated that to prevent the rapid decline of young farmers, awareness should be raised not only for young farmers, but also for the whole public.

Ma (2014) notified that in South Korea, within the scope of the Farm Successor Fostering program, the policy of granting a 10-year loan to young farmers was implemented. However, the program was not successful, especially as there were many applications for young farmers who are new to farming (Kang 2010). In Japan, on the other hand, they used a policy tool for farmers between the ages of 60-65 to receive additional payments if they retire and give their farms to their successors (Uchiyama 2014). Approaches where the amount of this payment is further increased if the successor to which the farm is given is under 35 years of age (Uchiyama and Whitehead 2012). Another supportive approach is to establish connections between families

who are interested in farming, who do not do farming, and those who want to retire but do not have a successor in the family (Nagatani and Sakamoto 2017).

In France, it is reported that many policy tools are used since the 1960s to enable young farmers to continue their activities in a sustainable manner. It is notified that the first condition to benefit from these supports is that the farm must exceed the threshold values varying according to the regions. One of the main aims of these policy tools is to prevent excessive growth of farm sizes. It is known that there are two main programs for medium-sized farms to be accessible to young farmers. First, the Land Development and Rural Establishment Societies (French acronym SAFER) are private companies whose shareholders are public organizations and farmers' unions (Sencebe 2012). In summary, SAFER buys the lands to be sold, then resells these lands, following consolidation and land reclamation efforts, giving priority to young farmers with shrinking business scale (Hennessy 2014). It is declared that some non-governmental organizations (NGOs) have also taken this action since 2014 (Ravenscroft 2014).

In the US, government support programs use the term "beginning farmer" rather than a young farmer. There is no age limit for them, but the condition that they have been farming for less than 10 years. The Department of Agriculture's farm service agency offers long-term loans for beginning farmers. If the applicant meets the proposed project criteria, this agency provides 100% of the credit required to purchase the farm (Dodson and Koenig 2007; Kaufmann 2013).

Aggelopoulos and Arabatzis (2020) examined the case study of the EU Young Farmer Program implemented in Greece. Accordingly, he discovered that, after the implementation of the financing Program, the approach of farms, by taking advantage of suitable crops, led to a shift towards taking advantage of the comparative advantages of the various regions.

According to the literature reviews, it is discovered that in almost all countries where agricultural production is important, special attention is paid to the efforts and struggles of young farmers to stay in agriculture. Although it is explored that many different support programs and tools are used for this purpose, it is clarified that a very limited number of studies are conducted to determine the success of these. For example, Pavic et al. (2020) analyzed the impact of the Young Farmers Support Program for the development of the dairy farming sector in Slovenia within the framework of an econometric model. As a result, it is discovered that the supports have positive effects on the number of workers employed full time, the number of cattle, total income, and net added value.

The rest of the work is organized as follows. After the introduction section, Young Farmer Support Program (YFSP), which was implemented in Turkey, s briefly mentioned in the content, and some scientific studies are examined. Then, data collection approach used in the study presented. In the following stage, the conceptual framework and model approach represented. The research results and discussion section are then included, and finally the conclusions section and recommendations are highlighted.

Young Farmer Support Program implemented in Turkey

Average age of the farmers in Turkey is increasing. Turkish farmers are on average 46 years old, and as such, they are 5 years younger than farmers in the EU and 12 years younger than those in the USA. It is clarified that the average agricultural experience of the Turkish farmer, who usually takes over his business (farm) from the family, is 23 years (CRO, 2019). For this reason, approaches to support young farmers have come to the agenda and started to be implemented in Turkey, as in many countries. The first regulation on supporting young farmers in Turkey was published in 2016. The purpose of this regulation is to determine the principles and procedures for ensuring sustainability in agriculture, supporting the entrepreneurship of young farmers, increasing the income level, creating alternative sources of income, and supporting rural agricultural production projects that will contribute to the employment of young people in rural areas. It covers the procedures and principles regarding the payment of grants up to thirty thousand TRY to the projects for the production, processing, storage and packaging of plant, animal, local agricultural products, medicinal and aromatic plants to be implemented by young farmers living in rural areas (OGRT 2016). Considering that 1

dollar was approximately 5 TRY during the survey period (Wikipedia, 2021), it turns out that this support is equivalent to 6000 dollars. In this regulation, the young farmer; it is defined as a real person between the ages of 18-40 who lives in a rural area or wants to engage in agricultural activities. The project subjects of the program are also framed. For animal production, the following are: (i) Cattle breeding and small ruminant breeding projects, (ii) Bee and bee products breeding projects, (iii) Poultry and silkworm breeding projects. For plant production, i) Closed orchard facility projects, ii) Seedling, sapling, indoor and outdoor ornamental plant growing projects, iii) Controlled greenhouse cultivation projects, iv) Cultivated mushroom production projects. For the production, processing, storage and packaging of local products and medicinal and aromatic plants; i) Production, processing, storage, and packaging of medicinal and aromatic plants, ii) Projects on vegetable and animal production with organic or good agricultural practices, using geographically indicated, local gene resources, iii) Projects on the production of foods with geographical indications. The conditions sought for young people to apply are as follows: i) Being a citizen of the Republic of Turkey. ii) Being over the age of 18 and under the age of 41 as of the publication date of this regulation. iii) Being literate. iv) Not being a paid employee as of the application date. v) Not attending formal education as of the application date. vi) Not being a taxpayer for VAT (Value Added Tax), real and simple procedure as of the application date. vii) Not benefiting from other grant programs of the Ministry for the same project. As the application area of this program, settlements with a population of less than twenty thousand were identified (OGRT 2016). The second regulation on young farmer support was published in 2017 (OGRT 2017). In this regulation, the definition of young farmer has been developed as follows: It refers to real persons between the ages of 18-40, who reside / want to reside in rural areas and who do / want to carry out agricultural activities. In this regulation, the grant support to be given for animal production has been developed as follows: Not having more than 15 cattle or 50 sheep and/or goat for animal production project applications on cattle and small breeding, facility construction and animal purchase as of the date of publication of this regulation. The third regulation on this subject was published in 2018. As a matter of fact, Young Farmers' Support in Turkey has been carried out over a three-year period covering 2016, 2017 and 2018. In this regulation, it is enriched with additional practices such as silkworm breeding and facility construction, free system laying hen breeding and facility construction, perennial forage crop cultivation (OGRT 2018). In the three-year period, 47775 people benefited from the young farmer support, and it was stated that the total amount of grant support provided was 1.5 billion TRY (MAF 2018). Most of this support was provided to cattle breeding farms and sheep/goat breeding farms.

There are several scientific studies that try to reveal the positive and negative aspects of the said support program or that make various recommendations. The main findings are summarized below. Doğan et al. (2018) discovered that the main factors affecting the level of benefiting from Young Farmer Project (YFP) support in Turkey are they defined that there was gender, marital status, farming status, the family's occupation in farming, the population of the place of residence, social security status, agricultural education certificate and land ownership. Unakıtan and Başaran (2018) explored that the YFP is not sufficient to keep young people in rural areas and to ensure reverse migration. Although 67.20% of the farmers stated that the YFP had an encouraging contribution to agricultural production, a high portion of them, such as 82.80%, stated that they could not reach the income level they expected because of the project. Kan et al. (2018) declared that the YFP support provided an important step in terms of encouraging young people in agriculture in rural areas. They emphasized that the integration of this support, especially with its entrepreneurship feature, will be very beneficial. Altıntaş et al. (2019), in a study examining the migration tendencies of the rural young population, it was determined that those who have a high education level, have income from non-agricultural areas, think that there are difficulties in village life, find the living standard in the village low and cannot make a living because they earn there are more likely to migrate than others. Gedik (2019) made the following important conclusions about YFP. The most important contribution of the project to young farmers; it was clarified that for the first time, it is the fact that women farmers must own enterprises on their own, and for male farmers they have grown their existing businesses. The main goals of young farmers with their projects are to continue their projects and expand their businesses. Women farmers, on the other hand, are more determined to want to expand their businesses. In livestock enterprises, it has been determined that there is

no increase in income levels, and they have difficulties in meeting their borrowing and operating input costs. Birol et al. (2020) used the preference test method to determine the parameters that can be a criterion for supporting young farmers in Turkey with a study conducted throughout Turkey. It is determined that the biggest needs of farmers are marketing support, later Social Security Institution (SSI) support. In case of grants + SSI support + Marketing support, it became clear that young farmers should be given 51000 TRY grant. Çağlayan et al. (2020), in the evaluation of the young farmer program, which was implemented for three years, in terms of animal breeders, they found this program successful despite its shortcomings, and the most important deficiency observed was that the amount of the grant was insufficient. According to the audit report prepared by the Turkish Court of Accounts (TCA, 2019), it is investigated that there are some inadequacies in young farmer supports in Turkey. These are: (i) Some animals purchased do not have the characteristics specified in the technical specifications of the work, (ii) In the YFP, the animals that were disposed of by young farmers during the follow-up period are shown as if they were purchased from close relatives.

In summary, according to the literature reviews, it is explored that YFP, which was implemented in Turkey in 2016, 2017 and 2018, had positive effects on many issues, but it also had parts that were found to be inadequate.

2. Materials and Methods

2.1. Data collection

In this study, the impact of YFP applied throughout Turkey on cattle breeding and small ruminant (sheep and goat) breeding farms is examined. In other words, in case of using the 30000 TRY provided to the farmers within the scope of this support in cattle and small ruminant breeding holdings, this effect is evaluated. Basically, the main population of the study is formed since the farms benefiting from the YFSP in 2016 and the control group farms with similar characteristics and without support. In 2016, it is defined that there were 14977 farms in Turkey benefiting from this support. 8514 of these beneficiaries are cattle farms (Figure 1) and 2680 are sheep/goat farms (Figure 2). As can be seen, it is revealed that the said support is mostly used for livestock production.

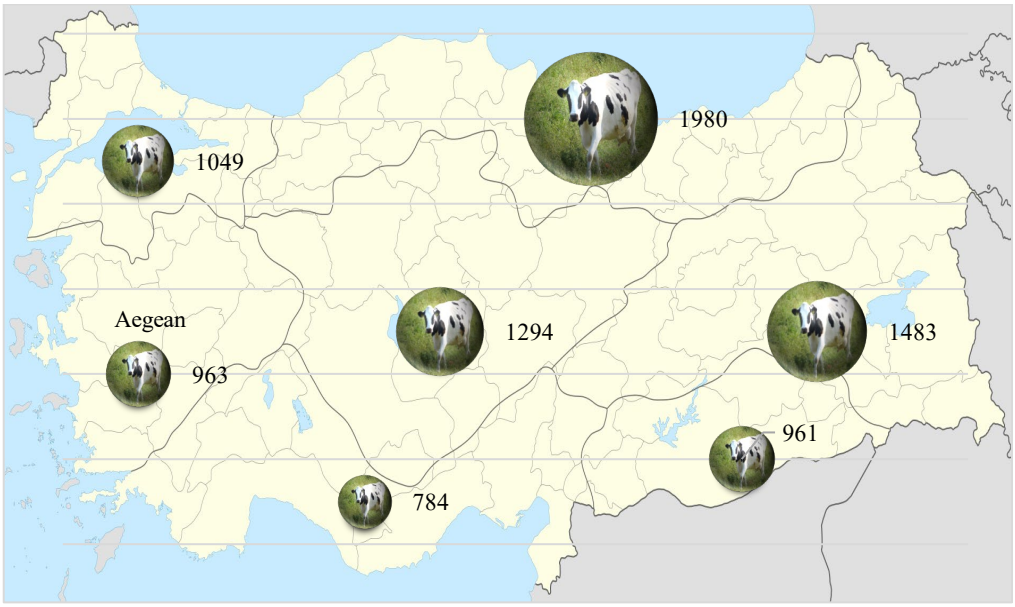

Figure 1. The farmers benefiting from YFSP for cattle breeding by regions in 2016

Considering the distribution and number of project subjects from each region, the provinces that would represent the region in terms of its differences were purposefully selected and sample selection was made. If the number of projects per region is small compared to the distribution of subjects in the provinces we selected by region, the full count method was used. On the other hand, 10% samples were taken from livestock projects with many projects. As a result of the sampling, a survey was conducted on farmers who did not benefit from the program as a control group, as well as the number of samples obtained in cattle breeding projects.

In the selection of the young farmers to be surveyed, the distribution of YFSP according to the regions is taken as a basis for use in cattle breeding and sheep/goat breeding. At this point, the selection of the producers according to the regions is acted upon according to the distribution of the producers by regions. In the selection of the producers in the comparison group, although the distribution by regions is considered, it is paid attention that the producer and/or farm characteristics are as similar as possible to the producers and/or farms benefiting from the support. Thus, the selection was made according to the counterfactual selection methodology. Although the status of benefiting from the YFSP in 2016 is considered, the survey studies were accomplished in 2019. In the light of all these explanations, it can be stated that the quasi-experimental method was used in the study in question.

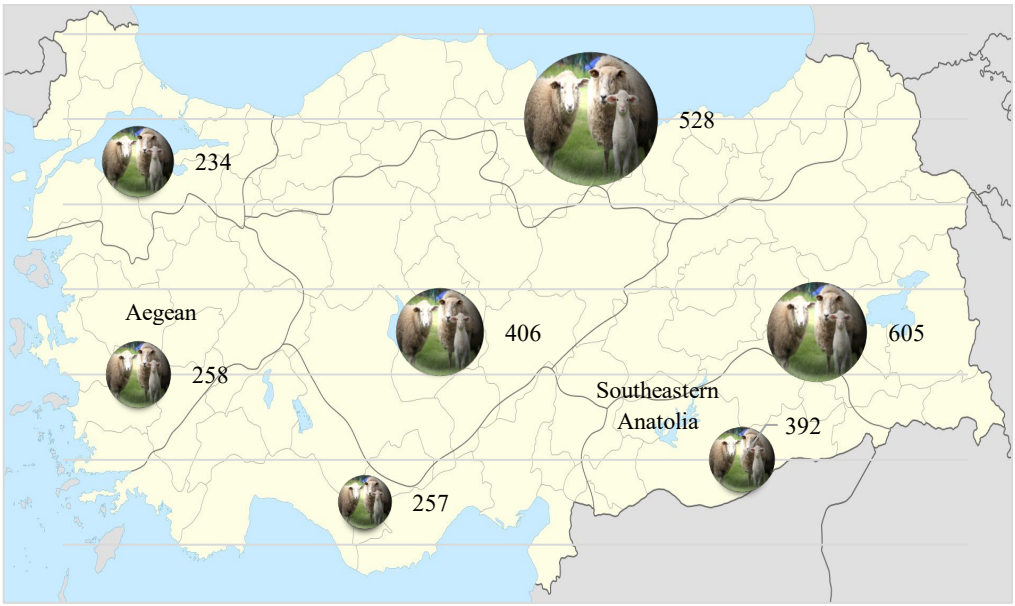

Figure 2. The beneficiary farmers from YFSP for sheep/goat breeding by regions in 2016

The number of surveys conducted on the number of young farmers who benefited from the support (treated) and who did not (control, comparison group) are described below (Table 1). In total, a questionnaire is conducted with 494 young farmers who benefited from the YFSP, 428 young farmers who were the control group as did not benefit from this support for the cattle breeding production. A survey study is performed with 210 young farmers who could benefit from YFSP, and 203 young farmers did not benefit from the support in the sheep/goat breeding.

The input and output variables examined under different models in the study are explained in the sections where they are analyzed. Covarrubias et al. (2012), and Sagbo (2019) notified that to determine the productive effects of supports at the farmer household level, it would be more appropriate to focus on components with high income generating capacity. In this case, they stated that the increase in productive farm capital assets would be an important indicator in determining the impact of the relevant support. In addition, the focus is on the impact of young farmer support used for cattle breeding and sheep/goat breeding on two outputs. These are: (i) The impact on the machine equipment value purchased (MEV) per livestock unit (LSU) obtained

in the last three years (EUROSTAT 2020), (ii) The effect on the average income value of cattle and sheep/goat (AVCSG) sold per LSU in the last three years (2016-2019). It is also quite natural to get this printout. Because, if the animal will not be used for milk production or if there is a defect that prevents it from living in a healthy way, it is sold naturally. This variable is used in similar studies. Agricultural and rural household income coefficients, which are among certain economic indicators, are considered as a differential in evaluating the impact of various development policies. Product income, livestock income and gross household income indicators can be used to assess the impact of different projects on household welfare. Livestock income is income from animals and animal products (Garbero et al. 2018). The income from this sales activity will also have an increasing effect on the income from farm activities. Livestock unit, abbreviated as LSU (or sometimes LU), is essentially a reference unit that facilitates the collection of livestock of various species and ages, using specific coefficients determined by nutritional or feed requirement. It is used for all types of animals. The reference unit (1 LSU) used for the calculation of livestock units is considered the grazing equivalent of an adult dairy cow producing 3000 kg of milk per year, without the use of additional concentrated foodstuffs. LSU is calculated only for cattle, goats, sheep, horses, pigs, poultry, and female breeding rabbits. In this study, it is calculated for cattle and sheep / goats (EUROSTAT 2020) (Table 2). As of the end of 2018, the exchange value of 1 dollar has a value equal to approximately 5 TRY (Wikipedia 2021). The machine-equipment value owned for both livestock production systems; purchased soil cultivation tools such as tractors, trailers, plows, fertilizer machine, harvester, irrigation equipment, etc.). Acquired in the period of 2016-2019 and priced considering the market values of the end of 2018. It is since the use of technology in agricultural production and thus the accumulation of capital is very important in outputting the value of machinery and equipment, and it is indispensable for the sustainability of all agricultural production systems.

Table 1. Distribution of young farmers surveyed by the regions

Regions	**Cattle farms**		**Sheep/goat farms**	
	Treated (n)	Control (n)	Treated (n)	Control (n)
Mediterranean	83	10	32	6
Eastern Anatolia	37	45	23	21
Aegean	52	53	18	23
Southeastern Anatolia	46	55	29	39
Central Anatolia	116	111	36	37
Black Sea	111	108	52	51
Marmara	49	46	20	26
Total	494	428	210	203

Table 2. Livestock unit coefficients

Category	**Description**	**Coefficient**
Bovine animals	Under 1 year old	0.400
	1 but less than 2 years old	0.700
	Male, 2 years old and over	1.000
	Heifers, 2 years old and over	0.800
	Dairy cows	1.000
	Other cows, 2 years old and over	0.800
Sheep and goats		0.100

Source: EUROSTAT, 2020.

All statistical and econometric analyzes were performed with the STATA/SE 14.2 package program.

For both livestock farms, descriptive statistics of some farmer and household characteristics are presented, and the impact assessment analyzes are explained in detail in the following stage. First, definitions and abbreviations of the variables used in the study are presented. These variables generally vary in the different

econometric models used in the study. The functional form of each model and the variables used are defined in the relevant section (Table 3).

Table 3. Variable abbreviations and explanations

Variables	Description	Abbreviation	Measurement
Dependent variables			
Machine equipment value	Machine equipment value per livestock unit (LSU) obtained in the last three years	MEV	TRY/LSU
Average value of cattle and sheep/goat	Average value of cattle and sheep/goat sold per LSU in the last three years	AVCSG	TRY/LSU
Treatment variable			
Benefiting from the YFSP	1: If the farmer is received support from YFSP 0: Otherwise	TREAT	
Independent variables			
Age	Year	AGE	Year
Gender	1: If the farmer is male 0: Otherwise	GENDER	-
Marital status	1: If the farmer is married 0: Otherwise	MS	-
Education	1: Primary school 2: Secondary school 3: High school 4: Associate degree 5: Undergradute	EDU	-
Family members (including the farmers)	Number	FM	Number
Family farming	1: If the family is farming 0: Otherwise	FF	-
Family members engaged in agriculture	Number	FMEA	Number
Farming experience	Year	FE	Year
Family farming experience	Year	FFE	Year
Earning non-agricultural income	1: If the farmer earns non-agricultural income 0: Otherwise	ENAI	-

2.2. Conceptual framework

Different methods are available to estimate the increased effects of utilizing a support program on beneficiaries. These methods, called semi-parametric estimators, have become an established standard for estimating the causal effects in question. Compared to parametric regressions, semi-parametric estimators include covariates more flexibly, allowing heterogeneous effects, narrowing the "covariable information" to a single parametric function (Handouyahia et al. 2013). Huber et al. (2010) indicated that these methods are "semi-parametric". Because they explained that while the trend score was based on a parametric model, the relationship between the outcome variables and the trend score was not parametric. These authors stressed that it would be appropriate to examine popularly used estimators by dividing them into four classes: (i) Parametric estimators (such as OLS or Probit (Robins et al. (1992)), (ii) Inverse (selection) probability weighting estimators (Horvitz and Thompson, 1952), (iii) Direct matching estimators (Rubin 1974; Rosenbaum and Rubin

1983), (iv) Kernel matching estimators (Heckman et al. 1998). This study focuses on the estimators in the second and third groups.

In this study, the effect of YFSP on some outputs considered to be important in cattle and sheep/goat farms is analyzed. The treatment effect is evaluated using the concept of potential outcomes, also called the counterfactual framework (Salvioni and Sciulli, 2011). The variables such as inputs and outputs used in the econometric models are explained in detail in the data definition section and in the parts where the models are clarified. Outcomes expected to vary mainly for both animal production systems; (i) The impact of YFSP on the MEV per livestock unit (LSU) obtained in the last three years. (ii) The effect of YFSP on the AVCSG sold per LSU in the last three years (2016-2019).

The MEV per LSU and the AVCSG per LSU are outcome variables. In the survey study, young farmers are organized under two groups. Let the beneficiaries of YFSP be expressed as *I*, and those who do not benefit as *J*. If a young farmer has received support (i.e. benefited from the Young Farmer Support Program), an indicator variable *T* is defined, which is equal to one, otherwise zero. Also, let us define the *Q* result variables for each farmer, the use young farmer support in the study. In this case, by writing Q_i (T_i = 1). It will be emphasized that the farmer is defined as a farmer who has benefited from the support. Benefiting from YFSP has two possible consequences for each farmer: It is expressed as Q_1 if the farmer benefits from YFSP, and Q_0 if the farmer does not. For the farmers who benefited from the YFSP, the average treatment effect on the treated (*ATET*) obtained by the farmers who benefited from this support, according to the case of not benefiting from this support, is the difference between Q_1 and Q_0 for this group of farmers:

$$ATET = E(Q_i^1 - Q_i^0) = E(Q_i^1 - Q_i^0 | T_i = 1) = E(Q_i^1 | T_i = 1) - E(Q_i^0 | T_i = 1) \quad (1)$$

The average treatment effect (*ATE*) for benefiting from the support is for all farmers who benefit from YFSP and who do not; if all farmers benefit from this support, it reveals the expected change in outputs according to the status of not benefiting from it. This is called the average treatment effect and is formulated as follows (2):

$$ATE = E(Q_i^1 | T_i = 1) - E(Q_i^0 | T_i = 0) \quad (2)$$

In this case, the connection between *ATE* and *ATET* is also explained below:

$$ATE = [E(Q_i^1 | T_i = 1) - E(Q_i^0 | T_i = 1)] + [E(Q_i^0 | T_i = 1) - E(Q_i^0 | T_i = 0)] \quad (3)$$

$$ATE = ATET + [E(Q_i^0 | T_i = 1) - E(Q_i^0 | T_i = 0)] \quad (4)$$

Unfortunately, since the data obtained from the survey study were obtained only once (in 2018), in other words, since the data were obtained after the YFSP was already applied, Q_1 was observed only for the farmers who benefited from the support and Q_0 for the control group who did not benefit from the support.

Therefore, to forecast *ATET*, if the farmers benefiting from the support had not benefited from the YFSP, it is necessary to estimate the status $E(Q_i^0 | T_i = 1)$. However, it would not be entirely correct to simply use the difference between groups of farmers to estimate *ATET*, for farmers who benefit from YFSP and those who do not. Since applying to the YFSP is optional, there are typically systematic differences between these two groups. Therefore, the average selection of the group that does not benefit from the support is a biased indicator of the choices the group benefiting from when they cannot participate in the YFSP. Response impact estimators try to obtain unbiased estimates of *ATET*.

For the predictors to objectively provide *ATET* estimates, two conditions must be met. The first condition, also called the unfounded assumption, is the Heckman et al. (1998). If the unconfoundedness is satisfied, conditionally on the set of observable common variables, the output obtained without treatment (YFSP), Q_0 is

estimated independently of treatment, i.e., $Q_0 \perp T_i|x_i$. In other words, considering the x covariates, this condition is met when the farmers will do in the absence of YFSP, regardless of whether the farmer is in the group that benefited from the support or not. Rosenbaum and Rubin (1983) showed that $P(T_i = 1|x_i)$, propensity scores of individuals can be used as conditional statistics to calculate $ATET$. In this article, the propensity score is an estimate of the probability of a farmer participating in the YFSP as a function of the covariates factor x_i.

The second necessary condition is that the data set has sufficient overlap. This implies that the propensity score for both the beneficiary and the control group farmers who did not benefit from the support was neither zero nor one, $0 < P(T_i = 1|x_i) < 1$. If satisfied, for each farmer who has benefited from the support, there is a possibility to find a farmer belonging to the control group who has essentially the same tendency to benefit from the support. In practice, the overlap condition is imposed, leaving observations that are not satisfied. In other words, if there are no farmers belonging to the control group who have a similar common variable set for some farmers, who did not benefit from the support, then these farmers are removed from the data set and thus $ATET$ cannot be estimated for this group.

In Equation (1), for $E(Q_i^1|T_i = 1)$ and $E(Q_i^0|T_i = 1)$ the matching estimators are:

$$E(Q_i^1 \left| T_i = 1) = \frac{1}{I}\sum_i (Q_i^1) \right. \tag{5}$$

$$E(Q_1^0 \left| T_i = 1) = \frac{1}{I}\sum_i (Q_i^0) = \frac{1}{I}\sum_i \sum_j w(i,j)(Q_0^j) \right. \tag{6}$$

where Q_0^j is the observed outcome for the farmers who did not benefit from treatment, $w(i,j)$ is the weights of the *j*th farmer who did not benefit from YFSP and used to estimate outputs, the MEV and AVCSG of the *i*th farmer who did not benefit from YFSP. In the Inverse Probability Weighting (IPW) estimators used in Stata Statistical Software 14.0 (StataCorp 2015), the weights $w(i,j)$ change inversely with the difference between the propensity score for the *i*th treated observation and the *j*th control observation. Therefore, Q_i^0 is predicted to place the more weighted control group observations which are the most like *i*th observation. The matching estimator used to calculate $ATET$ in equation (1) using equations (5) and (6) is given below.

$$ATET = E(Q_i^1|T_i = 1) - E(Q_i^0 \left| T_i = 1) = \frac{1}{I}\sum_i \{(Q_i^1 - \sum_j w(i,j)(Q_i^0)\} \right. \tag{7}$$

There are many matching algorithms to calculate $w(i,j)$. In this study, inverse-probability weighted (ipw) and propensity score matching (psm) estimators are used, which are the most widely used in the international literature and to make comparisons at a certain level.

3. Results

3.1. Descriptive statistics for the farmer and household characteristics

Table 4 represent some precise characteristics of cattle and sheep / goat farmers by the control and treatment assignments. The statistical difference between the groups is defined using the t test, according to the p significance value. In both farm groups, the age of the farmers in the control group is higher, while those who benefited from the support are lower ($p<0.01$). This circumstance is thought to stem from the characteristics of YFSP. In many studies conducted to evaluate the effects of various supports provided to rural areas, it is determined that the age of the farmers in the control group is higher, whereas the age of them is relatively lower in the farms using various support tools. This interesting finding suggests that younger farmers have higher entrepreneurial qualities and can take risks (Boone et al. 2013; Mwambi et al. 2016; Onyeneke et al. 2018; Ambler et al. 2020)

It is defined that the number of family members engaged in agriculture is higher in sheep / goat farms and this value is statistically significant ($p<0.05$). This result can be explained by the increase in the size of the enterprise, albeit to a certain extent, as well as employing more wage workers from outside. On the other hand,

it can be stated that the family workforce is still used more in sheep and goat enterprises. Although there are many positive benefits of using family workforce in agricultural production, there are also opinions that it decreases productivity after a certain threshold point (Kostov et al., 2018). For this reason, the owner of the business will decide on the ideal number and combination of family members' use in agricultural activities. It reveals that in both farm groups, the farmer's own farming experience ($p<0.01$) and the family's farming experience are higher on the farms that do not benefit from the YFSP ($p<0.01$ and $p<0.05$ in cattle farms and sheep/goat farms, respectively). This interesting inference can reveal that farmers and families who have less farming experience to YFSP have a higher tendency to benefit from this support.

Table 4. Descriptive statistics for the farmers

Variables	Cattle farms				Sheep/goat farms			
	Treatment	Control	t	p	Treatment	Control	t	p
AGE	32.23	36.35	59.581	0.000***	31.76	36.08	29.437	0.000***
FM	5.13	5.03	1.377	0.241	5.07	5.29	1.059	0.304
FMEA	2.62	2.54	0.545	0.461	2.54	2.90	5.320	0.022**
FE	11.39	15.92	70.399	0.000***	11.65	16.17	28.913	0.000***
FFE	26.47	31.12	15.667	0.000***	27.28	31.38	4.314	0.038**
GENDER	0.27	0.78	320.374	0.000***	0.32	0.87	180.388	0.000***
MS	0.93	0.86	14.404	0.000***	0.89	0.83	2.854	0.092*
FF	0.91	0.89	0.526	0.469	0.90	0.93	1.661	0.198
ENAI	0.27	0.31	2.144	0.143	0.16	0.27	7.455	0.007***

*, **, *** denotes statistical significance at $p<0.10$, $p<0.05$, and $p<0.01$, respectively that can be drawn.

The difference between gender, marital status, number of family members and non-agricultural income circumstance is analyzed statistically. For both farms, the difference between groups is statistically significant for variables of gender ($p<0.01$), marital status ($p<0.01$ and $p <0.10$ in cattle and sheep / goat farms, respectively). For both groups, it is determined that female farmers are more concentrated on the farms benefiting from the support. It is quite appropriate to make a positive choice especially for female farmers, who are quite difficult in nature and have a lower probability of sustainable earning than male farmers (Rahman, 2014). It is observed that the rate of marriage is higher among the farmers in the treatment group compared to the control group. Only in sheep / goat farms, the difference between the groups in terms of non-agricultural income is statistically significant ($p<0.01$). It can be inferred from that non-agricultural income is more common in the control group farms.

The distribution of data showing dual character such as gender, marital status, family farming, non-agricultural income can be demonstrated more clearly graphically (Figure 3). When evaluated cumulatively; It is observed that non-agricultural income earning is less, the number of male farmers is higher, and married farmers are more concentrated.

The education level of farmers also varies to a certain extent according to farm groups totally (Figure 4).

When evaluated cumulatively, it is observed that the education levels of the farmers are concentrated at the primary, secondary, and high school levels. Schultz (1964) elaborated on the importance of education in agricultural development. Education increases farmers' ability and productivity capacity (Weir 1999). It contributes to the use of many chemicals and inputs at the most appropriate dose and time (Appleton and Bolihuta 1996; Huang and Luh 2009). Although there is no consensus in many studies, it would not be wrong to state that the level of education increases agricultural productivity and efficiency (Paltasingh and Goyari 2018). In this study, it is determined that the education levels of the farmers who benefit from and apply to the YFSP are concentrated at the primary, secondary, and high school levels. This is due to the general agricultural structure of Turkey. On the other hand, as of 2019, the "Expert Hands in Rural Development Project" instead of YFSP aims to provide incentives to farmers and/or farmer candidates with a relatively higher education level.

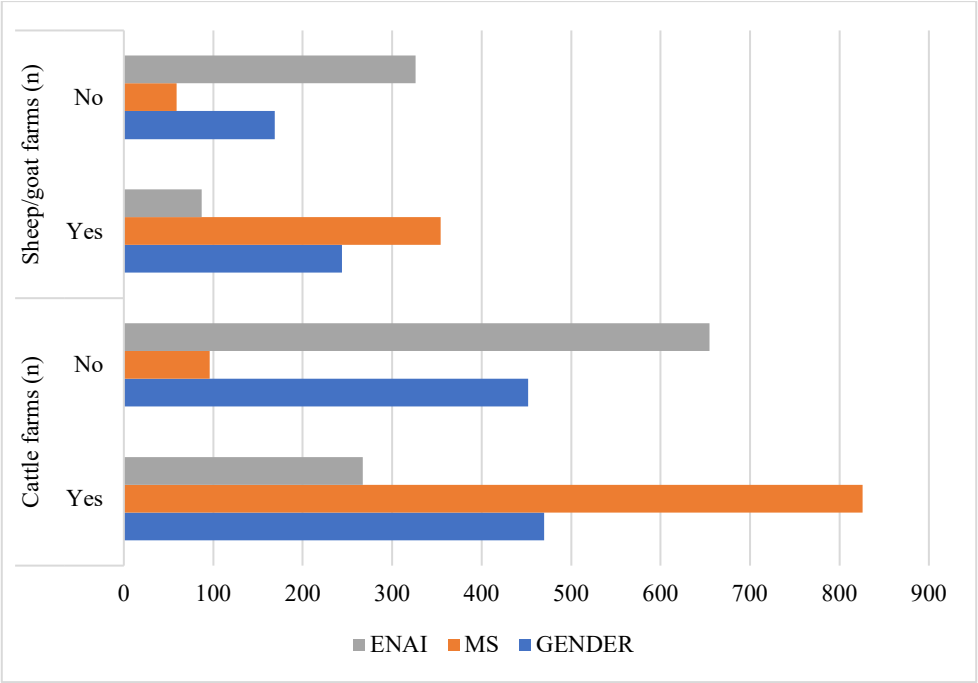

Figure 3. The farmer and household characteristics by the cattle and sheep/goat farms

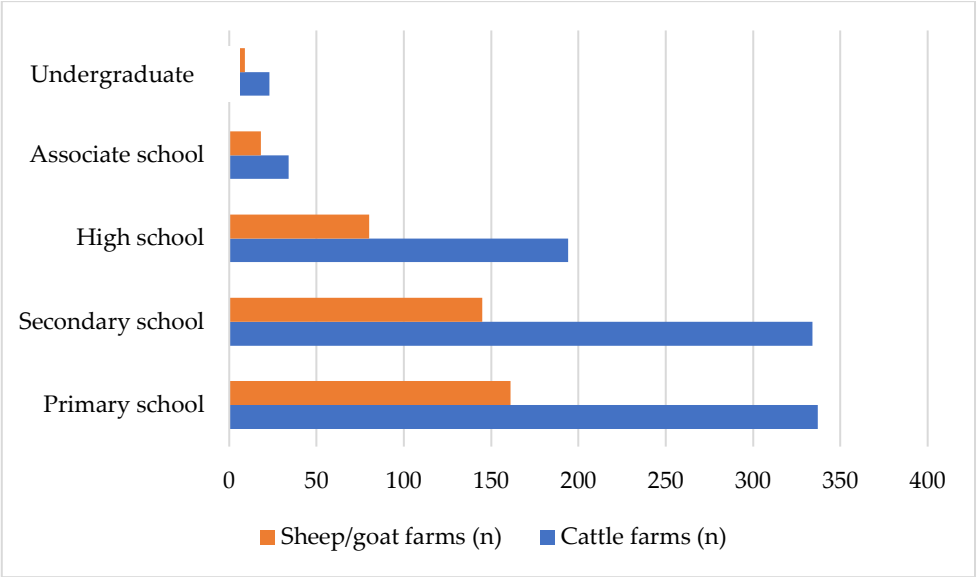

Figure 4. Farmer education characteristics by the farm groups

In the following section, the treatment effect of YFSP has been tried to be revealed.

3.2. *Empirical estimations*

Using a specific data set, it is very difficult to choose the most appropriate variables and their functional form in models for determining the treatment effect, as is the case for many purposes. In the context of treatment-effects, Cattaneo et al. (2013) could try to demonstrate that only choosing a model works by

minimizing an information criterion. The authors discuss a method and a user-typed command to facilitate the process. In this study, the most appropriate functional form and set of variables are used separately according to the analyzed livestock production system and the data obtained from the survey studies in the field.

3.3. Treatment effects of YFSP on cattle meat production

First, the effect of YFSP used for cattle meat production is analyzed (Table 6).

Table 6. Treatment effects of YFSP on the MEV and AVCSG in cattle farms

Outputs	ATE				ATET			
	ipw		psm		ipw		psm	
	coefficient	p	coefficient	p	coefficient	p	coefficient	p
MEV	2004.75	0.003***	2069.01	0.009***	1581.41	0.049**	1713.40	0.063*
AVCSG	701.50	0.088*	2129.53	0.050**	1023.00	0.008***	1438.47	0.075*

*, **, *** denotes statistical significance at p<0.10, p<0.05, and p<0.01, respectively.

After the psm estimator, the box plots are drawn and examined to check the balance in the paired samples in MEV output. According to the paired box plot, it is understood that the covariates are in balance (Figure 5).

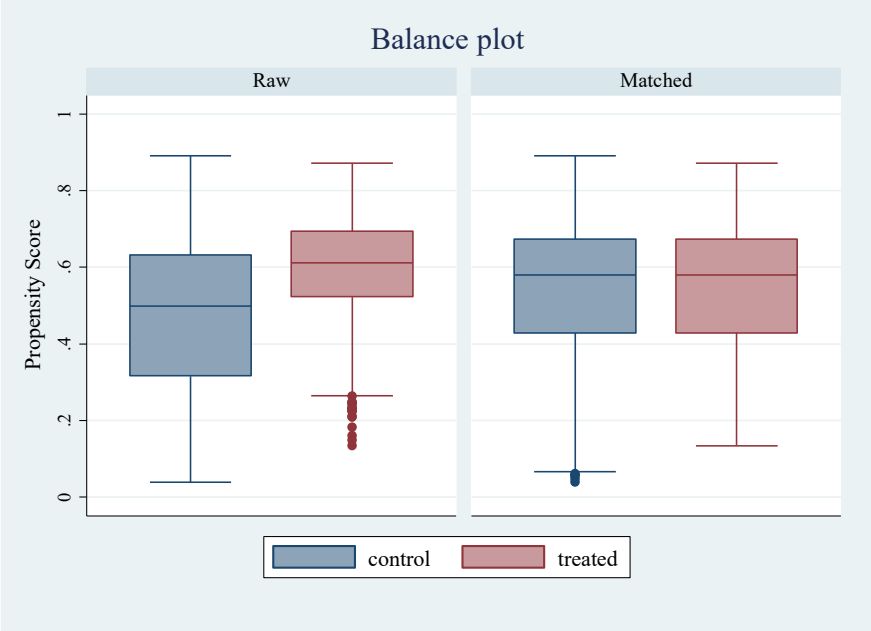

Figure 5. Box graph showing the balancing of all factors using psm estimator for MEV in cattle farms

After the psm estimator, the box plots are drawn and analyzed to detect the balance in the paired samples in AVCSG output. When considering the box chart, it is clarified that the covariates are in balance (Figure 6).

Regarding the MEV output, it is determined that the ATE and ATET coefficients obtained by ipw and psm estimators are quite close to each other. Considering the ATE coefficients, it is defined that if all farms would receive support from YFSP, they would have more machinery and equipment value of 2050 TRY/LSU [2004 TRY/LSU – 2069 TRY/LSU] (410 dollars/LSU) per farm, almost as if none of them would benefit from this support. In the case of ATET coefficients, it is estimated that the farmers who would benefit from the YFSP had an average of 1650 TRY/LSU [1581 TRY/LSU – 1713 TRY/LSU] (330 dollars/LSU) more machine equipment value per LSU, as they would benefit from this support. With an YFSP of 6000 dollars per farm, it is very

important to ensure an increase in value of machinery equipment of 410 $/LSU for ATE and 330 $/LSU for ATET per farm at the end of a period of approximately 2.5 - 3 years.

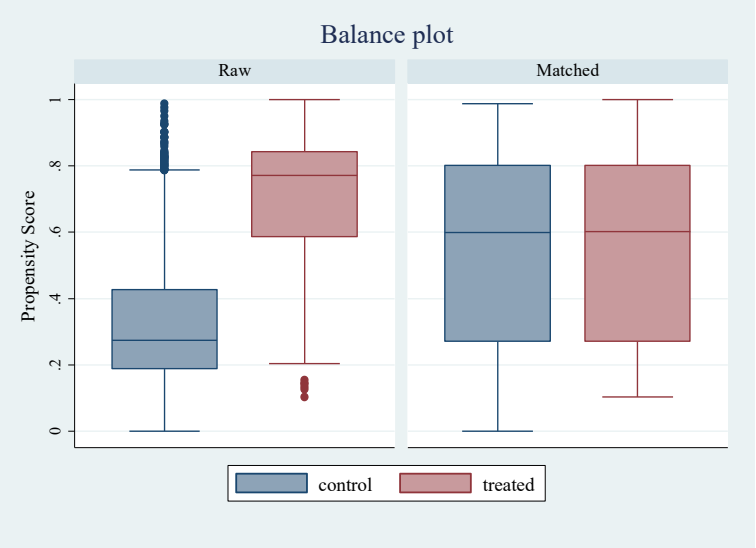

Figure 6. Box graph representing the balancing of all factors using psm estimator for AVCSG in cattle farms

Jiang et al. (2017) notified that in the land transfer policy process, farmers need financial resources, albeit at a certain level, in land acquisition, albeit with the support of the state, and this leads to the purchase of more machinery and equipment and encourages higher machinery and equipment investment costs. An important inference to be drawn from this is that the YFSP, which is used in our study, led to the need for more machinery for farms. Lopez et al. (2017), in their study to measure agricultural input supports and productivity, found that the treated group spent significantly more (34 percentage points) on machinery and equipment compared to the control group. Sagbo (2019) analyzed the impact of borrowing on the purchase of agricultural machinery and equipment. This study emphasized that the farmer could invest in agricultural machinery to fulfill many tasks and this decision can make agricultural activities more efficient. In the study, it is emphasized that loans taken especially for agricultural machinery can significantly reduce the expenditures made for the workforce employed on the farm, but with the new machinery purchased, more family members can be employed on the farm, while the use of family labor for other credit categories can be significantly reduced. In line with this inference, it can be inferred from that the increase in the value of machinery and equipment obtained by YFSP not only increases productivity in agricultural production, but also provides more intensive use of family workforce in the farm.

When the effect of YFSP on AVCSG output is evaluated, the following important conclusions have been reached. The ATE coefficient was determined to be on average 1500 TRY [701 TRY - 2129 TRY] (300 dollars) and the ATET coefficient to be 1250 TRY [1023 TRY - 1438 TRY] (250 dollars) on average. The ATE coefficient value reveals that if all their farm's benefit from YFSP, they will get an AVCSG output of 300 $/LSU more than if none of them benefit. ATET coefficient value is also determined that the farms benefiting from YFSP obtained 250 $/LSU more AVCSG since they benefited from this support. Ambler et al. (2016) evaluated the impact of cash grant on agricultural production among small-scale farmers for farm management practices in Senegal. Beneficiaries of the grant support have been found to have higher farm productivity and livestock asset accumulation. The analysis also revealed that the cash grant allows farmers to purchase agricultural inputs, that is, to invest in chemical fertilizers to increase crop yields. These findings are also consistent with the results obtained in our study. Garbero et al. (2018) conducted the impact assessment study of SPAM, a comprehensive support package that includes certified inputs (seeds, fertilizers, and pesticides), agricultural machinery, best production practices training, innovative practices, post-harvest management, in Senegal. The results

determined that the main effect occurred positively on the income of animals (animal and animal product sales) in particular. Arslan et al. (2020), given that the effects on wage employment are similar, they find that the impact of women's empowerment on animal production value is not very different in the comparison between female employment and male employment, as indicated by the analyzed women's empowerment indicators. In other words, they suggested that women in animal husbandry can be employed as wage workers within the framework of certain rules. Eroglu et al. (2020) examined the effects of livestock subsidies on the production and income of beef farms. The survey data were collected from 171 randomly selected cattle farms in Samsun, Turkey. It is discovered that the cattle breeding supports increase the meat production by 11760 kg and the gross profit by 8025.75 $ on average. Among the supported (processed) farms, the beef production of a farm increases by 12620 kg compared to the unsupported case, and the production coefficient is determined to be statistically significant. In addition, although the gross profit increased by 7811.15 $, it is determined that the gross profit coefficient is not statistically significant. As a result, it is demonstrated that cattle breeding supports significantly increase the average cattle meat production.

3.4. Treatment effects of YFSP on sheep/goat production

Treatment effect of YFSP used for sheep/goat production is analyzed (Table 7).

Table 7. Treatment effects of YFSP on the MEV and AVCSG in dairy/goat farms

Outputs	**ATE**				**ATET**			
	ipw		**psm**		**ipw**		**psm**	
	coefficient	p	coefficient	p	coefficient	p	coefficient	p
MEV	3344.71	0.007***	2858.63	0.035**	2754.55	0.048**	2942.88	0.039**
AVCSG	627.54	0.085*	⸸		704.40	0.025**	⸸	

*, **, *** denotes statistical significance at p<0.10, p<0.05, and p<0.01, respectively.

⸸ These coefficients could not be included, since the results are not statistically significant in the counterfactual impact assessment evaluation analysis performed using psm estimator.

The box plots are drawn and analyzed to control the balance in the paired samples in MEV output after using psm estimator. When considering the box chart, it is clarified that the covariates are in balance (Figure 7).

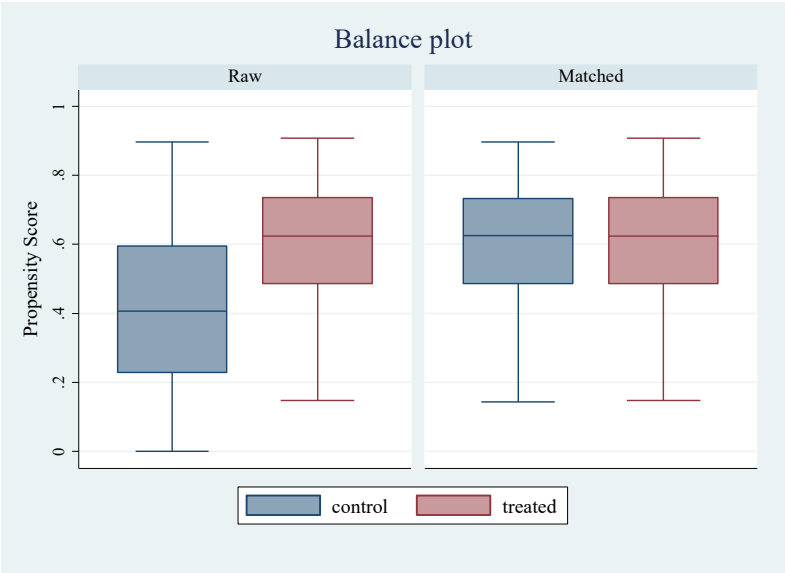

Figure 7. Box graph indicating all factors' balance using psm estimator for MEV in sheep/goat farms

When MEV output is considered, ATE and ATET coefficients estimated by ipw and psm estimators are relatively close values. For the ATE coefficients, if all farms would benefit support from YFSP, they would have more machinery and equipment value of 3000 TRY/LSU [2858 TRY/LSU – 3344 TRY/LSU] (600 dollars/LSU) per farm, as if none of them would benefit from this support. In the case of ATET coefficients, the farmers who would benefit from the YFSP had an average of 2800 TRY/LSU [2754 TRY/LSU – 2942 TRY/LSU] (560 dollars/LSU) more machine equipment value per LSU, as they would benefit from this support. With an as the YFSP support is 6000 dollars per farm, it can be stated that 600 $/LSU for ATE and 560 $/LSU for ATET per farm values are quite valuable to ensure sustainable farming during 2.5 - 3 years.

When the effect of YFSP on AVCSG output is evaluated, the following important conclusions are reached. The ATE coefficient is defined to be on average 627 TRY (125 dollars) and the ATET coefficient to be 704 TRY (141 dollars) on average. The ATE coefficient represents that if all their farms would receive YFSP, they will get an AVCSG output of 125 $/LSU more than if none of them would benefit. ATET coefficient is also indicated that the farms would benefit from YFSP obtained 141 $/LSU more AVCSG since they would benefit from this support.

Especially, after YFSP, it is observed that the value of machinery equipment purchased in the last three years is higher in sheep/goat farms than in cattle farms. It is thought that there are several reasons for this. First, in sheep/goat farms, the fixed capital components owned are less than that of cattle farms, therefore it is obtained from sheep and goat sales, which are purchased with the benefited YFSP and then sold more. Another reason is that animals such as sheep and goats have less life expectancy than cattle, and that these animals produce very little by-products such as milk and fleece and generate income. For this reason, it is not considered as an output. As a footnote, in the following period, it is estimated that farmers with cattle left in their hands will earn a main crop such as milk.

Paolantonio et al. (2018) assessed the impact of the project Plan VIDA-PEEP (PPV), an initiative financed jointly between IFAD and the Bolivian Government as part of the country's National Development Plan. To this end, this post-evaluation approach has applied a mixed method approach that combines non-experimental statistical methods and qualitative analysis to compare a sample of project beneficiaries with non-participants (control group). The results clearly demonstrated a positive impact on a range of economic mobility indicators related to asset ownership, as well as agricultural income, livestock sales which makes up the larger share of total income for households in the sample. INDECON (2019) analyzed the impact of various support programs on the physical capital of the farm, including Young Farmer's Capital Investment Scheme. It is determined that Indecon's completed and previous Rural Development Program (RDP) support components have led to results confirming the positive impact of capital grants on farm output and productivity, with counterfactual modeling involving capital investment. Overall, it is argued that through modeling and analysis, RDP support will contribute to enhancing the competitiveness of farms. It is emphasized that with increased competitiveness, it will most likely be mainly through capital investment measures.

Cavatassi and Mallia (2018) performed an impact assessment analysis for the Government of Tajikistan launched the Livestock and Pasture Development Project (LPDP) in August 2011, a project financed jointly by IFAD and the Government of the Republic of Tajikistan. Thus, this ex-post evaluation experimental design was used to design and define a valid counter-case. Thus, a non-experimental approach is utilized, combining quantitative methods and qualitative analysis used to enrich the project. As a result of the treatment effects, the effects of the project on the beneficiary group are positive and the effects on productive assets are important as well as the increase in income. This is particularly true when referring to livestock income or assets related to livestock, although of a smaller size, the positive effects also apply to crop income. The positive results showed that it is clearly reflected in the weight of the animals as well as the number of cattle on the farm. These positive results were highlighted in the form of better access to water and lower costs as well as tractor services. However, it was noted that these positive effects were not only due to the project, but also to the adoption of improved or controlled breeding and mating techniques.

4. Conclusion

An important motivation tool for young people to continue their agricultural activities and / or to attract young people to agriculture throughout Turkey, the Young Farmers Support Program (YFSP) was implemented in 2016, 2017 and 2018. However, the data obtained in this project were obtained from the 2016 YFSP. On the other hand, as of 2019, the "Expert Hands in Rural Development Project" instead of YFSP aims to provide incentives to farmers and/or farmer candidates with a relatively higher education level. In the YFSP, a fixed amount of cash of 30000 TRY (approximately 6000 dollars) was provided for each farmer in a three-year period, although this cash money cannot be used freely, but it is obligatory to be used in agricultural production branches directed by the Ministry of Agriculture and Forestry. In Turkey, especially in animal production, as there is a certain level of inadequacy in both meat and milk production, the usage preference and/or direction of the supports have mostly focused on cattle and sheep/goat breeding. For this reason, the research in question is conducted on the mentioned livestock farms. The project work is carried out throughout Turkey and it is thought that important implications are reached with this study. First, it is observed that in the farms benefiting from this support, relatively significant increases have been achieved in both cash assets and physical capital items such as animal assets, machinery, and equipment assets. Although it is observed that the sheep and goats are largely disposed of at the end of the project implementation period, it is clarified that this decrease in the number of cattle was less. The decrease in the number of sheep and goats is realized through the sale of them, and a certain accumulation is achieved in the equity of the farm because of this activity. On the other hand, from the unsold cattle and sheep/goat assets, in the following period, meat, milk, etc. it can be declared that there are significant increases in productive capital assets that will provide an increase in income for animal products.

As a result, it would not be a false statement to state that with the YFSP, an important awareness is achieved to attract young people's interest towards agricultural production.

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References

Aggelopoulos S, Arabatzis G (2020). European union young farmers program: A Greek case study. *New Medit, A Mediterranean Journal of Economics, Agricultural and Environment* 9:50-55.

Altıntaş G, Altıntaş A, Bektaş H, Çakmak E, Oruç E, Kızılaslan H, Birol D (2019). Effects of young farmer project support on the tendency of young farmers to stay in agriculture: Case of TR83 region, Turkey. *Turkish Journal of Agriculture - Food Science and Technology* 7: 1682-1693.

Ambler K, de Brauw A, Godlonton S (2016). Cash transfers and crop production in Senegal. Working paper, University of California Riverside, Riverside, CA.

Ambler K, de Brauw A, Godlonton S (2020). Cash transfers and management advice for agriculture: Evidence from Senegal. *The World Bank Economic Review* 34: 597-617.

Appleton S, Balihuta A (1996). Education and agricultural productivity: evidence from Uganda. *Journal of International Development* 8: 415–444.

Arslan A, Higgins D, Egger EM, Zucchini E (2020). Strengthening local development in the highlands and high rainforest areas project (PSSA), Peru. *Impact Assessment Report, Investing in Rural People. IFAD*, Rome, Italy, pp. 1-58.

Bednaríková Z, Bavorová M, Ponkina EV (2016). Migration motivation of agriculturally educated rural youth: the case of Russian Siberia. *Journal of Rural Studies* 45:99–111.

Bika Z (2007). The territorial impact of the farmers' early retirement scheme. *Sociologia Ruralis* 47: 246-272.

Birol D, Yilmaz HI, Akdemir HA, Cobanoglu F (2020). Determination of parameters that can be criteria to young farmers supports in Turkey: Choice Experiment Method. *Turkish Journal of Agricultural Economics* 26: 131-146.

Boone R, Covarrubias K, Davis B, Winters P (2013). Cash transfer programs and agricultural production: The case of Malawi. *Agricultural Economics* 44: 365-378.

Cattaneo MD, Drukker DM, Holland AD (2013). Estimation of multivalued treatment effects under conditional independence. *The Stata Journal* 13: 407–450.

Cavatassi R, Mallia P (2018). *Impact assessment report: Livestock and Pasture Development Project (LPDP), Tajikistan. IFAD*, Rome, Italy.

Chen R, Ye C, Cai Y, Xing X, Chen Q (2014). The impact of rural out-migration on land use transition in China: past present and trend. *Land Use Policy* 40: 101–110.

Covarrubias K, Davis B, Winters P (2012). From protection to production: productive impacts of the Malawi Social Cash Transfer scheme. *Journal of Development Effectiveness* 4: 50-77.

CRO (2019). Turkey Agricultural Outlook Field Study 2019. Credit Registration Office, pp. 1-36.

Çağlayan ZC, Göktaş İ, Örmeci Kart MÇ, Gümüş S (2020). Evaluation of the young farmer program in terms of animal breeders: Case of Izmir. *Journal of Agriculture Faculty of Ege University* Special Issue: 107-117.

Davis J, Caskie P, Wallace M (2013). Promoting structural adjustment in agriculture-the economics of New entrant schemes for farmers. *Food Policy* 40: 90–96.

Dodson CB, Koenig SR (2007). Facilitating beginning farmers purchase of farmland. *Journal of the ASFMRA* 72–84.

Doğan HG, Kan A, Kan M, Tosun F, Uçum I, Solmaz C, Birol D (2018). Evaluation of the factors affecting the benefiting level from the young farmers project support in TR 71 Region of Turkey. *Turkish Journal of Agriculture - Food Science and Technology* 6: 1599-1606.

Duesberga S, Bogue P, Renwick A (2017). Retirement farming or sustainable growth-land transfer choices for farmers without a successor. *Land Use Policy* 61: 526–535.

EC (European Commission) (2013). Overview of CAP Reform 2014-2020. Agricultural Policy Perspectives Brief No 5, December 2013. http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf. (access date: 10.01.2024).

Eroglu NA, Bozoglu M, Bilgic A (2020). The impact of livestock supports on production and income of the beef cattle farms: A case of Samsun province, Turkey. *Journal of Agricultural Science* 26: 117-129.

EUROSTAT (2020). Glossary: Livestock unit (LSU). EUROSTAT Statistics Explained. (access date: 10.01.2024).

Garbero A, Diatta D, Olapade M (2018). Impact assessment report: Agricultural Value Chains Support Project, Senegal. IFAD, Rome, Italy.

Gedik DS (2019). Rural Development Young Farmer Project: Sample of Tekirdağ Province. MSc. Thesis. Tekirdağ Namık Kemal University, Turkey.

Faysse N, Phiboon K, Filloux T (2019). Public policy to support young farmers in Thailand. *Outlook on Agriculture* 48: 292-299.

Hamilton W, Bosworth G, Ruto E (2015). Entrepreneurial younger farmers and the "young farmer problem" in England. *Agriculture and Foresty* 61: 61–69.

Handouyahia A, Haddad, T., Eaton, F (2013). Kernel matching versus inverse probability: A comparative study. *International Journal of Mathematical and Computational Sciences*, 7: 1218-1233.

Heckman JJ, Ichimura H, Todd P (1998). Matching as an econometric evaluation estimator. *Review of Economic Studies*, 65: 261-294.

Hennessy T (2014). Common Agricultural Policy, (2014–2020) Tools to Enhance Family Farming: Opportunities and Limits: In-Depth Analysis. Brussels: European Parliament.

Horvitz D, Thompson D (1952). A generalization of sampling without replacement from a finite population. *Journal of the American Statistical Association*, 47: 663-685.

Huang FM & Luh YH (2009). *"The Economic Value of Education in Agricultural Production: A Switching Regression Analysis of Selected East Asian Countries," 2009 Conference*, August 16-22, 2009, Beijing, China 50928, International Association of Agricultural Economists.

Huber M., Lechner, M., Wunsch, C (2010). "How to Control for Many Covariates? Reliable Estimators Based on the Propensity Score", *Institute for the Study of Labor*, Discussion Paper IZA DP No. 5268, Bonn, Germany.

INDECON (2019). Final Report. Indecon Mid-Term Evaluation of the Rural Development Programme Ireland. Prepared by Indecon International Research Economists in association with the Countryside and Community Research Institute, University of Gloucestershire submitted to Department of Agriculture, Food and the Marine. August 2019.

Jiang M, Paudel KP, Mi Y (2017). Rural land transfer and financial impact: Evidence from China. *Southern Agricultural Economics Association Annual Meeting*,4-7 February 2017; Alabama,USA.

Kan A, Kan M, Doğan HG, Tosun F, Uçum İ, Solmaz C (2018). Evaluation of young farmers project support program in terms of agri-entrepreneurship in Turkey. *Pakistan Journal of Agricultural Sciences* 55: 1021-1031.

Kang HS (2010). Understanding Farm Entry and Farm Exit in Korea. PhD Thesis, University of Birmingham, England.

Katchova AL, Ahearn MC (2016). Dynamics of farmland ownership and leasing: implications for young and beginning farmers. *Applied Economic Perspectives and Policy* 38: 334–350.

Kauffman N (2013). Financing young and beginning farmers. *Main Street Economist* 2: 1–7.

Kontogeorgos A, Sergaki P, Chatzitheodoridis F (2017). An assessment of new farmers' perceptions about agricultural cooperatives. *Journal of Developmental Entrepreneurship* 22: 1–13.

Kostov P, Davidova S, Bailey A (2018). Effect of family labour on output of farms in selected EU member states: A non-parametric quantile regression approach. *European Review of Agricultural Economics* 45: 367-395.

Leonard B, Kinsella A, O'Donoghue C, Farrell M, Mahon M (2017). Policy drivers of farm succession and inheritance. *Land Use Policy* 61: 147–159.

Lopez CA, Salazar L, de Salvo CP (2017). Agricultural input subsidies and productivity: The case of Paraguayan farmers. Inter-American Development Bank, Working Paper Series: IDB-WP-802, p.32.

Ma SJ (2014). How to encourage young generation to engage in farming: Korea's case. In: Proceedings of the International Seminar on Enhanced Entry of Young Generation into Farming, *Food and Fertilizer Technology Center*, Jeonju. South Korea, pp. 20–24.

MAF (2018). Annual Report. Ministry of Agriculture and Forestry, Ankara, Turkey.

May D, Arancibia S, Behrendt K, Adams J (2019). Preventing young farmers from leaving the farm: Investigating the effectiveness of the young farmer payment using a behavioural approach. *Land Use Policy* 82: 317-327.

Mazorra AP (2000). Analysis of the evolution of farmers' early retirement policy in Spain. The case of Castille and Leon. *Land Use Policy* 17: 113–120.

Mihi-Ramirez A, Kumpikaite V (2014). Economics reason of migration from point of view of students. *Procedia - Social and Behavioral Sciences* 109: 522–526.

Mills-Novoa M (2011). Sustaining Family Farming Through Mentoring: A Toolkit for National Family Farm Coalition Members. National Family Farm Coalition, USA.

Morais M, Binotto E, Borges JAR (2017). Identifying beliefs underlying successors' intention to take over the farm. *Land Use Policy* 68:48–58.

Mwambi MM, Oduol J, Mshenga P, Saidi M (2016). Does contract farming improve smallholder income? The case of avocado farmers in Kenya. *Journal of Agribusiness in Developing and Emerging Economies* 6: 2-20.

Nagatani T, Sakamoto K (2017). Succession of farming to entrant farmers through establishing agricultural corporations involving their predecessors. *The Natural Resource Economics Review* Special Issue: 53–66.

OGRT (2016). Communication on Support of Young Farmer Projects under Rural Development Support. Official Gazette of the Republic of Turkey. 2016/16, No. 29675, 5 April 2016.

OGRT (2017). Communication on Support of Young Farmer Projects under Rural Development Support. Official Gazette of the Republic of Turkey. 2017/10, No. 30024, 31 March 2017.

OGRT (2018). Communication on Support of Young Farmer Projects under Rural Development Support. Official Gazette of the Republic of Turkey. 2018/12, No. 30370, 24 March 2018.

Onyeneke RU, Nwajiuba CU, Mmagu CJ, Aligbe JO, Uwadoka CO, Igberi CO, Amadi MU (2018). Impact of adoption of improved cook-stove on different components of household welfare in rural communities in Nigeria: The case of save80 cook-stove in Kaduna. *Environmental Progress & Sustainable Energy* 37: 1327-1338.

Paltasingh KR, Goyari P (2018). Impact of farmer education on farm productivity under varying technologies: Case of paddy growers in India. *Agricultural and Food Economics* 6: 1-19.

Paolantonio A, Cavatassi R, McCollum K (2018). Impact Assessment Report. Bolivia (Plurinational State of) Plan VIDA-PEEP to Eradicate Extreme Poverty-Phase I, Investing in Rural People, IFAD, Rome, Italy.

Pavic L, Turk J, Grgic I, Prisenk J (2020). Impact analysis of the young farmers' support program on Slovenian dairy sector development using econometric modeling approach. *Agronomy* 10: 1-9.

Rahman S (2014). Impact of rural infrastructure on farm and non-farm enterprise choice and income in Bangladesh. *The Journal of Developing Areas* 48: 275-290.

Ravenscroft N (2014). Securing land for farmers. *The Land* 15: 39–42.

Robins JM, Mark SD, Newey WK (1992). Estimating exposure effects by modelling the expectation of exposure conditional on confounders. *Biometrics* 48: 479-495.

Rosenbaum PR, Rubin DB (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika* 70: 41-55.

Rubin DB (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology* 66: 688-701.

Sagbo NSM (2019). Effects of agricultural loans in developing countries – Benin case. Theses and Dissertations, *Agricultural Economics* p.131.

Salvioni C and Sciulli D (2011). Farm level impact of rural development policy: a conditional difference in difference matching approach. 122nd Seminar, February 17-18, 2011, Ancona, Italy 99421, European Association of Agricultural Economists.

Schultz TW (1964). Transforming Traditional Agriculture. Yale University Press, New Haven, p.212

Sencebe Y (2012). La SAFER. *Terrains & Travaux* 1: 105–120.

StataCorp (2015). Stata Statistical Software 14; StataCorp LP: College Station, TX, USA.

TCA (2019). Ministry of Agriculture and Forestry, 2018 TCA Audit Report. T.R. Turkish Court of Accounts, September 2019, pp. 1-209.

Uchiyama T (2014). Recent trends in young people's entry into farming in Japan: An international perspective. *In: Proceedings of the International Seminar on Enhanced Entry of Young Generation into Farming*, Food and Fertilizer Technology Center, Jeonju. South Korea, pp. 1–16.

Uchiyama T, Whitehead I (2012). Intergenerational farm business succession in Japan. In: Baker, J.R., Lobley, M. and Whitehead, I. (eds) *Keeping it in the Family: International Perspectives on Succession and Retirement on Family Farms*, London. Ebgland, pp. 55–73.

Unakıtan G, Başaran B (2018). A Suggestion for the success of the young farmer project: Young Farmer Cooperatives. *Balkan and Near Eastern Journal of Social Sciences* 04: 149-157.

Weir S (1999). The effects of education on farmer productivity in rural Ethiopia. Centre for the Study of African Economies Working Paper no. WPS/99–7, Oxford University, Oxford.

Wikipedia (2021). Available at: https://en.wikipedia.org/wiki/Turkish_lira (access date: 11.01.2024).

Zagata L, Sutherland LA (2015). Deconstructing the 'young farmer problem in Europe': Towards a research agenda. *Journal of Rural Studies* 38: 39-51.