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Multicriteria evaluation of ancestral family agricultural systems, Chimborazo Province, Ecuador

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ABSTRACT

Family farming units and their complex production systems provide the majority of global agricultural production. Aim of the study was to Characterize and evaluate each of the agricultural systems considering social, cultural, productive, and cosmic aspects. The study was carried out in several communities of Chimborazo - Ecuador, with four types of producers: Chacareros, who are references of the production systems; Producer in the process of transition to Chacarero; Conventional Producer and Subsistence Producer. In this study, several production, economic, technological, social, food security and biodiversity indicators were evaluated. It was established that the production systems of the Chacareros and producers in transition are more profitable and efficient than conventional and subsistence producers and are in better conditions to achieve food security. It was found that Chacareros and producers in transition are less vulnerable to the volatility of market prices and external factors. The Chacareros' production systems generate positive externalities that are not incorporated in the characterization of the production systems. Additionally, their priorities are different from other producers: First they produce to feed the family and animals, to share and save, and the rest to market. This study fundamentally presented the interpretation of the development of the productive systems of peasant family agriculture in the highland region of Ecuador. In conclusion, The chacareros' production system was much more efficient than the conventional producers one since an average net profit per hectare of 6,150 USD was obtained and an average efficiency rate was 145%, while conventional producers obtained an average net profit per hectare of 1,749 USD and an average efficiency rate of 119%. Chacareros were less vulnerable to the volatility of input prices and food products in the markets. Over 70% of the food consumed and 90% of the inputs used came from the farm itself, compared to less than 50% of the food and inputs in the case of conventional producers.

Keywords: Family farming, Chacarero, Production systems, Food sovereignty.
Article type: Research Article.

INTRODUCTION

According to estimates made by FAO (2011), worldwide, there are more than 500 million family agricultural units. These represent 98% of all agricultural units and are those that provide at least 56% of global agricultural production. Therefore, the key to combat poverty and malnutrition would then be focused on the application of

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policies and strategies that allow these sectors to improve their food sovereignty and generate income (Gattini 2011). Salcedo & Guzmán (2014) considered family farming to be "All family-based agricultural activities that are linked to various areas of rural development. Furthermore, family farming is a way of organizing agricultural and forestry production, as well as fishing, grazing, and aquaculture, which is managed and directed by a family and, for the most part, depends on family labor" (Maletta 2010). Through observations and field work, it has been confirmed that these production systems in communities and even within the same family are very complex and varied according to what was expressed by Lerman & Sedik (2018). In addition, they are related to the decision-making that the family makes on a daily basis, which in turn are influenced by cultural, social, climatic, etc. aspects that are very changing and that can disrupt any intervention strategy previously established by organizations and institutions (Martínez & Calixto 2014). In this context, the projects carry out interventions with the implementation of technological packages and methodologies, which according to reports, have always given good results. The observations and systematizations carried out reflect that very few have achieved any degree of sustainability or that have resulted in a good impact (Maletta 2017). It is enough to look at poverty data, agricultural GDP and other indicators, to realize that in most cases people are left the same or worse off than before, after a project intervention, in addition to the fact that the methodologies, technologies designed and transmitted have been very little adopted (Martínez 2013). On the other hand, several Andean crops have been displaced by modern and commercial agriculture, introducing foreign production and consumption patterns (Bogonos & Stepaniuk 2017). Among the Andean crops we found a wide group of species including cereals and legumes such as quinoa, amaranth and chocho; tubers such as oca, melloco and mashua; medicinal, ornamental, and culinary plants. According to Salcedo & Guzmán (2014), the aspects influencing the evolution of agricultural production systems are as follows:

- Natural resources and climate;
- Science and technology;
- Trade liberalization and market development;
- Policies, institutions, and public goods;
- Information and human capital.

Notably, although this characterization responds to principles that can be considered scientific, it does not take into account spiritual, agricultural, and cultural aspects (Maletta 2010). Furthermore, it has an approach that could be labeled as productivist or marketing that is oriented more towards productivity and the market than towards food sovereignty, which is the primary objective of family agriculture (Lerman & Sedik 2018). From a more comprehensive perspective, within the existing production systems in family agriculture, there are several producers whose relevant characteristic, among other aspects, is the preservation of traditional crops that contribute to a balanced diet as well as safeguarding the world's agricultural biodiversity and the sustainable use of natural resources (Maletta 2017). Furthermore, they are custodians of knowledge very well adapted to their dynamics, through which they sustain productivity on marginal lands, using complex and innovative management techniques. It entails using very few external inputs that create dependency and require investment that is not available (Burkitbayeva & Swinnen 2018). In a study carried out by Martínez (2013) and Haro (2022), it was established that in the central mountains of Ecuador there are initiatives by farmers belonging to family agriculture who have developed a series of alternatives and agricultural production systems, called Chakras, plots, farms or agroecological farms; and only 2 producers out of every 100 are applying systems similar to agroecological farms. Faced with this reality, conventional agriculture is not very diverse, simplified, requires large amounts of external inputs and is basically oriented towards the national or international market (Burkitbayeva & Swinnen 2018). In Chimborazo Province, there are the first testimonies that approach the agroecological system, however, with the difference that it is done in its own ancestral Andean way, by contemplating their worldview and integrating diversity, factors of production and care of Mother Earth or Pachamama (Martínez 2013). From the Western point of view and the scientific method, the problem of agricultural production is treated by independent disciplines or components. This leads to studying agrarian systems like a box, where we know what goes in (inputs) and what comes out (yield), however, it does not take into account what happens inside and beyond (Lerman & Sedik 2018). The main problems detected in the communities from the Western point of view refer to low land yields, deterioration of natural resources, use of poor quality seeds, pest and disease problems, lack of irrigation, and low prices received for their product on the market (Salcedo & Guzmán 2014). However, in very few cases and in

isolation, aspects related to ancestral knowledge, local dynamics, their worldview and vision of food sovereignty and care of the Pachamama are mentioned (Maletta 2010). Another important aspects mentioned include the low availability of human resources that have the skills to guide and move their organizations forward and the lack of leadership of some of its members due to an aggressive penetration of Western culture (Lerman & Sedik 2018), in addition to the poor conditions of basic services (education, health and basic sanitation), and the absence of coordination between the institutions that work in the communities, hinder the rational use of resources (Grisa & Sabourin 2019). From an Andean worldview, agriculture is aimed at recovering the identity of each people (indigenous and non-indigenous) through their own efforts based on their capabilities. To revive spirituality from the values of solidarity, reciprocity, and complementarity through community organization, the advice of elders, rituals, myths, organic production, natural medicine, guaranteed food, and fair trade become actors and managers of development itself (Paz 2011). However, the management of organizations to achieve sustainable development that allows overcoming the poverty situation suffered by peasant communities has been ineffective. Especially due to the intervention and imposition of an external culture that has weakened organizations and has interfered without further analysis in production systems (without even understanding its logic and dynamics from this other vision; Burkitbayeva & Swinnen 2018; Haro 2022). In most cases, intervention in the field is usually carried out by promoters and extension agents, who make use of the methods that are within their reach or that are established by the institution to which they belong. Seeking to produce positive impacts on agricultural productivity, without taking into account the differences between these two visions (Ramírez García *et al.* 2015). Frequently, the transfer of agricultural technology has been understood in a vertical way in which the technician goes to teach the farmers, being perceived in many cases by the beneficiaries as an external imposition (Lerman & Sedik 2018). The technicians recognize that this way of teaching originates in the way in which they themselves learned, in a vertical way, with few spaces for discussion, debate and generation of ideas. This pattern is often repeated in training in rural areas, where spaces were not contemplated for farmers' own knowledge to be shared and find complementarities with technical and scientific knowledge (Balmann *et al.* 2013). In this area, from the last century until today, great efforts have been made in Ecuador to achieve the development of the agricultural sector through the implementation of various projects and programs, which according to its directors have had the expected results. Despite the fact that it sometimes contradicts the statistics and levels of poverty and malnutrition that persist in those places (Martínez 2013). These efforts have been channeled through projects and programs whose actions have been based on a very marked paternalism and assistance that, among other aspects, has caused the intervened organizations to remain the same or worse than before once the project or program stage has ended (Salcedo & Guzmán 2014). Haro (2022) expresses that the programs and projects implemented have used the most diverse methodologies designed by their managers or consultants who have always sought to obtain the best results. However, there have always been several questions that could not be answered categorically: Were the actions, activities and methodologies designed to meet those that the producers needed and demanded? Were these methodologies applied according to their design? Were local dynamics respected in the implementation of the different activities? Were the actions deployed coherent and consistent with the local dynamics and the environment? Finally, what happened to several traditional projects where, once the organizations left, they were left the same or worse than before? In conclusion, we will mention: How can we understand what producers want? If we do not know their dynamics, how can they understand and adopt our dynamics if they do not know them either? (Vivar 2016).Within this context, in the communities of Chimborazo Province, there are producers who have certain characteristics that differentiate them from others, such as: They do not migrate, they always have enough to eat and/or sell, they take care of their Pachamama and are the reference of their organization in the productive aspects which have been called Chacareros. The Chacarero lives in the community, likes community life, is respected in his community, a counselor recognized by the Ayllus, free from politics, an exemplary leader, a dreamer and innovator, the repository of ancestral wisdom, and proves it in practice. He does not only think about money or projects; he takes care of Pachamama. He has clear values and goals for the indigenous and peasant people (Alvaro 2012). The Chacareros define themselves as the wise men and women of the indigenous peoples of the Puruway Nation in agricultural production systems and together they form the Council of Chacareros. They continued to exist in the communities despite the processes of domination and conquest of colonization. They never disappeared, and their knowledge was transmitted from generation to generation. However, they have been weakened by the profound structural changes suffered in the rural world in recent years (Vivar 2016). Based on what aforementioned, this study was carried out to explain the logic of these systems,

their advantages, and disadvantages, in addition to evaluating the different components from different points of view through the objectives set for this research, such as: characterize and evaluate each of the agricultural systems, taking into account social, cultural, productive, and cosmic aspects. The study was carried out in several communities in Chimborazo, Ecuador, with four types of producers: Chacareros, who are references to the production systems; producers in the process of Transitioning to Chacarero; Conventional producers; and Subsistence producers.

MATERIALS AND METHODS

Study area

This study was carried out in several communities in the province of Chimborazo in the Republic of Ecuador.

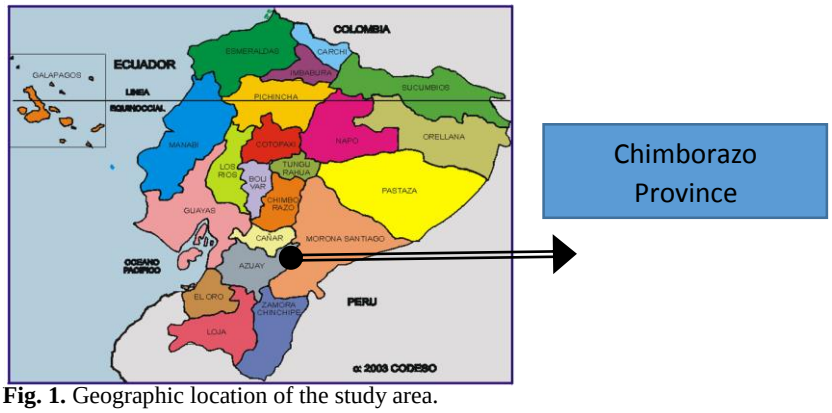

Fig. 1. Geographic location of the study area.

Chimborazo Province is located in the center of the Ecuadorian inter-Andean alley. It was created on June 25, 1826. Its area reaches 6,600 km^2. The provincial capital or capital is Riobamba City. The surface of the province rises from 195 m above sea level, in the subtropics, to 6,310 m at the summit of Chimborazo. The capital of the province, Riobamba, is located 180 km south of Quito and 216 km from Guayaquil and is where a large proportion of the indigenous population is concentrated. The highest poverty rates are also recorded here, which is more noticeable at the rural level (PDOT 2020). In the rural communities of Chimborazo, food security is poor. Although over 70% of families eat three times a day, as in other areas. The basis of the diet is almost exclusively carbohydrates such as potatoes, noodles, sugar, and rice. Only when there is greater availability of resources or very special occasions, meat is consumed. In recent years, population growth and the need to obtain food supplies has caused an increase in production, however, not necessarily income, since people in the rural sector when they arrive at the markets face a series of problems and are affected by the price of their products, which often does not justify leaving their workplace (PDOT 2020; Martínez 2013). To carry out the analysis of the wise and intelligent ancestral production systems of family agriculture in Chimborazo, the following process was developed:

Typification of family agriculture

Within the framework of the farm classification process based on the study developed by Haro (2022) and Renolfi & Pérez (2005) in which the typological processes of specialized, diversified and subsistence family agriculture are established, family agriculture has been divided into four types of producers: Chacarero, Producer in the process of transition to Chacarero, Conventional Producer and Subsistence Producer.

(a) Chacarero. It is a producer characterized by its production systems that allow it to maintain a high level of food sovereignty. He takes care of natural resources, has a greater diversity than the average of other producers in the area, lives in the community, is respected by it, is an exemplary dreamer and innovative leader and is the repository of ancestral wisdom. He is recognized as the Sage of Production Systems in the communities of the Puruway Peoples.

(b) Producer in the process of transition to Chacarero. It is the producer who, without being a Chacarero, has characteristics that empower him to be one, since his production system has the components and vision similar to those of the Chacarero. It manages its production system based on a combined logic between traditional and business/western, seeking to increasingly value the Andean worldview.

(c) Conventional producer. He is the producer whose activities and production are oriented more towards the market. He does not value what the Chacareros value, nor does he have the characteristics that they possess. In terms of their worldview, his level of food sovereignty is lower.
(d) Subsistence producer. It is the producer whose production system does not allow him to have the products or income to be able to live, who normally resorts to other sources of income to cover his most basic needs and who is normally below the poverty level.

Producers selection
From each of the established types of family agriculture, two producers were selected who were followed for a year to establish and characterize their production systems (Haro 2022).

Indicators to be evaluated
Several indicators were evaluated according to the methodology of Foladori & Tommasino (2000) and Díaz & Trujillo (2010) related to production aspects (species, yield and management) including: **economic** (valuation of all inputs and outputs of the farm, gross benefits, net benefits, monetary and non-monetary income and costs); **technological** (technology used in the components of the production system, inputs produced on the farm itself and externally, type of agriculture practiced); **social** (access to education and health, expenditure on health and education and participation in decision-making bodies); and **food security** (diet, diversification, value of food purchased and produced and biodiversity (species that are part of production systems). To be able to establish parameters with respect to the Western vision, it was necessary to establish the amount of money left in the family once the year ended through an estimate of monetary flows.

Gathering information
To collect information at the farm level, matrices were designed for the different variables, which were validated and then adjusted when necessary. The information collected through the matrices was complemented with qualitative information that producers were providing spontaneously. The process for the survey was based on coexistence with the producers during the different activities they carried out daily, complemented by the collection of information from the environment and periodic meetings between those who collected the information. This process was carried out with the purpose of understanding the logic applied in the different production systems. Assessing the entrances and exits of the farm and collecting information on the different variables, therefore, the days were very long and difficult for twelve months, but very enriching. All products and components that enter and leave the production system were valued, including those that do not have economic value for producers.

Systematization of information
The information was collected based on the methodology presented by Colmenares (2012), which was systematized in the different files and analyzed together with all the participants with the objective of establishing adjustments or complementing with missing information so that all the information is standardized and can be analyzed comparatively between the different types of producers. The methodology as well as the tools designed and applied allow information to be gathered quickly, without causing inconvenience to the producer, however, rather a sharing of their daily experience. The characterization of production systems focuses on establishing the different components, their interrelationships and systematizing them in different matrices on economic, food security, biodiversity, and social issues. To achieve the stated objective, a comparative analysis of the results obtained from different producers selected through multivariate analysis was carried out (Haro 2022).

RESULTS
The most conclusive findings of the research are presented in a logical, objective and sequential manner through texts, tables and figures, without falling into repetitions or redundancies. Tables and figures should be able to be interpreted autonomously. The discussion of results should be complete and exhaustive, contrasting the results obtained with the most current literature on the subject, highlighting the limitations of the study, and equally, avoiding speculation.

Efficiency of production systems
It was possible to establish that the Chacareros' production system is much more efficient than the conventional producers' one, since an average net benefit per hectare of 6,150 USD and an average efficiency rate of 145%

were obtained, while conventional producers obtain an average net profit per hectare of 1,749 USD and an average efficiency rate of 119%. In the case of transition producers, they are slightly more efficient and profitable than specialized producers. In the case of subsistence farmers, their production systems are considered inefficient and unprofitable since they have an average net benefit per hectare of 4,125 USD and an average efficiency rate of 48%. This is due to their own characteristics, such as limited access to water, technology, credit, as well as little practice and appreciation of ancestral knowledge that is more friendly and compatible with their production systems. Values are similar to the results obtained by Haro (2022) within its three study typologies: specialized, diversified and subsistence family agriculture.

Family food security

The Chacareros' production system is not only more efficient and profitable than conventional production systems, but also provides better feeding conditions. In the following graph (Fig. 2), the closer the lines are to 100, i.e., the closer to the outside of the radial graph, the better the conditions for achieving family food security, as expressed by Benavides *et al.* (2019), who analyzed each of the indicators for the evaluation process. Chacareros, represented by a light green line, have the best conditions since they have abundant, healthy, and diverse food. The food and inputs for production come largely from the same farm. Then, they are closely followed by producers in transition, with similar characteristics, while conventional and subsistence producers do not have the conditions to achieve food security. The Chacareros comply with their cultural preferences and improve their nutrition, since they recover a variety of traditional products, and their production system allows them to diversify risks and have greater stability in the supply of food produced.

Comparison of food safety indicators.

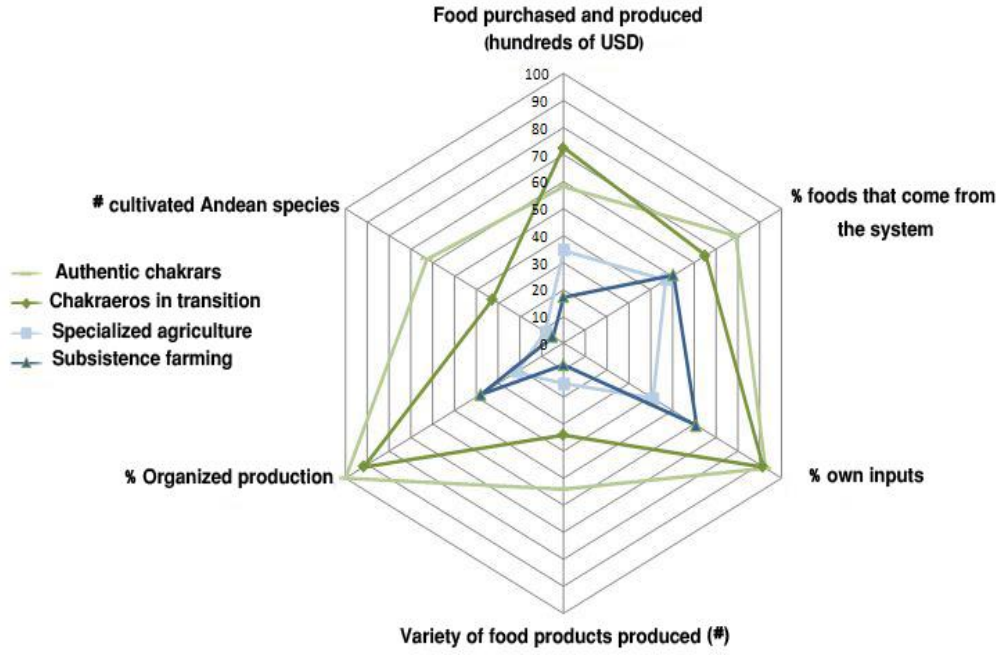

Fig. 2. Food security indicators; Source: Producers and Chacareros.

In general, the Chacareros' production systems allow their family to have a healthy, quality, varied, and abundant diet to meet nutritional requirements. The food consumed annually by the Chacareros family was estimated at 6,500 USD. In the case of conventional producers the value amounted to 2,500 USD. The Chacareros' production is more than 90% organic, while conventional production does not exceed 30%. Chacareros produce a variety of 50 foods versus 12 in the case of conventional producers, reflecting values similar to those obtained by Martínez (2013) in the report on family agriculture, pointing out issues of poverty and development. Chacareros are less vulnerable to the volatility of the prices of inputs and food products in the markets. Over 70% of the food consumed and 90% of the inputs used come from the farm itself, compared to less than 50% of the food and inputs in the case of conventional producers.

Sustainability

Fig. 3 represents the average Shannon index (which varies between 1 and 4) by type of production system exhibiting that the Chacareros' production systems and producers with similar practices have an index greater than 2, while conventional producers close to 0. The scaling was according to the methodology developed by Haro (2022) in the sustainability of farms analysis at the agricultural level, and analyzing the variables with the same weighting. This index reflects the high biodiversity of the Chacareros' production systems, which on average maintain an inventory of 130 species of flora and fauna. These data are added to the good agricultural practices applied. Among these, we can mention the association and rotation of crops, application of organic fertilizers, agroecological practices, and no application of pesticides, among others.

Shannon index by types of producers.

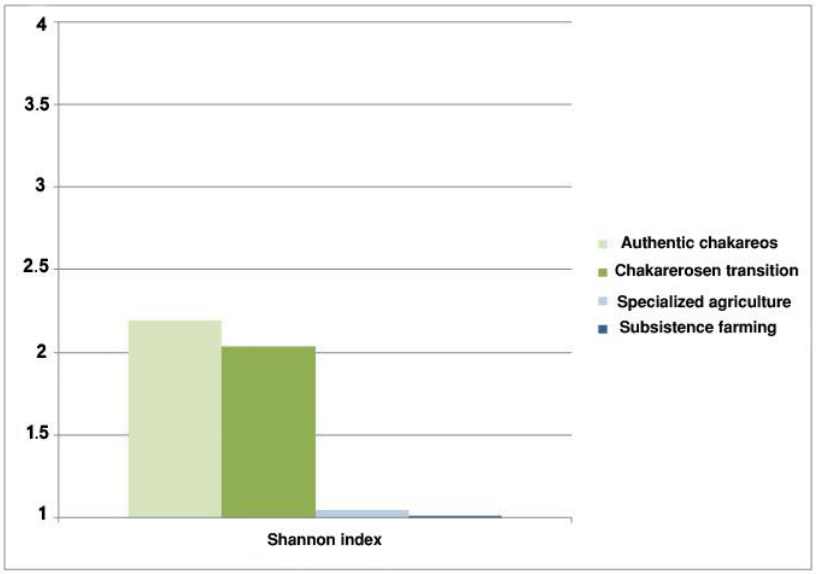

Fig. 3. Shannon index by types of producers; Source: Producers and Chacareros.

It is important to mention that plots were found with over 20 different species and without any specific rotation pattern. Therefore, an estimate of production was made, which may vary according to the different factors that influence the producers' activity.

Social and organizational aspects

It was also found that Chacareros or producers by equivalent practices are saving on health expenses. This data reflects that Chacareros value traditional Andean medicine, having a diversity of medicinal plants on their farm. Among the possible explanations, we can mention that the families of the Chacareros are in better health, linking this to a healthier and diversified diet as well as better harmony with nature, since there is no use of chemicals. However, for these explanations to be accurate, further study would be needed. Aspects analyzed by Alvaro (2012), within his research highlight ancestral medicine and the reduction of agrochemicals by Chacareros. Both Chacareros and specialized conventional producers dedicate a good part of their budget to the education of their children, while subsistence producers show less interest and priority towards education. Chacareros and conventional producers see associativity as a crucial element. In the case of Chacareros, the importance of the organization for the recovery and valuation of ancestral knowledge and practices is highlighted, while in the case of conventional producers it is considered as a strategy to generate income. In the case of subsistence producers, their interest is less in terms of organization, and in practice, they participate for specific interests or to comply with the obligations imposed by their managers, reflecting the typology of subsistence agriculture from the study by Haro (2022).

Table 1. Summary of data by type of production system.

Items	Chacareros		Producers in transition		Conventional producers		Subsistence producers	
	1	2	1	2	1	2	1	2
Economic indicators								
Gross income / ha (USD)	18.721	17.575	7.737	11.287	12.882	8.687	3.199	2.299
Net profit / ha (USD)	6.429	5.872	1.484	2.796	2.190	1.308	-4.834	-3.485
Efficiency (%)	143	147	123	132	120	117	40	37
Monetary income (USD)	9.284	611	10.744	-373	9.090	5.589	901	156
Total monetary income (USD)	9.284	1.475	10.744	5.386	12.690	5.589	901	156
Monetary income generated on the farm (%)	100	41	100	60	72	100	100	100
Indicators related to food security								
Food purchased and produced (USD)	7.424	2.075	6.140	8.357	3.700	3185	1.695	1.730
Foods that come from the system (%)	68	90	61	69	51	43	47	54
Own inputs (%)	92	93	91	92	31	51	49	73
Variety of food products produced	71	37	29	39	14	16	7	9
Organic production (%)	100	100	83	100	26	17	53	23
Andean species cultivated	25	100	27	38	9	7	3	7
Biodiversity indicators								
Shannon index	2.11	2.28	1.98	2.09	1.10	1,00	1,03	1,00
Species present in the system	73	127	49	66	21	19	9	9
Other indicators								
Budget health expenses (%)	0.01	0.001	0.45	4	12	12	-	-

Source: Producers and Chacareros.

DISCUSSION

Once comparing the Chacarero with the conventional producer, it was find that the Chacarero develops his production with the main objective of feeding his family, and the surpluses are destined for the market, while the conventional producer directs his production for sale in the market and maintains a small area of land as an orchard to produce a few species for family consumption. Regarding technological aspects, the conventional producer has a production with high use of technological packages, while the Chacarero makes use of his ancestral wisdom, which includes diversified production with little use of external inputs. Regarding the efficiency of the different production systems, it was established that the Chacarero system reaches 133% while the conventional producer system 117%, which is slightly lower. If we economically value each of the systems practiced by this type of producer, we find that the Chacarero has a net profit that is almost three times higher than that of the conventional producer (Peñafiel & López 2017). Regarding monetary income, we see that although the Chacarero's production is directed primarily towards home consumption, this income is higher than the income of the conventional producer who directs his production to the market, especially due to their higher income stability from diversity of production. In the social aspects, it was found that the conventional producer should dedicate a much higher monetary budget than the Chacarero to health issues. An important aspect found was that the Chacarero's children are studying and despite this situation they are always closely linked to the productive activities of the farm. However, in the case of the conventional producer's children, they study with less success and are practically not linked to the productive activities of the family, and their actions are limited to very specific activities. Once comparing a Chacarero with a subsistence producer, it was noticed that the Chacarero has a much higher net benefit. Respecting to the efficiency of the different production systems, it is found that the Chacarero system reaches 150% while the subsistence producer's system less than 100%, exhibiting that their system is not efficient. In the case of monetary income, the Chacarero has much higher incomes than the subsistence producer, in accordance with the study carried out by Haro (2022), since they corresponded to specialized and diversified family agriculture. In association with the conditions to achieve food security, as in the previous case, the Chacarero is in excellent condition, while the diet of the subsistence producer is very basic. If possible, he feeds twice a day, rarely three, and his diet is little varied and based on carbohydrates. It was similar to what was

referenced by Pengue (2005) who pointed out that the issue of food security constitutes the basis for local rural development. The Chacarero's system demonstrates much greater biodiversity, since their system has 139 species, while only 19 species were found on the subsistence producer's farm. Once comparing a producer in transition with a conventional producer, it was found that the producer in transition directs his production for home consumption, while the conventional producer for sale in the market. The producer in transition obtains a slightly higher net benefit than the conventional or subsistence producer. In the case of the efficiency of the different production systems, it was found that the producer system with practices similar to the Chacarero reaches 132%, while the specialized producer system 120%. Regarding the conditions to achieve food security, we found that the producer in transition is in better condition than the conventional producer. Finally, we observed that the producer should dedicate a much higher monetary budget than the producer in transition for health issues. Once comparing the producer in transition with a producer who has subsistence agriculture, it was found that both types of producers grow for sale and for home consumption. We found that the producer in transition has a higher net benefit than the subsistence producer, whose benefit is negative. Regarding the efficiency of the different production systems, we can see that the transition producer system reaches 123% while the subsistence producer system is less than 100%, which shows that it is not efficient. Regarding monetary income, it was found that the producer in transition has an income five times higher than that obtained by the subsistence producer.

Production destination

Many correlations have been found between the components of the production system that is carried out at different levels. It is important to consider what the system's production is used for to explain these correlations.

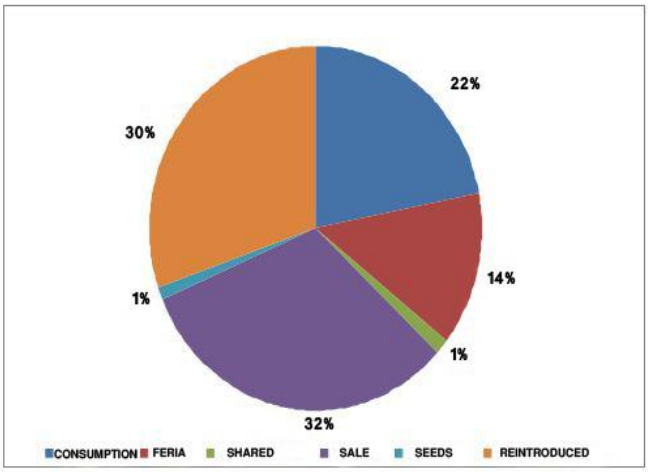

Fig. 4. Production destination from the Chacareros' production system (%).

CONCLUSION

The case study allows us to have a characterization of the production systems of the Chacareros, confirming that they are the wisest of the production systems in the indigenous communities of the Puruway people. Their systems are generally established on a small area (about one hectare) without using chemicals and have a high diversity of agricultural, livestock, medicinal, and forestry species, recovering ancestral and traditional products, practices, technologies, and knowledge. Its production is mainly intended to achieve “Ally Kausay”, i.e., for family consumption, feeding animals, sharing with neighbors and relatives, redistributing during the holidays, feeding and protecting natural resources in concert with the Pacha-mama, and the sale of surpluses in the market, preferring sale at fairs. Even with limited access to land, the Chacareros and their family manage to lead a dignified life, since their production system is profitable. They achieve good nutrition, and value their natural and cultural heritage. They reduce their vulnerability to natural and anthropic risks (financial, ecological, and chemical). Beyond access to land, we see that it is fundamentally about choosing the agricultural model that best suits the sustainable development of Ecuador. The traditional production systems studied generate positive externalities that are not incorporated in the conventional financial valuation. For example, savings in feeding the family and animals, redistribution during the holidays, savings in the purchase of agricultural inputs, environmental conservation, recreation, landscape, health. Furthermore, it was found that Chacareros periodically encounter

healthy and quality products in limited quantities to market and always manage to sell them without being affected by the negotiating power of the intermediaries. In this regard, we can observe that the concept of agricultural economies of scale is inaccurate. The appreciation of the culture and identity of the people is achieved through the recovery of traditional Andean products, practices, technologies, and knowledge. This helps with personal development and organizational strengthening in communities. At the level of the production system, it has been observed that both men and women have complementary roles. From the indigenous worldview, the concept of duality within the home is valued. It is necessary to reconsider the concept of poverty when diagnosing the territories, since in the study carried out, it was noted that these production systems generate numerous benefits that are not incorporated in the Poverty by Consumption indicator. Poverty by NBI is debatable, since it also does not incorporate cultural preferences. Development projects and state intervention must ensure that they do not overlap with local initiatives but rather strengthen the role of the people and organizations that make up the territory, so that they are the subjects and actors of their own development. In general, Chacarero's production system and producers in transition are more profitable and efficient than conventional producers. The production systems of the Chacareros and producers in transition are in better condition to achieve food security. Chacareros and producers in transition maintain a more balanced relationship with nature than conventional producers since the former maintain a very high biodiversity and practices that are respectful and integrated with nature. Chacareros and producers in transition distribute their money much better, try to promote education to their children, are part of associative structures, and have strong leadership in the community.

Conflict of interest

Nothing to declare, Therefore, all the authors declare that they have no impediment in publishing the information, since they have the consent to participate on the part of the producers who participated in the investigation.

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