STRATEGIES AND DRIVERS DETERMINING THE INCORPORATION OF YOUNG FARMERS INTO THE LIVESTOCK SECTOR

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ABSTRACT

The aim of this work was to identify the drivers that determine the process of incorporation of young farmers into the livestock sector, as well as to characterize the strategies young people implement to do so. The data were obtained through direct semi-structured interviews to young farmers in Catalonia, Spain (n = 82). A combination of principal component analysis and Cluster Analysis was conducted to identify the three main groups of strategies followed by young farmers: (i) taking advantage of the family tradition; (ii) the adoption of agroecological management; and (iii) the vertical integration with a mother company. In addition, the results also point the fact that the existence of these three main groups of strategies is determined by the differentiated exposure to the following drivers: (i) the existence of an agrarian tradition in the family; (ii) the existence of a desire to experience a change in lifestyle by the young farmer; (iii) the degree of agricultural professional training and knowledge available; (iv) the capacity and/or willingness to respond to the new demands emerging in society on rural areas and livestock farming in particular; (v) the capacity and/or willingness to implement innovative strategies; (vi) the presence and relevance of women in the livestock farm; (vii) the desired degree of self-management and autonomy in decision making by the young farmer; and finally (viii) the capacity and/or willingness to make the required paperwork to have access to the available aid programs. The existence of this multiplicity of strategies due to the existence of multiple drivers indicate the complex nature of the process of incorporation of young livestock farmers. Also, the identified drivers reveal the different domains where actions should be implemented to effectively address the incorporation of the youths into the livestock sector and thus, in addition, contribute to avoid the depopulation of rural areas and the unwanted consequences this entails.

Keywords: generational replacement, farm typology, agroecology, vertical integration, pastoralism, new peasantry

1. INTRODUCTION

The lack of generational replacement in rural areas and particularly in the livestock farming sector in Europe is dramatic. While the total number of livestock farmers dropped from 14.5 to 10.7 million between 2005 and 2013 (EU-27); the number livestock farmers under 44 year-old dropped from 3.3 million to 2.3 million during the same period (TCE, 2017). In particular, in the case of Spain, the percentage of young livestock farmers decreased from 21% to 16% between 2007 and 2013, being it lower than the EU average (20%). The trend of land and/or livestock farming abandonment is dramatic (Terres et al., 2013; Corbelle-Rico and Crecente-Maseda, 2014). The consequences of it go beyond the lack of continuity in rural population, but comprise acute effects in terms of landscape alterations and loss of cultural landscapes, reduction of biodiversity and loss of traditional ecological knowledge (Fernández-Giménez and Fillat, 2012; Borec et al., 2013; Bassi et al., 2014; Moragues-Faus, 2014; Bertoni and Cavicchioli, 2016).

Rural Europe and the livestock sector in particular are undergoing numerous transformations, which are affecting the economic, ecological and social viability of the sector, and are forcing livestock farmers to develop specific strategies to secure their sustainability. The transformations occurring, as identified in the specialized literature, comprise the following trends: (i) increasing market globalization (EC/COM, 2011; Cheshire & Woods, 2013; Sandu & Mantea, 2017; FAO, 2017); (ii) changes in international policies, such as the Common Agricultural Policy (Keenleyside & Tucker, 2010; Swinnen et al., 2013; Bartolini and Viaggi, 2013); (iii) emergence of new social demands driven by new emerging sensibilities, regarding environmental awareness (Milne, 2005; Stock & Forney, 2014; Morgan et al. 2010), animal welfare (Hocquette & Chatellier, 2011; Jacques, 2014; Eurobarometer, 2010; Terres et al. 2013) or organic production (Sundrum, 2001; Ronchi & Nardone, 2003; Borell & S, 2004; Eurobarometer, 2010; Toro-Mujica et al., 2011); and (iv) stagnation of meat demand with increasing public demand for food safety and food quality (Delgado et al., 2001; EU SCAR, 2013; FAO, 2017; Salmon et al., 2018). These multiple transformations are increasingly polarizing the strategies encountered within the livestock farming sector. Thus, while some farmers tend to intensify further the production system with capital to increase production, reduce costs per unit produced and to enhance market access; others tend to make their management more and more extensive (employing less and less inputs per land area) to take advantage of natural resources and obtain local products from native breeds. While the latter tend to be the case of sheep, horse, goat or cattle farmers located in regions far away from city centers; the formers tend to be cattle farmers and particularly pig producers of the lowlands. The latter is particularly the case of small farms and those located in marginal regions, comprising both traditional operations and new-peasantry operations (Corsi, 2006; van der Ploeg, 2008; Lobley, 2010; López-i-Gelats et al., 2015; Bertoni & Cavicchioli, 2016; Milone and Ventura, 2019). The increasingly polarized strategies that can be observed within the livestock farming sector, comprising both intensification and extensification – abandonment in the extreme case, pose additional threats for biodiversity and cultural heritage conservation and the provision of high-quality animal based food products and services (Belletti, et al., 2003; Zasada, 2011; Borec et al., 2013; Bertoni and Cavicchioli, 2016; Joosse and Grubbström, 2017). It also threatens to uproot a great number of families from their farms and rural environments (Grubbström, 2011; Wheeler et al., 2012; Cheshire and Woods, 2013; Corbelle-Rico & Crecente-Maseda, 2014). Thus, all these trends are not only threatening the viability of numerous livestock farms and forcing the rest to adapt, but they are hindering the process of incorporation of young people into livestock farming (Corbelle-Rico & Crecente-Maseda, 2014; Banovic et al., 2015; Dreby et al., 2017). In fact, dramatic ageing is one of the fundamental characteristics of the livestock sector in the last decades in Europe (Eurostat, 2014; Eurostat, 2016).

The ageing of the agrarian population makes it difficult for the European livestock sector to cope with all the transformations pointed above. In fact, some authors point that rejuvenating the agrarian population would provide the livestock sector greater dynamism, flexibility and adaptability (Tuyttens et al., 2008; Grubbström et al., 2014; Sánchez-Zamora et al., 2014). However, the young people trying to incorporate into the livestock sector find themselves in front of numerous obstacles. As shown below, according to the specialized literature, these obstacles depend on the following drivers: (i) the fact of belonging to an agrarian family; (ii) the economic context and the influence of it on urban and rural unemployment rates and the opportunity costs of labor for livestock farms; (iii) the increased importance of the service sector in the rural economies and the emergence of new demands from the consumer sides, with rising interest in organic food and animal welfarism; (iv) the economic globalization and the structural disadvantages of extensive livestock farms; (v) the changes in land use and ownership; (vi) the changing role of women in the farms; and finally (vi) the changes in the availability of the aids available for young farmers.

The fact of belonging to an agrarian family is crucial since from this condition it depends whether the young farmers in process of incorporation have at their disposal or not a set of fundamental assets, such as land, machinery, livestock and even knowledge and social network (Joosse and Grubbström, 2017; Banovic et al., 2015; Kontogeorgos et al. 2014; Góngora et al. 2019). Another crucial driver is the economic context in which the livestock activity is inserted and its implications concerning the labor market, since the labor available for livestock farms strongly determines their viability (Grubbström and Sooväli-Sepping, 2012; Moragues-Faus, 2014). The influence of the economic context was made evident during the recent economic crisis in Spain, where the rise in the unemployment rate in urban areas triggered that some young people increasingly see rural regions and livestock activities in particular as feasible alternatives for residence and work respectively (Sánchez-Zamora et al., 2014). In line with the importance of the economic context, the emergence of new demands on rural regions and livestock farming in particular that is taking place in conjunction with the increasing importance of the service sector in rural economies is fostering the cohabitation of livestock farming with other activities and expectations, such as landscape and biodiversity conservation or animal welfare. This forces livestock farming to both compete with other economic activities for resources, such as land and labor, and redefine the traditional expectations livestock farming used to satisfy, fundamentally meat production (Delgado et al., 2001; Viladomiu et al., 2002; López-i-Gelats et al., 2009; Phillips, 2005; Sutherland, 2012). But also, it has been a source of new working force and innovations through the 'new peasantry' movement (van de Ploeg, 2008; Holt-Giménez, 2011). There is a dramatic increase in demand by consumers for leisure and environmental services in rural areas, and for an increase in livestock production that adheres to animal welfare and organic production regulations (López-i-Gelats et al., 2009; EC/COM, 2010; Zasada, 2011; Tropea, 2014). In addition, the increasing exposure to a globalized and increasingly competitive market has pushed livestock farms to seek higher levels of productivity, encouraging farmers to concentrate their productive activities in the most fertile and accessible lands. This implies that those farms with few investments and more unfavorable conditions, which are those that tend to be located in mountain and marginal regions, see their viability seriously threatened, due to the competitive disadvantage their location entails – e.g. fragile ecosystems, low population density, long distances from economic centers, harsh climate conditions, and lack of public infrastructure and services (Garcia-Ruiz et al., 1996; Marín-Yaseli and Martínez, 2003; Madruga-Andreu et al., 2011). Land abandonment has thus been one of the most evident consequences of the recent transformations in the socioeconomic domains in rural areas. It triggered notable changes in the land use and ownership (Garcia-Ruiz et al., 1996; Marín-Yaseli and Martínez, 2003; López-i-Gelats, 2013; Terres et al., 2013; Corbelle-Rico and Crecente-Maseda, 2014), which in some occasions also ended up in the occurrence of the phenomenon of land grabbing (Kontogeorgos et al., 2014; Leonard et al., 2017). Another increasingly relevant driver is the changing role of women, particularly in family farms (Grubbström and Sooväli-Sepping, 2012; Brandth, 2002; Riley, 2012). The number of women performing as the leading person of the livestock farm is increasing. Also, the farm management of woman-led livestock farm seem to more prone to adopt innovative strategies. Finally, it is also relevant to mention the fact that in the last years the number and nature of the existing aid programs to accompany both the process of incorporation of young people into the livestock sector and the process of retirement have been changing (Mishra & El-osta, 2007; Bournaris et al., 2014; Leonard et al., 2017).

In view of all this, we hypothesized that the combined effect of the resources available by the young livestock farmers with specific exposure to these drivers determines the strategies followed by them to incorporate the livestock sector, which in general terms seem to consist of either further intensification or further extensification – entailing land abandonment in extreme cases. We believe that multiple situations occur that make different sets of strategies becoming more effective in different conditions. A clear identification of the multiple strategies being developed by young farmers, beyond the general

groups of further intensification or extensive management, is thus relevant to better comprehend the phenomenon. The objective here is to identify the different groups of strategies that young people are following to better guarantee their incorporation into the livestock sector and the key drivers that determine these strategies. To this end, we established a farm typology to identify the main groups of strategies young farmers employ. This method has been largely employed to characterize farms according to their structural and technological characteristics, as well as to examine their sustainability, through similarities and differences between groups of farms and the trajectories followed by them in particular conditions (Milán et al., 2006; Riedel et al., 2007; Gaspar et al., 2008; Milán et al., 2011; López-i-Gelats et al., 2011; López-i-Gelats et al., 2016). This method has not been used before to identify the multiple strategies young farmers are implementing to secure their incorporation into the livestock sector.

2. MATERIALS AND METHODS

Study area

The study was carried out in the region of Catalonia (Figure 1). This region covers 32,000 km^2 in Northeastern Spain, with a population slightly over 7,000,000 inhabitants. Rural regions comprise 88% of the total area of Catalonia (more than half of it being mountains), 34% of the population and 79% of all municipalities (PDR, 2014).

The rural population of Catalonia has been increasing since the 1990s, mainly due to the productive diversification of rural areas (Viladomiu et al., 2010), which has led to the increased importance of the service sector in rural economies, and to the emergence of new interests and expectations, such as rural tourism, landscape preservation or animal welfare (López-i-Gelats et al., 2009). Most of the rural population concentrates in municipalities with more than 5,000 inhabitants, while the smaller municipalities greatly suffer from depopulation (DARP, 2014). This is closely related to the abandonment of less mechanized and traditional livestock farms, mainly characterized by extensive management of sheep and goats (López-i-Gelats et al., 2015), the scarcity of young farmers under 35 years of age (4.8%), and a high proportion of farmers over 55 years old (61.5%), which translates into a livestock sector with a high rate of aging (MAPAMA, 2016).

The abandonment of livestock activities is reflected both in the reduction of labor and number of farms. The workforce of livestock farms decreased from 72,253 to 56,045 Annual Work Units (AWU) in the period 2003-2013. This represents an annual decrease rate of 2.2%. In the same period, the number of livestock farms decreased from 15,282 to 12,078, a decrease of 2% every year (MAPAMA, 2017). That is, 320 livestock farms are disappearing annually. This decrease in the number of livestock farms affected mainly farms in the range of 10 to <20 ha (-14.7%), and 20 to <50 ha (-9.3%). An opposite trend was observed in the ranges of 50 to <100 ha (+ 17.7%) and 100 to <200 (1.4%). As also observed in other regions, small farms are becoming extinct and those that survive are getting larger and intensifying through the employment of more and more inputs per area (Mishra and El-Osta, 2008; Terres, 2013; Corbelle-Rico and Crecente-Maseda, 2014; Zagata and Sutherland, 2015), being the latter cattle and particulary pig production. This concentration of land goes in line with the moderate increase in the total livestock units recorded in Catalonia in the same period (1.7%) (Idescat, 2013). The livestock sector in Catalonia is thus now being characterized by the phenomenon of polarization. That is, a sector with little mechanized family livestock farms located in marginal regions becoming more vulnerable, and an apparently flourishing sector of landless and industrial enterprises, mostly devoted to raising monogastric livestock based on a system of vertical integration with large companies – mainly pig production.

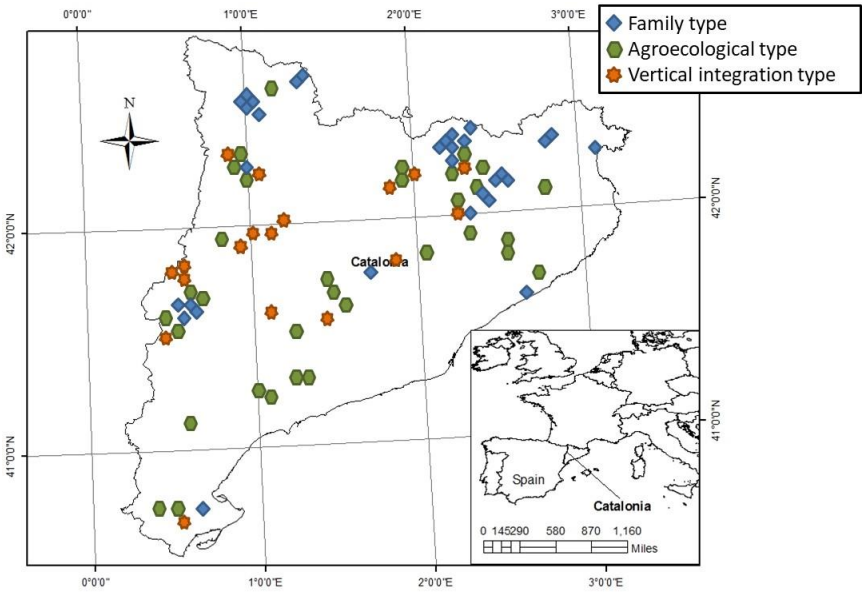


Figure 1. Geographical location of surveyed farms in the study area: Catalonia (Spain)

The role policy measures play in the process of incorporation of young farmers into the livestock sector is relevant. In particular, in Catalonia there exists an aid specifically devoted to facilitate the incorporation of young people with adequate professional skills into viable farms. Financed through the European Agricultural Fund for Rural Development and promoted by the Rural Development Program (PDR) of Catalonia (MAPAMA, 2013). The following are the requirements to get this subsidy: between 18 and 40 years old; owner of the farm for the first time with a minimum contribution of 0.5 Annual Working Units; completion of a planned training itinerary or commitment to do so within two years; a business plan certifying the viability of the enterprise that must be applied within 9 months after receiving the aid. The aid consists of a base premium of around 20,000 €, which can be increase considering several elements, such as location in a region with natural limitations, presence of hired labor, etc. In any case the total amount received cannot exceed 70,000 €. The aid is effective in two stages, 50% at the beginning and the other 50% in two years. The fact of becoming a beneficiary of this subsidy entails the commitment of performing this activity at least for the next 5 years. In addition to the monetary aid, there is also an accompanying program, which consists of technical advice by specialists during the first two years of the implementation of the business plan.

Data Collection and Analysis

To identify both the different groups of strategies employed by young people trying to incorporate the livestock sector in Catalonia and the main drivers that either facilitates or make more difficult this process, semi-structured interviews were conducted between January and August 2016 to young livestock farmers. The following were the two criteria used to define the sample under consideration: (i) incorporation into a livestock farm in the period 2009-2013; and (ii) currently being working in the livestock farm. The regional government provided the information of all young farmers who met the criteria. Thus from a total of 296 farmers a final random sample of 82 young livestock farmers was selected and surveyed, comprising 27.7% of the total population, with a sample error of ± 8.5% at a confidence level of 95%. The interviews lasted 45 to 60 minutes and were conducted face to face with the owners of the farms, taking notes on the interview card. The previous questionnaire included 49 questions, of which 33 were open questions and 16 closed-ended questions, on the most important aspects of livestock production and commercialization, namely: territorial base and land tenure, livestock

composition and breed, degree of technification of the livestock farm, distribution between family and wage labor, type of commercialization and income diversification. The interview was also thought to examine the characteristics of the young person, specifically their motivations and the process of incorporation into the livestock sector, the training and education received, the aids and subsidies gained, their access to credit, innovations made or in process, problems and/or barriers faced by the young farmer, and finally perspectives for the future.

The data obtained from the interviews were organized into a set of quantitative (15) and categorical (22) variables. Table 1 describes the different quantitative variables and the seven indices generated (ordinal variables) from the qualitative variables, following what has already been done by other authors (Riedel et al., 2007; López-i-Gelats et al., 2019). All these variables were analyzed, first, using descriptive statistical analysis, to identify the main characteristics of the livestock farms. A Principal Component Analysis (PCA) was then carried out to analyze the relationships between variables and to reduce their number to a few independent components that account a significant percentage of variance. A Varimax rotation was carried out to facilitate the interpretation of the components. The components thus finally selected (those with an eigenvalue greater than 1) were subjected to a cluster analysis in order to group the livestock farms into different types representing the different paths and strategies followed by young livestock farmers. When the correlation coefficient between variables was equal to or greater than 0.7, the variable with the smallest correlation coefficient was removed (Ter Braak, 1986). With regard to the cluster analysis, a hierarchical conglomerate analysis was performed to classify the farms into different types according to their homogeneity using the first six components obtained in the PCA (71.7% of the variance). This analysis differentiates and groups the farms according to their homogeneity using Euclidean distance (Hair et al., 2010). Eight qualitative variables were also included to help in the interpretation and description of the typologies, namely: type of farm, access to land, reasons for incorporation, agricultural experience, level of study, commercialization, barriers to incorporation and problems faced during the start-up of the project (Table 1). The differences between the identified livestock farm types were examined by ANOVA, using the Student-Newman-Keuls test to compare the means. In the case of the qualitative variables, contingency tables were created to analyze the differences using a Pearson Chi-square test. All statistical analyzes were performed with the software package SPAD (version 5.6) (SPAD 5.5, 1996). It should be noted that this method is commonly used to identify characteristics and establish typologies of agricultural enterprises (Milán et al., 2006; Riedel et al., 2007; Gaspar et al., 2008; López-i-Gelats et al., 2011; López-i-Gelats et al., 2016).

Table 1. Description of the variables used to characterize the different types of livestock farms.

Variables	Description
Age	Age in years of the young livestock farmer
UAA	Utilized Agricultural Area. Total of land tilled or employed as permanent pasture (ha)
OUAA	Owned UAA (%)
PPCA	Percentage of Cultivated Area (Cultivated area/UAA)
LUMT	Meat cows (livestock units)
LUMK	Milk cows (livestock units)
LUGT	Goats (livestock units)
LUSP	Sheep (livestock units)
LUP	Porcine (livestock units)
AWU	Total Annual Work Units available in the farm
AWUF	Percentage of Annual Work Units of family members available in the farm (Family AWU/Total AWU)

IAT	The **Training index** measures the training and education received by the young people incorporating into the livestock sector and their interest in continuing to acquire it. The index values range from 0 to 5. The following are the items it includes: university education in related areas, such as veterinary science, agronomy or biology (3); agricultural professional training (2); medium-level professional training (1); payment for some other type of professional training (1); and consultation of sources of agricultural information (1). In brackets the index scores.
IFA	The **Index of family ties to agriculture** measures the extent to which the young livestock farmer has family ties to farming. The index values range from 0 to 5. The items it comprises are: multi-generation (1) or second-generation livestock farm (0.5); land belonging to the family at the time of incorporation (1); previous work on the family farm (1); having been in charge of decision-making within the farm (1); proportion of family labor (100%=1).
IAV	The **Agroecological vision and operation index** measures the degree of implementation of agroecological practices in the farm. The index values range from 0 to 3. The items considered are: the use of a mixed farming system, with different livestock species, crops and trees (1); generation of added value through transformation (1); use of short commercialization channels or direct sales (1).
IEM	The **Index of application of environmental measures** the degree of acceptance and implementation of the agro-environmental measures of the EU Common Agricultural Policy. The index values range from 0 to 10. The measures it comprises are: sustainable management of wetlands (1); management and recovery of cut meadows (1); improvement of the steppe habitats of the network Natura 2000 (1); beekeeping for the improvement of biodiversity (1); use of alternatives to chemical control of insect pests (1); conservation of autochthonous breeds (1); and management of fertilization and cultivated biodiversity (1) (OJEU, 2013).
ISC	The **Social capital index** measures the network of social, economic and/or institutional actors with who the young farmer counts for support and advice. The index values range from 0 to 4.5. The items it includes are: communication with previous owners (1); membership in an association or producers' cooperative (1); communication with young people working in the livestock sector in the same area (1); contact with local government institutions and consultation with institutions (1).
ISM	The **Self-management index** measures the degree of autonomy of the young farmer. The index values range from 0 to 6. The items it includes are: proportion of land owned (100%=1); percentage of income from subsidies less than 30% (1), proportion of family labor is higher than hired labor (1); self-sufficiency in the availability of feed for livestock (1); the commercialization of the main product is carried out through short channels or direct sales (1); It hasn't credit debt (1).
ICI	The **Composite innovation index** measures the effort devoted to innovation by the young farmer. The index values range from 0 to 10. The items it comprises are: adoption of innovation (use of technical and financial analysis software = 0.5, use of ICTs = 0.5), and innovations in different areas of the production process, infrastructure and commercialization (reproductive management = 1.5, Feed = 1.5, Product = 2, Marketing = 1, Environment = 1, Infrastructure = 1).), and continuous innovation (purchase of machinery for productive or transformation processes =1).

3. RESULTS

3.1. General characteristics of the young farmers in process of incorporation

As regards the whole of the sample, the great majority of the young farmers in process of incorporation are male (81.8%), with an average age of 31.2 years old (Table 2). Most of these young

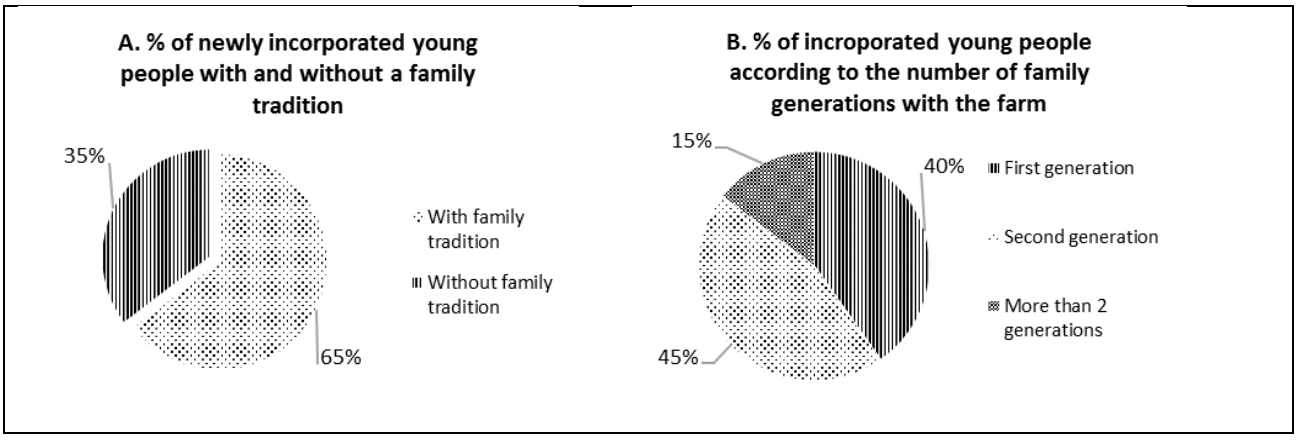
people come from agrarian families (64.6%). However, more than a third are young people without any farming background in the family (Figure 2, A). The type of livestock farm through which young people get into the sector are first-generation farms (owned by new livestock farmers) in 40.2% of the cases, second-generation farms in 45.1%, and multi-generation farms in only 14.6% of the cases (Figure 2, B). Land access is largely associated with the availability of land in the family context. Young livestock farmers in Catalonia gain access to land ownership fundamentally through inheritance (51.2%), which may involve only the transfer of property, or a programmed process of succession and management of a family company. Of the participants in the present study, 23.2% entered the livestock sector with land leased from third parties (Figure 2, C), a result of the limited availability of land and its high price. For these reasons, having family farming tradition (30.5%) and having land (19.5%) are the main incentives for young people to enter the livestock sector. In some of them, there is a sense of duty that compels them to take care of the family land and preserve it for future generations. Drivers such as having agricultural training (17.1%), having recently looked for employment in a context of economic crisis (15.9%) and the search for a change in lifestyle (7.3%) are other motivations, identified by young people that impel them towards the livestock sector (Figure 2, D). More than 60% of the young people interviewed have went through professional training, of which 47.6% consists of higher agricultural education and 14.6% of university studies, mainly in biology, agronomy and veterinary medicine (Figure 2, E). This training is complemented by agricultural experience in 80.5% of the cases, mainly in the family livestock farm or in other livestock companies. The percentage of young people without previous practical experience is low (12.2%) (Figure 2, F). We observed also that 60.0% of the participants in the study have invested resources in acquiring formal education. However, 37.0% of respondents admitted having difficulty accessing training and education, the main problem being the need to travel from the farm or house to the training center. In this context, virtual training is becoming increasingly important, with an important share of respondents (30.5%) reporting using e-learning services and internet discussion forums (23.2%) to acquire new knowledge. This type of training is complemented with queries for information to Agricultural Training Schools (24.4%), which were designed to provide mainly agricultural training, and are financed by the government. The respondents also consult technical assistance services (24.4%) and, especially, other producers (30.5%) (Figure 2 G and H).

The economic viability of a livestock farm is vital for the successful incorporation of young people, as other authors have observed (Inwood and Sharp, 2012; Davis et al., 2013; Terres et al., 2015). In the struggle to guarantee the viability of a livestock farm, the subsidies granted to young people to help them in the incorporation process, as well as the diversification and commercialization alternatives provided by the government, are seen as playing a very important role. The economic aid granted to young people to support them in the incorporation process is mainly invested in the purchase of animals (34.1%), either to increase the productivity of the farm or just to increase the number of animals; it is also invested in construction or infrastructure upgrades (29.3%) related to animal welfare and to making labor more efficient. In 17.1% of the cases, the aid is used to purchase land (Figure 3, A). A total of 64.6% of the young people interviewed here complemented this economic aid with their own resources (Table 3) and 51.2% with bank financing. These results highlight the importance of incorporation aid as a key investment and planning resource for livestock farms. However, only 57.3% of the young people interviewed rated this aid as positive factor; the rest of them rated as between fair and bad (42.7%) (Table 4). That is, even though it provides important economic support, incorporation does not tend to be well regarded by young people, probably because of the bureaucratic hurdles they need to overcome to obtain it.

Table 2. Quantitative variables that characterize the three types of livestock farms identified among young farmers in process of incorporation in Catalonia (Average values).

Quantitative variables	Family (n=31)	Agroecological (n=33)	Vertical integration (n=18)	Overall Percent
General data				
Age (years)	32.7[a]	32.1[a]	27.1[b]	31.2
Year of incorporation	4.1	3.7	4.1	3.9
Female incorporation	16.1 [a]	24.2 [a]	11.1 [a]	18.3
Livestock resources				
UAA[1] (ha)	85.3[a]	12.3[b]	2.1[b]	37.7
Owned UAA (%)	90.0[a]	60.4[b]	28.0[c]	64.5
Proportion of cultivated area (%)	75.4[a]	74.4[a]	100,0[b]	80.4
LU[2] Bovine Meat	130.5[a]	14.8[b]	0.0[b]	55.3
LU Bovine Milk	55.3[a]	0.0[b]	0.0[b]	20.9
LU Goats	0.3[a]	3.7[b]	0.0[a]	1.6
LU Sheep	0.5[a]	6.4[b]	0.0[a]	2.8
LU Pigs	0.0[a]	0.0[a]	77.2[b]	16.9
Total AWU	3.3[a]	2.4[b]	1.7[c]	2.4
Family AWU	2.5[a]	1.6[b]	1.4[b]	1.9
Income				
Income from sale of animals (%)	88.7[a]	91.0[a]	93.4[a]	91.0
Income from subsidies (%)	22.6[a]	28.9[a]	27.8[a]	25.9
Indexes				
Agricultural training index (IAT)	3.5[a]	3.6[a]	2.9[b]	3.4
Index of family ties to agriculture (IFA)	4.2[a]	1.9[b]	1.7[b]	2.7
Agroecological vision and operation index (IAV)	0.9[a]	1.5[b]	0.1[c]	0.9
Index of environmental measures (IEM)	4.0[a]	2.7[b]	2.0[b]	3.1
Social capital index (ISC)	3.0[a]	2.8[a]	2.1[b]	2.7
Self-management index (ISM)	4.0[a]	2.8[b]	1.4[c]	2.9
Composite innovation index (ICI)	3.6[a]	2.9[a,b]	1.7[b]	2.9

[1]UAA .Useful Agricultural Land
[2]LU Livestock Units
Different letters in the same row indicate significant differences ($p<0.05$).



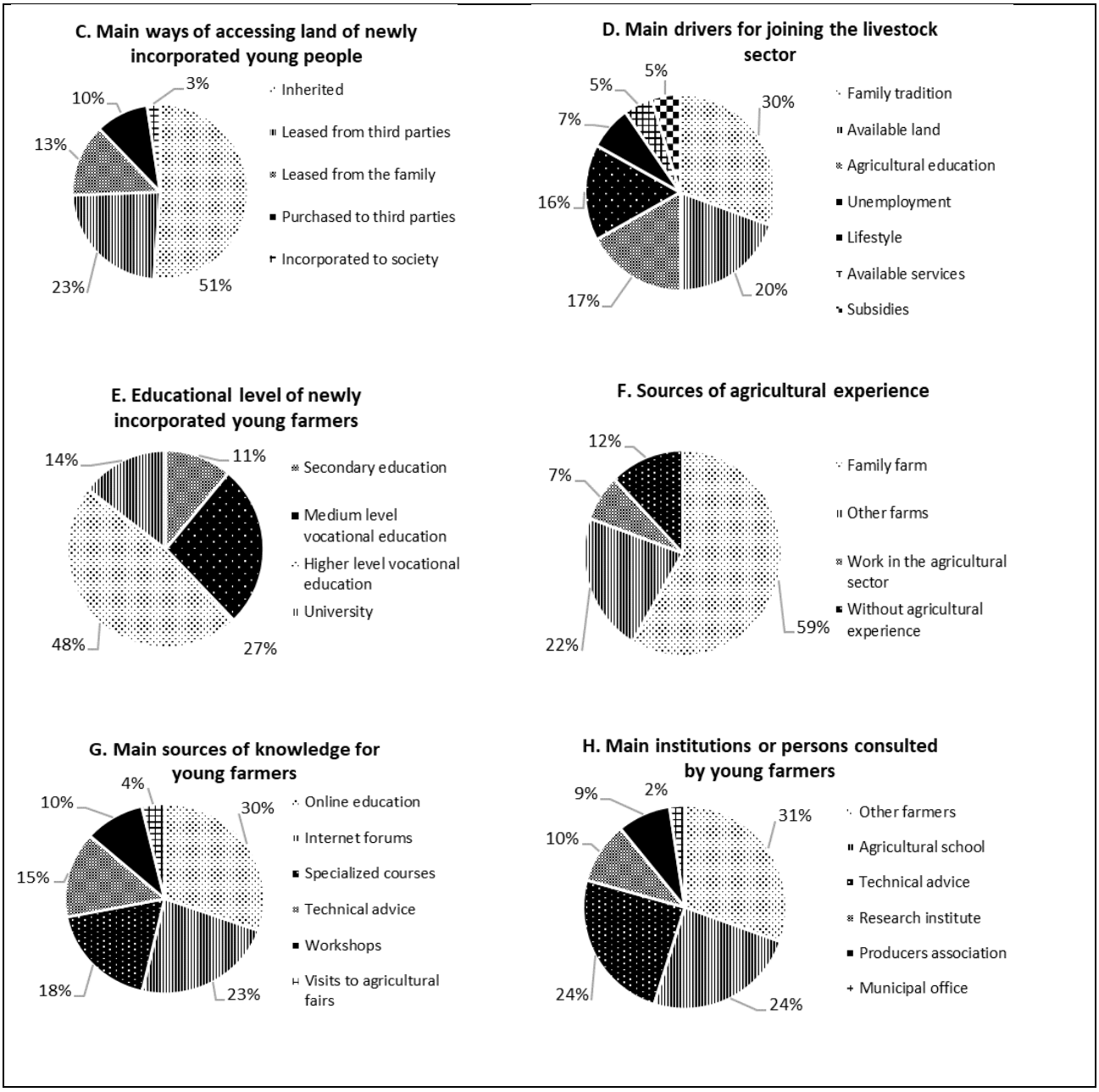


Figure 2. Relevant attributes of the young farmers in process of incorporation into the livestock sector in Catalonia

Diversification is a very common practice among Catalan young livestock farmers, despite the fact that secondary activities only contribute on average to 9.0% of the farm revenues, compared with the main activities (sale of animals, meat, milk and other products), which generate 91.0% of the revenues. Diversification activities are mainly aimed at developing agricultural alternatives (45.1%), and less so at non-farming economic activities, such as rural tourism or agritourism (6.1%). The remaining young farmers interviewed have not implemented diversification strategies yet (Figure 3, B), possibly due to the innovation, organization and knowledge they require, which are often considered more limiting than traditional production factors, such as land, labor and capital (Esparcia, 2014).

As a primary activity, livestock farming suffers from a disconnection between the farmer and the consumer, a relationship that is mediated by the markets and the food production chain. This disconnection exists due to the complexity, ambiguity and dynamism of the food production chain (Curry et al., 2002; Wilkie, 2005), a situation that has led to ignorance and a negative evaluation of the work of the livestock farmer, which is the production of meat and milk. In recent years, this trend is being reversed; primary production is being reevaluated, in part due to the positive perception by young people (36.6%) about farming activities. This is possibly associated with the increasing popularity of healthy habits and the value given to the origin of food products (Sánchez-Zamora et al., 2014), which has brought producers to the attention of consumers. The media has also played a role by promoting rural life (Phillips et al., 2001), rural products and the way they are produced, which has fitted well with the professionalization of the sector and the participation of young people (Bournaris et al., 2016).

Table 3. Qualitative variables that characterize the three types of livestock farms identified among young farmers in process of incorporation in Catalonia (Percentage of farms belonging to each type).

Qualitative variables	Categories	Family (n=31)	Agroecolo -gical (n=33)	Vertical integration (n=18)	Overall Percent
Type of farm	Family	93.5[a]	45.5[b]	50.0[b]	64.6
	Not family	6.4[a]	54,5[b]	50,0[b]	35.4
Generations on the farm	First generation	12.9[a]	54.5[b]	61.1[b]	40.2
	Second generation	64.5[a]	30.3[b]	38.9[a,b]	45.1
	Multi-generational	22.6[a]	15,1[b]	0,0[b]	14.6
Access to land	Inherited	87.1[a]	36.4[b]	16.7[b]	51.2
	Lease from family	6.5[a]	9.1[a,b]	33.3[b]	13.4
	Lease from third parties	0.0[a]	30.3[b]	50.0[b]	23.2
	Purchased from third parties	3.2[a]	21.2[a]	0.0[a]	9.8
	Incorporated into society	3.2[a]	3.0[a]	0.0[a]	2.4
Reason for incorporation	Family tradition	54.8[a]	18.2[b]	11.1[b]	30.5
	Land available	19.4[a]	21.2[a]	16.7[a]	19.5
	Agricultural training	9.7 [a]	21.2 [a]	22.2 [a]	17.1
	Unemployment	0.0[a]	21.2[b]	33.3[b]	15.9
	Lifestyle	0.0[a]	18.2[b]	0.0[a]	7.3
	Available services	12.9[a]	0.0[a]	0.0[a]	4.9
	Subsidies	3.2[a,b]	0.0[b]	16.7[a]	4.9
Agricultural experience	Family farm	83.9[a]	42.4[b]	44.4[b]	58.5
	Other type of farm	12.9[a]	30.3[a]	22.2[b]	22.0
	Work in the agricultural sector	0.0[a]	18.2[b]	0.0[a]	7.3
	Without agricultural experience	3.2[a]	9.1[a,b]	33,3[b]	12.2
Who makes the decisions	Incorporated young person	12.9[a]	69.7[b]	66.7[b]	47.6
	Young person and father	45.2[a]	15.2[b]	27.8[a,b]	29.3
	Family consensus	35.5[a]	6.1[b]	5.6[a,b]	17.1
	Society	6.5[a]	9.1[a]	0.0[a]	6.1
Educational level	Secondary education	3.2[a]	0.0[a]	44.4[b]	11.0
	Middle VT[1]	35.5[a]	18.2[a]	27.8[a]	26.8
	Higher VT	48.4[a]	57.6[a]	27.8[a]	47.6
	University education	12.9	24.2	0.0	14.6
Source of knowledge	Technical advice	12.9[a]	0.0[a]	44.4[b]	14.6
	Visits to agricultural fairs	9.7[a]	0.0[a]	0.0[a]	3.7

	Specialized courses	22.6[a]	12.1[a]	22.2[a]	18.3
	Workshops	12.9[a,b]	0.0[b]	22.2[a]	9.8
	Internet forums	12.9[a]	45.4[b]	0.0[a]	23.2
	Online training	29.0[a]	42.4[a]	11.1[a]	30.5
Networking with other young people	Yes	67.7[a]	100.0[b]	50.0[a]	76.8
Investment of aid	Land	12.9[a,b]	30.3[b]	0.0[a]	17.1
	Infrastructure	25.8[a]	15.1[a]	61.1[b]	29.3
	Machinery and equipment	19.4[a]	9.1[a]	0.0[a]	11.0
	Animals	41.9[a]	45.4[a]	0.0[b]	34.1
	Rent payment	0.0[a]	0.0[a]	22.2[a]	4.9
	Payment of bureaucratic procedures	0.0[a]	0.0[a]	16.7[b]	3.7
Investments made with own resources	Yes	93.5[a]	45.4[b]	50.0[b]	64,6
Diversification	Agricultural activities	48.4[a]	42.4[a]	44.4[a]	45.1
	Non-agricultural activities	6.5[a]	9.1[a]	0.0[a]	6.1
Commercialization	Intermediary	51.6[a]	57.6[a]	100.0[b]	64.6
	Direct or local sales	48.4[a]	33.3[a]	0.0[b]	31.7
	Specialized channels	0.0[a]	9.1[a]	0.0[a]	3.7
Purchase/sale contract	Yes	93.5[a]	45.4[b]	100.0[a]	64.6
Product promotion	Agricultural Cooperative	38.7[a]	12.1[b]	0.0[b]	19.5
	Electronic media	22.6[a,b]	30.3[b]	0.0[a]	20.7
	None	38.7[a]	57.6[a]	100.0[b]	59.8

Different letters in the same row indicate significant differences ($p<0.05$).
[1]*VT Vocational training*

Concerning commercialization, the use of intermediaries is the most common practice among the interviewees (64.6%). However, direct sales also play a significant role (31.7%). In much smaller proportion, some interviewees use retail distribution or specialized local retailers (3.7%) (Figure 3, C). While direct sales do not require a product brand, it is advisable to have one when selling to retailers. Young people using brands identify their products underlining the following attributes: an autochthonous breed (12.2%), their own brand (9.8%), an organic production brand (3.7%) or artisanal production (2.4%) label. The remaining 72.0% do not use any specific brand or identification for their products (Figure 3, D). Concerning commercialization, 20.7% employ electronic means and 19.5% make use of consumer cooperative; the rest sell their products by establishing agreements with intermediaries or by selling directly to retail companies (Table 3).

The process of incorporation into the livestock sector as described by Monllor (2013) consists of a planning phase in which the young person gathers information and makes the decision to join or not a livestock farm, and a subsequent incorporation phase in which the young person already incorporated starts working and redefines his project. In both phases, young people encounter significant barriers. The young farmers interviewed here identified the following obstacles in the planning phase: excessive bureaucratic paperwork (26.8%), limited availability of and limited access to land (22.0%), restricted access to credit (15.9%) and little access to subsidies (15.9%). It is worth noting that young people identify bureaucracy as their main problem, not the limited access to land (Figure 4, A). In the incorporation stage, the following were the barriers identified: late delivery of subsidies (31.7%); too much complexity of the bureaucratic procedures to obtain the required permits to perform conventional livestock activities (28.0%); lack of specialized extension service (20.7%), especially with respect to new productive

activities, such as agroecology or organic production and limited availability of labor (14.6%) (Figure 4, B).

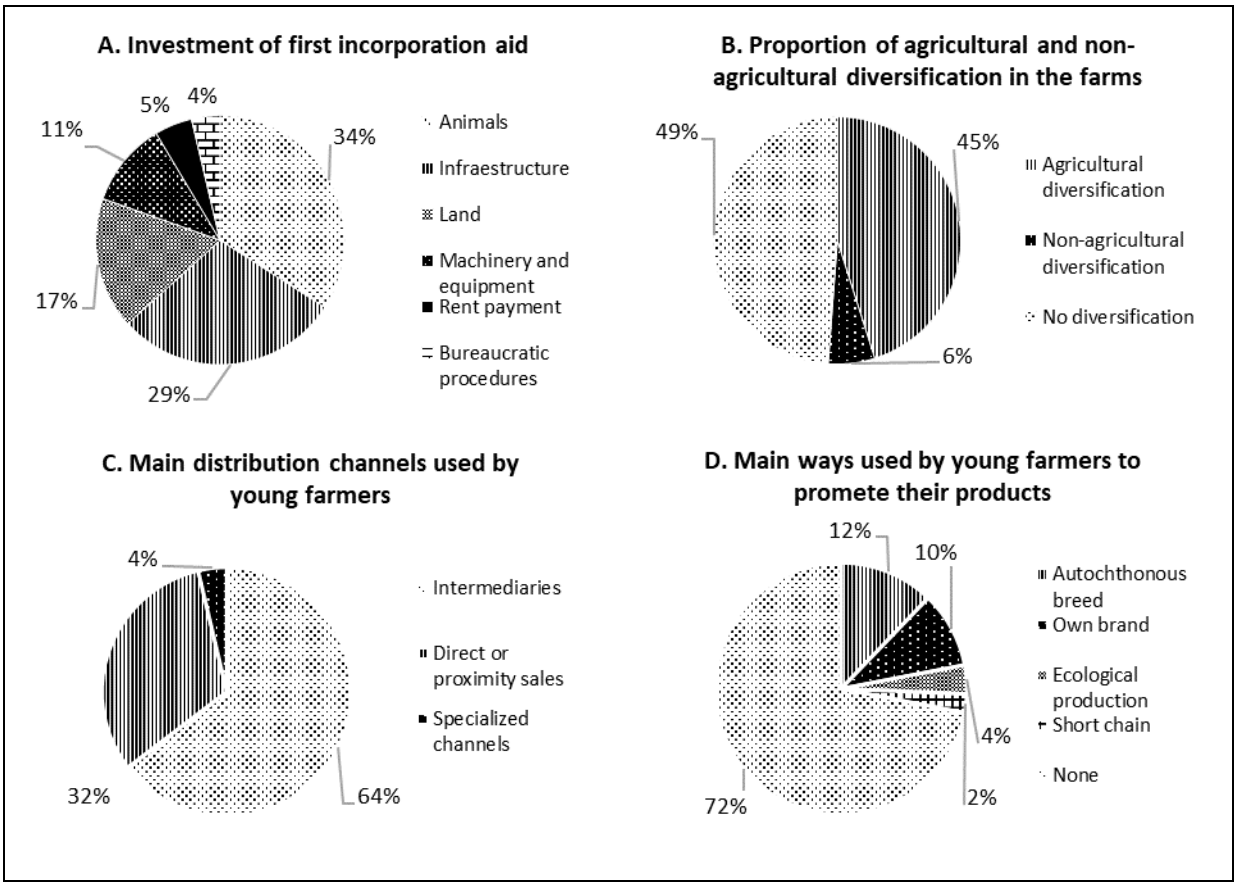


Figure 3. Additional main attributes of the young farmers in process of incorporation into the livestock sector in Catalonia

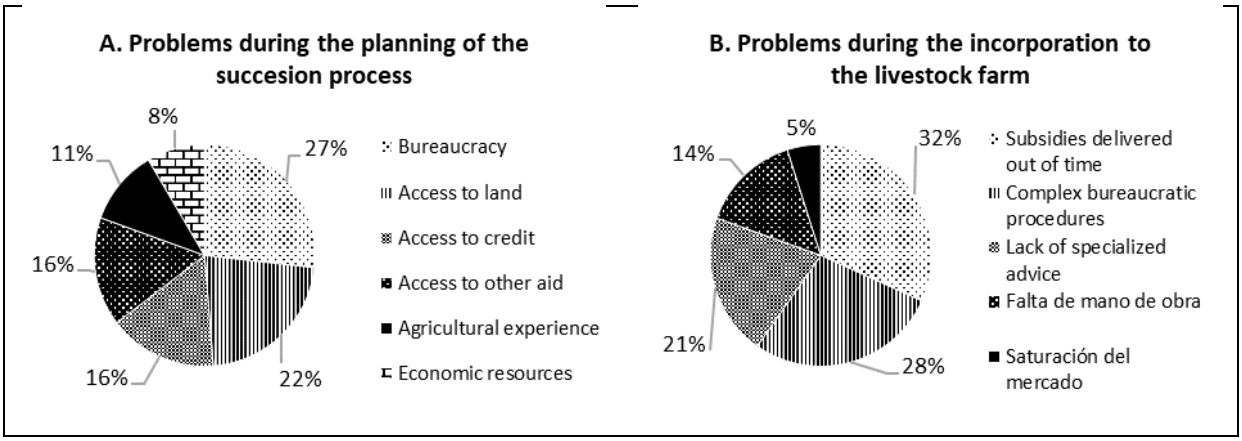


Figure 4. Main barriers identified by young people in the planning and incorporation stages in Catalonia.

Table 4. Differences in opinions and barriers faced in incorporation between the three types of farms identified among young farmers in process of incorporation in Catalonia. (Percentage of farms belonging to each type).

Qualitative variables	Categories	Family (n=31)	Agroecolo -gical (n=33)	Vertical integration (n=18)	Overall Percent
Barriers to incorporation	Access to land	22.6[a,b]	33.3[b]	0.0[a]	22.0
	Agricultural experience	3.2[a]	9.1[a,b]	27.8[b]	11.0
	Economic resources	6.5[a]	9.1[a]	11.1[a]	8.5
	Access to credit	25.8[a]	9.1[a]	11.1[a]	15.9
	Access to other aid	12.9[a]	18.2[a]	16.7[a]	15.9
	Bureaucracy	29.0[a]	21.2[a]	33.3[a]	26.8
Problems when starting-up the project	Aid delivered out of time	32.3[a]	33.3[a]	27.8[a]	31.7
	Lack of specialized advice	19.4[a,b]	33.3[b]	0.0[a]	20.7
	Complex bureaucratic procedures	25.8[a]	27.3[a]	33.3[a]	28.0
	Availability of labor	9.7[a]	6.1[a]	38.9[b]	14.6
	Market saturation	12.9[a]	0.0[a]	0.0[a]	4.9
Opinion of first incorporation aid	Very good	3.2[a]	6.1[a,b]	27.8[b]	9.8
	Good	64.5[a]	27.3[b]	55.6 [a,b]	47.6
	Fair	32.3[a,b]	54.5[b]	11.1[a]	36.6
	Bad	0.0[a]	12.1[a]	5.6[a]	6.1
Opinion about their relationship with other farms in the same area	Positive	71.0[a]	63.6[a]	100.0[b]	74.4
	Negative	29.0[a]	36.4[a]	0.0[b]	25.6
Opinion about the agricultural sector as a profession for the future	Positive	80.6 [a]	75.8 [a]	77.8 [a]	78.0
	Negative	19.4 [a]	24.4 [a]	22.2 [a]	22.0
Opinion about the incorporation of women	Positive	71.0 [a]	81.8 [a]	72.2 [a]	76.8
	Negative	29.0 [a]	18.2 [a]	27.8 [a]	23.2
Change in the perception of livestock farmers	Yes	48.4[a]	42.4[a]	5.6[b]	36.6

Different letters in the same row indicate significant differences ($p<0.05$).

3.2. Types of young farmers recently incorporated into the livestock sector

Family Type

This group consists of 31 farms (37.8% of the sample). The main characteristics of this type is the fact of belonging to a family with farming tradition. It is seen as crucial for a successful incorporation into the livestock sector, which is reflected in the highest value obtained in the Index of family ties to agriculture (IFA), with significant differences compared to the other types (Table 2). These young farmers also conceive livestock farming as something more than a mere economic activity; it is a tradition and way of life to which their family has historically been linked. The existence of these family ties puts at the disposal of the young person a whole set of resources that facilitate the process of incorporation, whether in the form of access to land, livestock, infrastructure, knowledge and networking.

Being part of a productive family tradition (64.5% are second generation farms and 22.6% belong to livestock farmer families of more than 2 generations; Table 3) means that most of these young people have land available to them, 90.0% of useful agricultural area is owned (Table 2) and 87.1% have accessed the land through inheritance (Table 3). In fact, this is the group with the largest amount of total land available (85.3 ha). The greater availability of land goes together with greater availability of labor, mostly provided by the family (3.3 AWU, of which 2.5 come from the family; Table 2). This initial availability of resources is related to the high degree of autonomy (ISM) of young farmers observed in this group. This large availability of land and livestock also facilitates access to subsidies, such as agro-environmental payments, which is reflected in the Index of Environmental Measures (IEM), with significant differences compared to the other types (Table 2). In general, these are young people who have professional education of intermediate, higher and/or university level. This shows that the family is willing to train these young people so that they continue to be involved in the livestock farming sector in the best way possible, acquiring experience and knowledge in the family farm (83.9%; Table 3).

Cattle farmers predominate in this group, in particular those dedicated to both raising beef cattle and producing milk (130.5 and 55.3 LUs respectively). This economic activity requires competitiveness and efficiency, which entails a constant implementation of innovations, both in the operation and administration of the farm, and in the improvement of the production process, infrastructure and commercialization. Not surprisingly, this is the group with the highest value in the Composite Innovation Index (3.6; Table 2). They are investing their economic resources in the genetic improvement of animals through purchase and replacement (41.9%), the construction of infrastructure that facilitates animal management (25.8%), and the acquisition of machinery and equipment (19.4%) for mechanization purposes (Table 3).

As regards the commercialization of meat and milk, it is carried out in two ways. While the first way usually requires the participation of intermediaries, the second way is based on direct selling and is part of a broader strategy of diversification followed by the farm, distributing the product through consumer cooperatives (38.7%) and electronic media (22.6%) (Table 3).

The majority of the young farmers of the Family type consider that the first incorporation aid is adequate for the needs they encounter (67.7%), whereas the rest see it as not being very effective (32.3%) due to the large delay between the application and its delivery (Table 4). It is also a general complain among the farmers of this type that the access to credit should be easier, and the amount of paperwork and bureaucracy to be made should also be dramatically reduced. Bureaucratic paperwork demands time and economic resources from young people, while access to credit depends on being able to show that one is receiving incorporation aid.

Agroecological Type

The Agroecological comprises 33 farms and represents 40.2% of the sample. This group of livestock farmers is characterized by the idea that livestock farming is something more than a mere economic activity. It is rather a lifestyle based on harmony between human and nature. This group also stands out by the preponderant role reserved for women, as well as for having limited access to economic resources and a limited family tradition in agriculture.

These agroecological farms are characterized by including a small herd of sheep or goats (6.4 and 3.7 LU, respectively), a limited amount of land (12.3 ha) (Table 2), and by the fact that the incorporation of young people tends to occur in the absence of a family farming tradition (54.5% are first generation farm: Table 3). This lack of a family tradition in livestock farming explains that more than half of the young farmers interviewed for this work had to buy or lease land to third parties. These are livestock farms oriented towards agroecological production (with the highest Index of Agroecological Vision and Operation (IAV), which allows them to reduce costs in terms of the purchase of machinery, infrastructure

and inputs. Although there is no significant difference between the three types of farms in terms of the integration of women, the highest number of women working in livestock farms was observed in agroecological farms (Table 2).

In this group, direct sales or sales through specialized commercialization channels are very important (33.3 and 9.1% respectively) (Table 3); this allows them to obtain better prices and gain greater acceptance for their products. It is worth noting the ample use of electronic media to promote the products of these farms (30.3%; Table 3). Not having a family tradition in livestock farming certainly limits the access of young people to certain resources, such as land, infrastructure and experience. However, being part of a first-generation farm, created by young people, gives them great freedom when making decisions and adopting innovations.

The young livestock farmers who decide to follow the agroecological strategy to join the livestock sector are often well-educated people, with most of them having a high education level (57.6% have higher education degrees; 24.2% have university degrees), as shown by the value in the Agricultural Training Index (IAT) of this group of farmers (Table 2). Furthermore, the training of these young people is unusually complemented by prior farming experience, both in livestock and agricultural operations (90.9%). It is also important to note the importance of e-learning as a way of accessing knowledge (87.8%) for this type (Table 3); as well as their participation in social networks with other young people, which explains why they have a high Social Capital Index (2.8), comparable to those in the Family type (Table 2). Unemployment and the desire for a lifestyle change are fundamental drivers leading the young people of this group to incorporate into the livestock farming sector (Table 3).

Limited access to land and the difficulty in enlarging the herd are two of the main obstacles the young people of the Agroecological type deal with (Table 4). In addition, it should be mentioned the little chance of receiving subsidies of such kind of farms, as well as the complex bureaucratic means to apply for them. Regarding the execution of their incorporation projects, the need of specialized advice is the main problem they face. This group of young livestock farmers have the most negative opinion of the procedures that must be carried out to receive incorporation aid (12.1% rate it as poor; 54.5% rate it as fair; Table 4). Concerning existing potentialities in the sector, both in the Family type and in the Agroecological type it is identified a tendency towards an improved perception, by society in general, of livestock farmers, and of their role in the transition towards healthier diets.

Vertical Integration type

The Vertical Integration type comprises 18 farms, and represents 22% of the sample. This type of young farmers is characterized by conceiving livestock farming exclusively as an economic activity, that provides them with job and income. All the farms included in this group are organized into a vertically integrated system, generally for porcine production. In this system, the mother company provides livestock farms with animal feed and with the necessary technical and sanitary advice, while it also decides the productive orientation of the farms. These farms have thus very little autonomy, however the risk posed by unexpected developments to which they are exposed to is reduced to a minimum.

This type is associated with pig farms (77.2 LU), which have a small amount of land (2.1 ha) that are mostly used to grow cereals or fodder for sale to third parties (Table 2). Since these farms depend on the mother company for access to the resources they need, the existence of a family tradition in livestock farming is of little importance. In fact, it is in this type where we find the highest percentage of first-generation farms (61.1%). Access to land is achieved mainly through leasing from third parties (50.0%) and from the family (33.3%), what seems to negatively impact on the Self-management index, which is the lowest of the three types (Table 2). Regarding commercialization, this is the group with the highest percentage of income obtained from the sale of animals (93.4%), with 100% of its sales occurring through purchase/sale contracts with intermediaries (vertical integration system) (Table 3). So, they have no need

to promote the products. The young farmers belonging to this type are the youngest of the three types (27.1 years old on average, Table 2), in addition to being the group with less previous experience in livestock activity and less high education and university degrees (27.8 and 0.0%, respectively) (Table 3).

Concerning the reasons for engaging in animal husbandry, those most frequently mentioned were economic reasons, mainly to face unemployment (33.3%), and access to subsidies (16.7%). In line with this, the young farmers in this type have the best opinion as to the incorporation aid (83.4%) (Table 3). Concerning the main existing obstacles, the main problems identified were excess of bureaucracy and limited experience. For starting-up a livestock project, the main problem is the limited availability of workers specialized in pig farm management (Table 4).

A counterposition of this type is observed with the Agroecological type, in the Agroecological vision and operation index (IAV), as well as the contrast with the Family type, in relation to the Social capital index (ISC) and the Self-management index (ISM).

4. DISCUSSION

Three major types of livestock farms were identified here, representing three different groups of strategies young livestock farmers are developing to deal with the multiple existing drivers that mediate the incorporation into the livestock sector (Figure 5). The three strategies recorded have already been identified in the specialized literature in isolation, namely: (i) taking advantage of the family tradition (Lobley & Potter, 2004; Joosse & Grubbström, 2017; Dreby et al., 2017); (ii) new peasantry and adherence to the agroecological principles (Desmarais, 2007; van der Ploeg, 2008; Lobley & Potter, 2004; Holt-Giménez, 2011; Esparcia, 2014; Suess-Reyes & Fuetsch, 2016; IPES-Food, 2016); and (iii) vertical integration with a mother company (Lobley & Potter, 2004; Inwood & Sharp, 2012). We also observed that the three groups of strategies are mediated by the following key drivers (Figure 5): (i) the existence of an agrarian tradition in the family; (ii) the desire to experience a change in lifestyle; (iii) the degree of agricultural professional training and knowledge at the disposal of the young farmer; (iv) the capacity and/or willingness to observe the new demands emerging among the general population; (v) the capacity and/or willingness to implement innovative strategies; (vi) the presence of women and their role in the livestock farm; (vii) the desired degree of self-management and autonomy in decision making; and finally (viii) the capacity and/or willingness to make the required paperwork to have access to the available aid programs.

The role of the existence of family ties to farming and particularly to livestock in the process of incorporation of young people into the sector has long been discussed by the specialized literature (Mishra & El-Osta, 2007; Lobley, 2010; Wheeler et al., 2012; Grubbström & Sooväli-Sepping, 2012; Borec et al., 2013; Riley, 2014; Suess-Reyes & Fuetsch, 2016; Dreby et al., 2017; Joosse & Grubbström, 2017; Góngora et al., 2019). There seems to be a broad consensus in pointing that the existence of farming tradition in the family invigorates the incorporation of young farmers (Wheeler et al., 2012). Also, the young farmers seem to show a stronger commitment to the place where they live and work than the others (Hildenbrand & Hennon, 2005; Kuehne, 2013) The dairy cattle and beef farms are those domains where we identified the existence of more family tradition and young farmers with deeper roots in livestock farming. The lack of family land is a driver deeply pushing the young livestock farmers to follow the Agroecological or the Vertical Integration strategies for incorporation into the sector. We observed how the Index of family ties to agriculture is directly related to the Self-management index, Index of environmental measures and Composite innovation index (Table 2), what shows the advantage that young people with family tradition enjoy in the process of incorporation. The weakening of agrarian family traditions clearly disrupts the process of incorporation of young farmers, leading to the abandonment of family farms. This phenomenon is occurring throughout Europe (Terres et al., 2013; Corbelle-Rico &

Crecente-Maseda, 2014; Banovic et al., 2015; Terres et al., 2015), and livestock farms are being leased or sold outside the family, a process that has been called non-family agrarian transfer (Joosse et al., 2017). As shown here, it is worth keeping in mind that unemployment is one of the reasons why young people without family ties to agriculture join the livestock sector (Table 3).

In line with the phenomenon just mentioned, above, another key driver mediating in the process of incorporation of young farmers, particularly relevant in those with no family tradition, is the existence of a motivation for a change in lifestyle and the conviction that joining the livestock sector might guarantee this. Burton et al., (2008) mention that in this type of incorporation, which identifies intrinsic rewards in rural activities, young people value the personal independence that can be obtained by working in an agricultural environment and closer to nature. This is largely the case in those young farmers following the Agroecological strategy and involved in the new peasantry movement in general (van der Ploeg, 2008; Holt-Giménez, 2011; Milone and Ventura, 2019). However, it should be emphasized here that, despite preconceived ideas, we note that the young farmers who followed this incorporation strategy did not show a particularly bucolic conception of rural life. Unemployment, vocational training and land availability were more important reasons for incorporation (Table 3). Although they seek a change in lifestyle towards a more harmonious relationship with nature, they do not see agricultural work as a hobby or a leisure space, as noted in other studies (Phillips et al., 2001; Duenckmann, 2010; Oteros Rozas et al., 2013), but rather as a productive economic activity.

Some studies have argued that the transfer of farms within the family gives continuity to agricultural practices, while the transfer of farms to non-family members leads to further innovation (Zasada, 2011; Grubbström et al., 2014; Kontogeorgos et al., 2014). However, in line with other researchers, we identified a higher degree of innovation in the farm types with larger family tradition in livestock farming, with more trained and educated farmers (Läpple et al., 2015), and with more social capital and networking available (Trigilia, 2001). This is particularly the case of the young farmers following the Family strategy. It goes largely in line with Esparcia, (2014), who claims that innovation in farming is highly dependent on the availability of resource - traditional ecological knowledge, social network, land, labor, machinery, etc. However, this does not mean that small farms with few resources cannot innovate, as shown here by those young farms following the Agroecological strategy. In this case, the innovations conducted are based on new forms of knowledge and new types of production and/or commercialization strategies (e.g., agritourism).

Another key driver mediating is the capacity/willingness of young farmers to benefit from the new social demands emerging on rural areas and livestock farming in particular – mainly, animal welfare, healthy habits and ecosystem services. In line with the new peasantry movement (Milone and Ventura, 2019; Monllor, 2013; Holt-Giménez, 2011; van der Ploeg, 2008; Mailfert, 2007), the Agroecological group of farms are these more actively observing these trends. The implementation of an agroecological management in the livestock farm tends to be conducted by highly educated young people, wide networking with other young farmers, mainly devoted to raise small ruminant, and with a conception of livestock farming as something more than an economic activity. The limited availability of resources of the group of Agroecological farms seem to force the recently incorporated young people to optimize resources under a scheme of local production oriented towards direct sales and specialized commercialization channels that allows them to differentiate their products and better capturing the added value of their production (Rosset and Martínez-Torres, 2014; Altieri et al., 2012; Di Masso et al., 2015; Desmarais, 2007; McMichael, 2008). This goes in line with Carlson, (2008) and Gray, (2013) who indicate that local production and commercialization stimulates the incorporation of new farmers without family tradition. This seems to point to the existence of a double source of innovation the abundance of resources but also the scarcity of them, being represented in our study by the Family and the Agroecological strategies respectively.

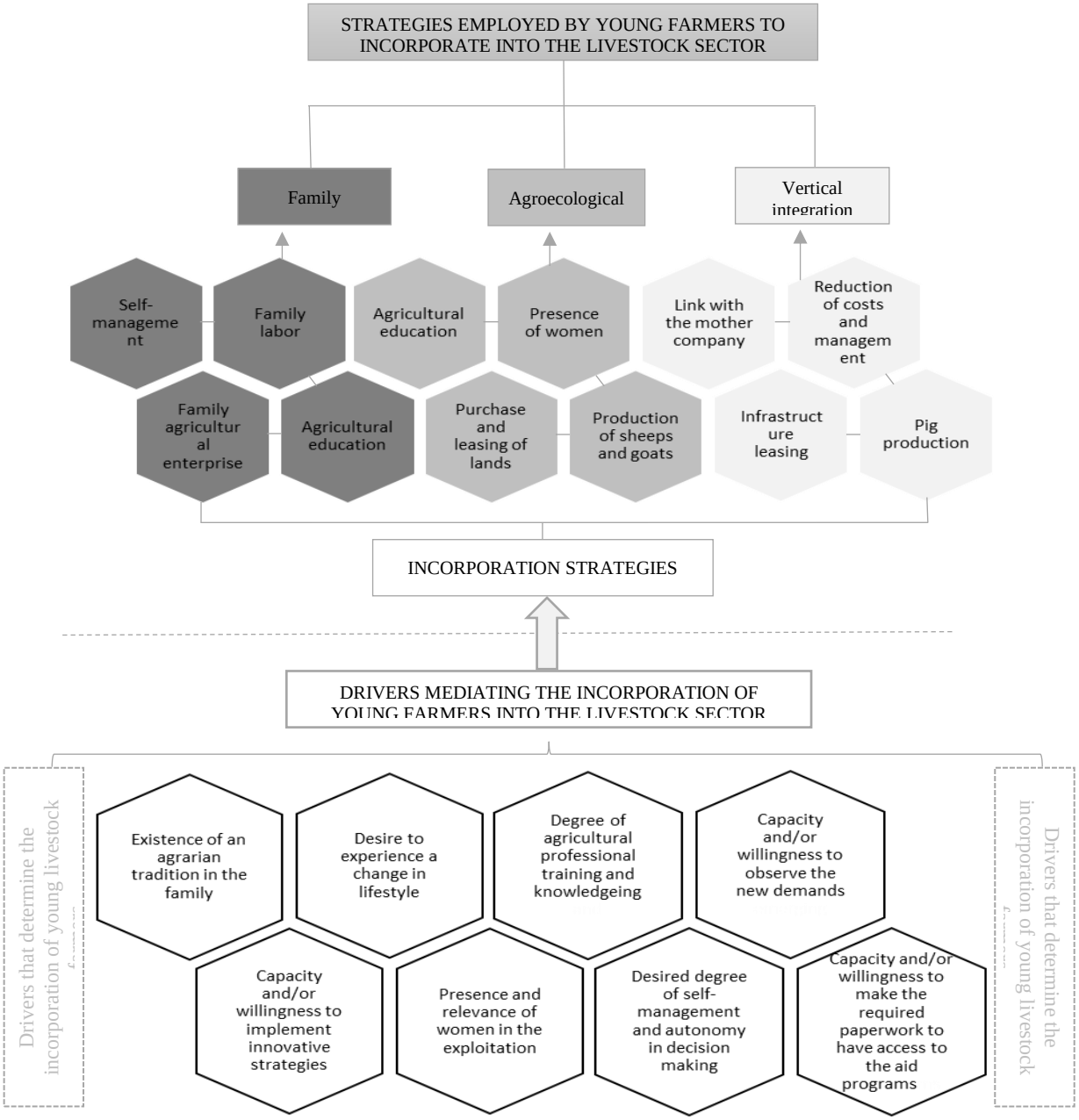
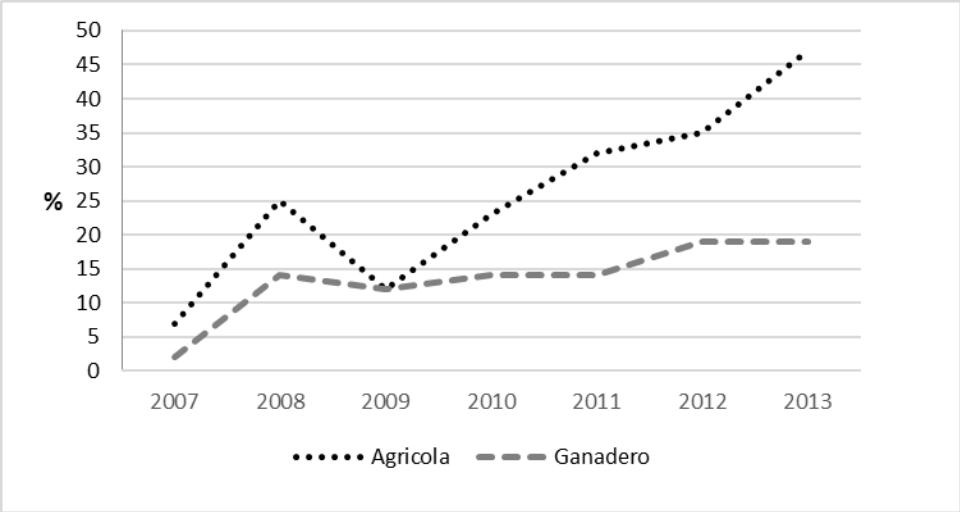


Figure 5. Main drivers and strategies that determine the incorporation of young farmers into the livestock sector in Catalonia.

The adoption of relevant roles in the farm by women is also a major driver. While on average the percentage of women joining the livestock sector in Catalonia is lower than for the whole of Spain -18.3 and 28.8% respectively (MAPAMA, 2017); we observed that a larger presence of women in relevant positions in the farms go with the adoption of more innovative strategies. This is particularly the case of the Agroecological type with 24.2% of its members being women, in contrast to the other two types accounting for 16% in the Family type and 11% in the Vertical Integration type (Table 2). However, there is large consensus among the three groups of livestock farmers on the fact that women playing a relevant

role in livestock farming is positive for the sector (Table 4). This goes in line with numerous studies pointing that large degree of masculinization of the farming sector results in further adoption of production-driven farming models, based on enhancing specialization, mechanization and an increase in the size of the farms (Viladomiu & Rosell, 2016; Brandth, 2002; Burton & Wilson, 2006; Bjorkhaug & Blekesaune, 2007; Grubbström et al., 2012; Riley, 2014). These trends seem to go with further constraints for women to perform main roles in the farms. The limited presence of women in livestock farms affects the continuity of family groups in rural areas, and reduces the opportunities for women to participate in the diversification of livestock activities (Viladomiu et al., 2002; Brandth & Haugen, 2007; Haugen et al., 2015; Dreby et al., 2017). The restrictions for women to enter the labor market are even greater in the livestock sector than in the agricultural sector in general (Figure 6). Riley (2014) proposes that this process does not depend only on the ideas of older farmers, but also on the relationship with their sons and daughters, in which gender categories come into play, restricting the participation of women in the management of the farm.



Source: (MAPAMA, 2014)

Figure 6. Incorporation of women into agricultural and livestock farms in Catalonia

A clearly differentiating element between the strategies identified is the degree to which it is valued to have autonomy and capacity to make your own decisions in a very changing socioeconomic context. Here we identified two contrasting pathways: the Family and Agroecological strategies that are centered on actively enhance the capacity of the farmer of being able to make decisions in all relevant aspects of the farming activity; and the Vertical Integration strategy that is based on delegating this capacity to the mother company. It is interesting to notice here the convergence in the quest for larger degrees of autonomy of the new peasantry movements (here the agroecological strategy) and the traditional operations (here the Family strategy) illustrating what some authors come up to name re-peasantization (van der Ploeg, 2018; Cálvario, 2017). Here both the new peasantry and the tradition meet to opposite industrial production (here the Vertical Integration strategy). Through vertical integration young people transfer an important number of decisions and processes to the mother company, such as commercialization, purchase of animals, feed supply, medicines, veterinary services and also general technical advice. This reduces the risks that young people have to tackle in the management of the farm, as well as allow them to enjoy certain advantages. This strategy of vertical integration, that in the case study region, was fundamentally identified in pig producers (Table 2), turns land into a non-required resource, since the feed is provided by the mother company. This is very important because this strategy

manages to overcome one of the main barriers young livestock farmers in process of incorporation encounter. Another advantage of the Vertical Integration strategy is that allows young farmers to work part-time, since not many hours of work are needed to generate a significant income (Segrelles, 1990).

Finally, the access to the emerging aids also plays a key role in the process of incorporation of young farmers. Here the amount of paperwork to be done comprise the fundamental constraint encountered. Thus, the capacity and/or willingness to make the paperwork becomes key. We observed large consensus among all interviewees in pointing that this is a serious inconvenient (Table 4). The deleterious influence of this on the process of incorporation of young farmers has also been reported by other authors as very problematic (Suess-Reyes et al., 2016). The obstacle of the fact of being forced to make large amount of paperwork has also been identified in other domains of the farming activity, in particular in sanitary domain, and applying for economic incentives for the preservation of autochthonous breeds (Soini et al., 2012) or implementing biosecurity measures in livestock farms (Gunn et al., 2008). Bureaucratic obstacles have also been identified seen as one of the main causes of the low interest of the agricultural sector in applying for public funds (EU SCAR, 2013). The need to simplify bureaucratic procedures has been identified in several policy documents, such as in the Common Agricultural Policy (Tropea, 2014).

5. CONCLUSIONS

The incorporation of young farmers into the livestock sector is one of the main challenges the European livestock sector is facing. In view of the undergoing trends and transformations that are affecting the livestock farming sector, rural regions and society as a whole, the examination conducted here of the incorporation process of young farmers into the livestock sector in Catalonia points that the differential access to different resources and exposition to different drivers by the young farmer leads them to follow different strategies to try to join the livestock sector in the most satisfactory and effectively manner. In particular, three groups of strategies were identified: the Family strategy, the Agroecological strategy and the Vertical Integration strategy. The Family strategy is based on benefitting from the fact of belonging to a family with solid ties to agriculture and livestock farming in particular. This tends to provide the young farmer with many essential resources, such as social capital and networking, land and infrastructures, as well as the opportunity to get adequate education and training. The Agroecological strategy, in line with the new peasantry movement, is based on the implementation of agroecological management practices. It tends to be followed by young farmers with weak or no family ties to agriculture working thus in first-generation farms. The main obstacle for these young farmers is the scarcity of resources they count on. This is why this strategy usually is undertaken by young people devoted to the production of small ruminants (fundamentally sheep and goats), which require fewer inputs and can be more easily commercialized through direct sales. The Vertical Integration strategy is based on the integration of the farm with a mother company. This is generally a strategy followed by young farmers, for which the existence of a family tradition in livestock farming is of little importance, so they do not have great access to resources and little determination to keep involved in livestock farming. These young farmers choose a strategy that guarantees them to face minimal risks. This strategy is mainly reported on intensive pig production. Under the vertical integration schemes, the young famers see themselves free from making any decision regarding the most relevant domains of the farm – e.g. production, marketing, input purchase, etc.

Better facilitating the incorporation of young farmers into the livestock sector is crucial. There is large consensus in pointing that the opportunities that may arise out of this could provide relevant benefits in the following domains: (i) socio-economic revitalization of rural areas; (ii) development of environmental-friendly and animal-welfare aware livestock production systems; (iii) reactivation of abandoned lands, which would go with more adequate conservation of cultural and high-nature value

livestock farming systems; and (iv) strengthening the provision of healthy products for human consumption. These contributions would be further secured not only by the existence of a more numerous livestock farming sector but also by the greater dynamism, flexibility and adaptability that the presence of young people would bring to the livestock sector (Tuyttens et al., 2008; Grubbström et al., 2014; Sánchez-Zamora et al., 2014).

Considering the eight drivers identified as largely mediating the incorporation of young farmers into the sector, three main policy domains emerged as necessary to be addressed, namely: promotion of land banks or other mechanisms to facilitate relations between owners and livestock farmers, developing and making specialized training more available, and finally simplification of paperwork, particularly regarding the Common Agricultural Policy.

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