



Bird roles in small-scale poultry production: the case of a rural community in Hidalgo, Mexico



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Abstract:

In Mexico, various studies emphasize that the importance of small-scale poultry farming in the rural setting falls on two of the roles assigned to poultry: 1) Contribution to food security and 2) Generation of economic income. Few studies identify and describe the complementary functions of poultry in small-scale production systems and how these species contribute to the welfare of the producing family. In this study, was identified and analyzed the roles assigned by the producing families to the poultry species in the 26 bird production units, out of 29, in the rural community of La Cuchilla, Hidalgo, Mexico. It was found that poultry could be assigned six different functions, not mutually exclusive: nutritional (26.9 %), environmental (24.4 %), cultural (17.9 %), economic (16.7 %), social (11.5 %), and recreational (2.6 %). Each one of these roles contributed to the family welfare in five different spheres: food security, availability of economic resources, strengthening of social relationships, link to the market, and transmission of vernacular knowledge. This study concludes that poultry can have multiple roles beyond their contribution to food security (nutritional role) and economic resources (economic role). These roles can be used as strategies by the producers to achieve family welfare in five different spheres. Comprehensively understanding the concept of role is essential to design development strategies based on the production aims and logic of the producing family.

Key words: Backyard, Rural development, Food security, Family poultry farming.

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Introduction

In the rural sector, small-scale poultry (SSP) is one of the most practiced livestock activities, in which the needs of the producing family, and not the market demands, dictate the production strategies. Several authors have highlighted two main roles of poultry production in rural communities: the high-quality and low-cost protein contribution to the family diet and the extra income generated from selling poultry products, which allows the acquisition of complementary goods and services to satisfy the family's needs^(1,2).

However, Centeno⁽³⁾ proposed that the farm animals in a small-scale production system can fulfill additional roles, such as a socio-cultural one (in community festivities and family celebrations, and as an educational instrument). Moreover, other authors have observed that producing families can also use farm animals for environmental (manure), social (strengthening of ties and social hierarchy), and work-related purposes (pack animals and traction), as well as a source of savings or insurance (by providing the family with assets in times of crisis)^(4,5).

Producing families assign diverse roles to their farm animals based on their strategies to improve the family welfare. Each strategy is determined by the capacities of the producing family (labor force, experience, and knowledge availability), their needs (economic income, health services, food, etc.), resources, particular objectives, and values^(3,5).

Although the roles and dynamics of small-scale poultry production are closely linked to the livelihood and welfare characteristics and needs of the producing family, few studies in Mexico have identified or analyzed the different roles assigned to poultry and how they improve family welfare.

This study aimed to identify the roles assigned to the poultry species in the rural community of La Cuchilla, Nopala de Villagrán, Hidalgo, Mexico, as proposed by several authors^(4,6) and how these roles contribute to the welfare of the poultry producing families.

Material and methods

Study area

This study takes place in La Cuchilla, a highly marginalized rural community in Nopala de Villagrán, Hidalgo. La Cuchilla is one of the 112 communities of Nopala de Villagrán, which, according to the INEGI, is the second municipality with the highest number of poultry in the State of Hidalgo (689,850 heads); it concentrates 18% of the total poultry in the State. This community has a humid subtropical climate with rains during the summer. It is classified as a rural community with a high degree of marginalization⁽⁷⁾.

Research stages and data collection

This study followed a non-experimental design using a descriptive method. During the first stage, an agricultural census was carried out to identify the total number of family farm production units (FFPUs) and the type and number of animal species in the community. After recognizing the FFPUs used for poultry production (26/29), bird species were identified.

During the second stage, semi-structured questionnaires were applied to the person responsible for the poultry production in the selected production units to identify the roles assigned to the poultry, following the classification proposed by various authors^(4,6). In this study, bird roles were defined as the function that the family assigns to their poultry based on the benefits they expect to obtain from their breeding and production. Roles were identified and classified by applying semi-structured questions designed to obtain information about the following characteristics:

Nutritional role: production destined for family consumption, amount of production destined to family consumption, and frequency of use of poultry-derived products.

Cultural role: participation of sons and daughters in poultry production and reasons to include them in breeding and poultry production activities.

Economic role: production percentage destined for sale.

Social role: production destined for celebrations, parties (weddings, baptisms, birthdays), or gifts to family or neighbors.

Environmental role: chicken manure destined as fertilizer.

Recreational role: bird breeding for pleasure.

Family welfare spheres were defined based on previous reports that identified the contribution of small-scale livestock at the family level: food security^(8,9), availability of economic resources⁽¹⁰⁾, strengthening of social ties⁽¹¹⁾, market connection⁽⁸⁾, and transmission of vernacular knowledge⁽⁵⁾. The family welfare spheres were defined as those positive impacts in the daily life of the producing family that result from the roles assigned to the poultry.

Egg-sale strategies were identified using semistructured questions about the points of sale (direct or indirect), the types of consumers, and sales periodicity. These sale strategies were classified as proposed by LEADER⁽¹²⁾.

Data analysis

The collected data were analyzed by descriptive statistics (absolute and relative frequencies) using the statistical software for social sciences SPSS 15.0 and Excel 2010.

Results

General characteristics of the family farm production units (FFPU)

Of the total FFPU, 93.1 % (27/29) reported having animals. There were 1,089 animals in the community; the most abundant species were poultry (48 %), followed by sheep (39 %), dairy cattle (11 %), rabbits (1 %), horses (0.6 %), and pigs (0.3 %). Of the total FFPU with animals, 96.3 % (26/27) had poultry, of which 96.15 % were used for egg production and 3.85 % for meat. Laying hens were the most abundant poultry species (71 %), followed by chickens (10.4 %), roosters (6.4 %), turkeys (6.1%), fighting poultry (4.7 %), ducks (0.8 %), and geese (0.6 %).

Family members involved in the FFPU

Poultry activities were performed by women in 100% of the FFPUs. However, in 57 % of the cases, the interviewed women were entirely in charge of the poultry; in the rest of the cases, the mother (4 %), husband (14 %), children (14 %), and adult daughters (11 %) were involved in poultry production and frequently or sporadically contributed to various activities, such as egg collection, feedlot cleaning, feeding, cleaning of drinking and feeding troughs, and egg selling.

Importance of poultry

The FFPUs with animals had 2.4 ± 0.9 animal species in a range from 1 to 6 species; in the community, the livestock activity tended more towards diversification than its production specialization. Overall, poultry animals were considered the most important species (Table 1). However, FFPU with less than three animal species were the ones that considered poultry the most important species (82.3 %); this shows that as the diversity of animal species increased (from 4 to 6), the importance attributed to poultry decreased (17.7 %).

Table 1: Most important livestock activity according to the interviewed producers in La Cuchilla

Livestock activity	Frequency	%
Poultry	17	63.0
Dairy cattle	7	25.9
Sheep	2	7.4
Rabbits	1	3.7
Total	27	100.0

Due to the numerous benefits obtained from poultry farming, food security being the most mentioned benefit, 63 % of the producers consider it the most crucial activity in their FFPU (Table 2).

Table 2: Reasons why poultry species are considered the most important by the interviewed producers in La Cuchilla

Reasons	Frequency	%
Family food source (food security)	9	37.4
Hens are used as food during food shortage.	1	4.2
The sale of eggs and chicks allows obtaining money that satisfies family needs	4	16.6
Avoid external purchase of chicken and eggs	1	4.2
Possibility of selling a bird or sheep in family emergencies	1	4.2
For special occasions (family visits, celebrations, family gatherings)	1	4.2
Recreation and hobby	1	4.2
It is their only species	2	8.3
Provides a sense of ownership	2	8.3
Egg collection	1	4.2
Poultry are considered as part of the family	1	4.2
TOTAL	24	100.0

The role of poultry in small-scale production systems

Roles were classified into six categories based on the different uses and purposes assigned to the poultry products and poultry by the producers (Table 3). On average, each producer assigned three roles to the poultry, these roles were not mutually exclusive.

Table 3: Roles assigned by the interviewed producers in La Cuchilla

	Role	Frequency	%
Nutritional	Family consumption of poultry products	21	26.9
Environmental	Use of manure as an organic fertilizer in the milpa (cornfield)	19	24.4
Cultural	Transmission of vernacular knowledge, teaching work ethic and values through the breeding and caring of the poultry	14	17.9
Economic	Sale of poultry products to obtain economic income	13	16.7
Social	Use of poultry products in celebrations (weddings, parties, birthdays)	9	11.5
Recreational	Obtaining pleasure and satisfaction from bird care	2	2.6

a) Nutritional role

On average, producing families consumed bird meat from their production one time every 24 ± 5.61 wk (6 mo). Producing families only consume poultry meat in specific situations, such as in times of food shortage or special occasions (Table 4). Moreover, poultry was mainly used for egg production purposes, not for family meat consumption.

Table 4: Reasons why producers consume the chicken meat from their production units in La Cuchilla

	Reasons	Frequency	%
Food shortage		7	26.92
Taste		7	26.92
Old poultry that are sick or no longer used for egg production		5	19.23
Celebration (birthdays, family visit)		4	15.38
When there is no money to buy meat		1	3.85
Meat is not consumed		1	3.85
Avoid spending money in "free range" meat		1	3.85
Total		26	100.0

Of the total FFPU with poultry, 96.15 % were engaged in egg production. Eggs were mainly used for family consumption (54.76 %), sale (35.71 %), and as gifts to their neighbors or family members that no longer live in the community to strengthen ties (9.53 %).

b) Cultural role

In this study, 100 % of the producers with family members younger than 17 yr old, either from their nuclear or extended family, used poultry farming to teach them values and work ethic by involving their family members in bird care and production activities. The cultural role of poultry farming consisted in:

- 1) Teaching children how to work from an early age and make them responsible for one activity to keep their minds focused on something positive that will help them in the future;
- 2) Teaching them about savings;
- 3) Preserving across generations the culture and knowledge that states that through hard work, children can procure their own food;
- 4) Teaching them how to take care of the animals in order to harvest tangible (money, food) or intangible benefits (knowledge, experience in animal handling);
- 5) Teaching them the value of things;
- 6) Leaving a legacy for the children, which can constitute a means of life for the future.

c) Economic role

Of the total egg producing FFPU, 60 % sell their products in the local area. The egg-selling price was \$2.00/egg in the entire community, except for one producer that sold it at \$2.50/egg. The weekly economic income obtained from egg sales ranged from \$20 to \$ 420. This variation resulted from the number of hens per FFPU and the percentage of eggs for sale.

The small producers used different short food supply chains (SFSC) to reach consumers inside and outside the community. In this study, 10 SFSC were identified and classified into three groups, as proposed by LEADER⁽¹²⁾: local markets (25.92 %), direct sale to the FFPU (55.56 %), and home delivery (18.52 %) (Table 5).

Table 5: Egg short food supply chains (SFSC) used by the producers in La Cuchilla

SFSC	Venue/ Actor	Frequency	%
Sales in stores	Supermarkets and butcher shops	2	7.41
	Tianguis (open-air market)	3	11.11
SFSC1 (25.92 %)	Restaurants	1	3.70
	Bakery	1	3.70
Direct sales in the FFPU SFSC2 (55.56 %)	Neighbors	8	29.63
	Family members from a different State or municipality	4	14.81
	Neighbors - to complete their orders (cooperation)	2	7.41
	Visit in the FFPU	1	3.70
Home delivery SFSC3 (18.52 %)	Specific people by previous orders	3	11.11
	Door-to-door sales in the municipality	2	7.41

Although 60 % of the FFPU sold their eggs, not all production was intended for sale. The number of eggs produced was distributed based on the profit that each producer intended to obtain. The FFPU were divided into three groups based on the number of eggs destined for sale.

Group 1 (Economic): producers that destined the largest number of eggs for sale locally (66.67 %) (Table 6).

Table 6: Short food supply chains (SFSC) used by the producers who sold the majority of the eggs produced in their FFPU

Type of role	SFSC	Venue/ Actor	%
Group 1. Economic	SFSC2 52.38 %	Neighbors	28.57
		Cooperation	9.52
		Family members	9.52
		Visit to the FFPU	4.76
	SFSC1 28.57 %	Bakery	4.76
		Tianguis (open-air market)	14.29
		Supermarket	9.52
	SFSC3 19.05 %	Previous orders	14.29
		Door-to-door sales	4.76

Group 2 (Family consumption): producers that destined the largest number of eggs for family consumption (26.67 %) (Table 7).

Table 7: Short food supply chains (SFSC) applied by the producers who used most of their egg production for family consumption

Type of role	SFSC	Venue/ Actor	%
Group 2. Family consumption	SFSC2 60 %	Family members	40
		Neighbors	20
	SFSC1 20 %	Restaurants	20
SFSC3 20 %	Door-to-door sales	20	

Group 3 (Social): producers that used most of their eggs as gifts to family members or close neighbors (6.67 %).

As shown in Tables 6 and 7, the variety of places used to sell eggs differed according to the group to which each FFPU belonged. For example, group 1 had a wider variety of places to sell eggs by SFSC than group 2. Group three consisted of only one FFPU. These results indicate that although most FFPU sold their eggs, some used most of their products for other social or nutritional roles.

d) Social role

As mentioned before, a percentage of the eggs produced in the FFPUs was assigned a social purpose. These eggs were consumed in family events (family visits or birthdays) or used as gifts for family members or neighbors to strengthen their ties. In this case, the consumption of poultry meat in special events was not reported.

e) Environmental role

Chicken manure was used as a milpa (cornfield) fertilizer by 83.3 % of the producers; 8.3 % did not use it at all, and 4.2 % sold it or used it in the herbarium (4.2 %). Furthermore, 52 % of the producers used the corn from their milpa (cornfield) to feed their poultry; this practice decreases the purchase of external supplies. This feeding practice changed at specific times of the year (non-sowing seasons or water scarcity).

f) Recreational role

According to 2.6 % of producers, poultry farming represents a recreational and relaxing activity that allows them to rest from their daily activities, bringing them pleasure and satisfaction.

Family welfare spheres

Each of the roles assigned to poultry contributed to the family welfare in different ways, classified in five spheres: food security, availability of economic resources, strengthening of social relationships, link to the market, and transmission of vernacular knowledge. Food security (availability and accessibility): poultry eggs or meat were consumed in times of food shortage, for pleasure, and as savings or when money was not available.

Availability of economic resources: the economic income obtained from each FFPU was used to obtain several goods and services that improved family welfare, allowed reinvesting in the various livestock activities of the family, and contributed to their food security by allowing them to purchase food that was not produced in their FFPU (Table 8).

Table 8: Use of the economic income obtained by the producers from the sale of eggs in La Cuchilla

Use of the economic resources	Frequency	%
Food for family	12	57.14
Poultry feed	4	19.06
Feed for other species	1	4.76
Fare	2	9.52
School fare for children	1	4.76
Mill use	1	4.76
Total	21	100

Strengthening social ties: eggs were used as gifts for their neighbors or family members who no longer lived in the community as a symbol of reciprocity and trust.

In this case, it was possible to infer that egg production allowed the establishment of close relationships between the producers through cooperation mechanisms; one producer could complete the number of eggs of another producer so that the latter could sell the required number of eggs (cooperation strategies).

Link to the market: Small producers used different SFSC to sell the eggs produced in their FFPU. The SFSC included strategies that connected them with consumers both inside and outside the community. According to the producers, the advantages provided by the SFSC included the inexistence or low number of intermediaries involved in egg commercialization, which allowed them to sell their product directly to the consumers and concentrate their profits.

Transmission of vernacular knowledge: producers with family members younger than 17 yr old, either from their nuclear or extended family, used poultry farming to teach them values and work ethic by involving their family members in poultry care and production activities. Producers also transmit vernacular knowledge about production strategies and means of subsistence.

Discussion

General characteristics of the FFPU in the rural community

The current data about the state of rural communities in Mexico only correspond to population density, marginalization degree, social lag degree, number of housing units, and

household deficiency indicators. However, the data about the production and productivity of agricultural and non-agricultural activities in rural communities are scarce. These data are available per municipality or state, not per rural community.

The search of poultry production data at a micro-level in rural communities is difficult because the data provided by the INEGI have the following limitations: 1) The information provided is solely at the municipal level and focuses on the population density of its poultry, the number of poultry products sold, and their access to technology. 2) INEGI only considers the production units that report having more than 1,000 poultry, ignoring small-scale producers. 3) The data do not distinguish the dynamics between large-scale and small-scale poultry production systems based on their access to technology or animal density.

In the specific case of La Cuchilla, there are no previous data about the overall production characteristics of its agricultural and non-agricultural activities or its technological level, productivity, income, or employment.

Therefore, it is essential to carry out studies that collect and analyze data from rural communities at a micro-level. These studies will provide basic information for future and more complex studies that will help understand the dynamics of the FFPU in rural communities at a local, national, and international level and how they survive in a capitalist system.

The data in this study allow us to glimpse the activities practiced in La Cuchilla and the importance of poultry production for producing families.

Importance of poultry

Several studies carried out in Mexico highlight two common reasons for which small-scale poultry farming exists in the rural sector, family consumption and the sale of poultry products. For example, previous studies in Yucatan reported that poultry products were used for selling purposes, family consumption, and, in some cases, for incubation^(13,14).

In some Oaxacan communities, eggs are mostly used for selling and incubation purposes; in other communities, like Zompantle, eggs are mainly sold and used for breeding chicks⁽¹⁵⁾. In the Oaxacan coast, poultry products are mostly sold, used for family consumption, or as gifts. In other communities, also in Oaxaca, poultry products are mainly sold to neighbors and used for family consumption⁽¹⁶⁾.

As reported by different studies carried out in Mexico, the roles assigned to poultry in rural communities are based solely on the use of poultry products. These roles have not been described, studied, or analyzed as a way to establish strategies to achieve the welfare of the producing families.

Contrary to previous studies, which technically characterize small-scale poultry farming in Mexico and focus on its nutritional and economic roles, several authors highlight that poultry must be considered as a means to improve the lifestyle of rural communities, that is, family welfare. Poultry are also important for pest control, as a source of organic fertilizer, and essential in special festivities and traditional ceremonies^(6,11).

This study indicates that producing families guide their production based not only on technical-economic interests⁽¹⁷⁾; they also consider non-economic interests, such as their basic needs (nutritional, economic, social, and cultural)^(18,19). These results highlight the multiple roles of poultry, not their zootechnical purpose.

a) Nutritional role

Increasing food production, by itself, is not enough to mitigate hunger and malnutrition; it is also important that the food satisfies the tastes and preferences of those who consume it, in addition to making it more available to those who need it⁽²⁰⁾.

Several authors agree that small-scale animal production systems can potentially contribute to the food security of the inhabitants of developing countries^(6,9,21,22). This study reports similar results; it shows that poultry farming increases the availability and accessibility of chicken meat and eggs, particularly during food shortage.

b) Cultural role

The importance of poultry as a means to teach work ethic and values to family members younger than 17 yr old has not been previously reported; however, the transmission of vernacular knowledge, work ethic, and values through backyard practices to younger generations has been reported⁽⁵⁾.

This study shows that producers use poultry farming as a means of informal education to teach and promote their agricultural practices among young people, teaching them a way of living. Other studies focus on the use of poultry in religious activities, traditional medicine, and farm waste control⁽²⁰⁾; however, during this study, not such uses were observed.

c) Economic role

The economic role of poultry was fulfilled through the sale of eggs to obtain immediate economic income. A previous study reported that in Oaxaca, 50 % of the eggs was sold, the

remaining 50 % was used for incubation purposes⁽¹⁵⁾. However, in this study, 60 % of producers sold a fraction of their egg production in the local area.

Similar to what was previously reported in Ethiopia⁽²⁰⁾, the economic income obtained from the sale of poultry products was mainly used to purchase complementary goods and services to meet the family needs, such as food that was not produced in their FFPU, and to pay the corn milling in the local mill^(18,19).

Some authors consider that small-scale producers are reorienting their production profile towards the generation of products destined for the market due to a greater demand for cash to meet new needs and obligations that were not present at the beginning of the century⁽²³⁾. However, these data show that the relative importance of the nutritional role has not decreased in this rural community. In fact, the different roles assigned to poultry have met the needs of the producers and their families, and the economic role is not the only way to achieve family welfare.

d) Social role

Animals social roles are mainly used to meet the responsibilities acquired through the social relationships established between the family and members of the community, such as family celebrations (weddings, baptisms, funerals), local festivities (Patron Saint Festivals), traditions (Day of the Dead, Holy Week), gifts, or barter^(1,3,5). The data from this study show that eggs were consumed in special events (birthdays, festivities, etc.) and gifted to family members or neighbors to strengthen social relationships, which is similar to that reported in studies carried out in Asia and Africa^(10,21,24).

e) Environmental role

The studied FFPU show the possibility of carrying out different activities, both agricultural and non-agricultural. The interrelationship between livestock and agriculture is important because it strengthens the symbiotic connections between both agricultural activities. According to several studies, poultry has three important environmental roles: pest control, by collecting the waste from grains and forages⁽²⁵⁾; chicken manure as organic fertilizer; and weed control⁽²⁰⁾. In this study, results showed that, within the environmental role, poultry were only used as a source of organic fertilizer; this activity reduced the residues produced by poultry.

f) Recreational role

Some authors have reported that breeding and producing small-scale animals results in tangible and intangible benefits to the women in charge of this activity. It has been reported that although the intangible benefits have a direct positive effect on the mood of the producers, they cannot be transformed into money⁽²⁶⁾. Other studies have identified the acquisition of poultry for companionship or combat purposes, as in the case of gamecocks,

considering them as a means of entertainment⁽²⁷⁾. In this study, poultry, specifically their breeding and production, functions as a distraction from daily activities, bringing satisfaction to the producers and contributing to their welfare (intangible benefits).

Family welfare spheres

Food security: a family has food security when it has access to the food required by all its members for a healthy live (adequate in terms of quality, quantity, security, and cultural acceptability)⁽⁹⁾. This study identified that poultry production contributes to food security; however, it is necessary to evaluate other food security elements to determine its contribution more accurately.

Availability of economic resources: producers in rural communities often do not have access to financial markets, such as banks. Livestock, as a “source of living savings”, offers an alternative to save or accumulate capital. In times of crisis, producers can sell their cattle, pigs, and sheep to obtain money. In this study, poultry were not sold to solve financial crises, probably because the economic value of poultry is low compared to cattle. However, it was possible to identify egg sale strategies that gave access to complementary goods and services⁽⁴⁾.

Strengthening of social ties: Animals assigned social roles are mainly used to meet the responsibilities acquired through the social relationships established between the family and members of the community, such as family celebrations (weddings, baptisms, funerals), local festivities (Patron Saint Festivals), traditions (Day of the Dead, Holy Week), gifts, or barter^(1,3). In this case, it was possible to infer that egg production allowed to establish close relationships between producers based on egg sale cooperation mechanisms.

Link to the market: To face the economic, social, technological, and political changes, small producers have developed commercialization strategies to ensure the generation of family income and the continuity of the FFPU across generations⁽²²⁾. In this study, producers used various short food supply chains to sell their poultry products; this allowed them to find different niche markets, where producers could also sell other products generated in their FFPU.

Transmission of vernacular knowledge: A study performed in Yucatan reported that small-scale production unites the family and community through activities focused on preserving, enriching, and spreading the knowledge of its inhabitants; backyard production reflects how

much a family knows about their environment⁽²⁸⁾. This study identified the essential elements transmitted through poultry production: values, work ethic, and production strategies.

It is necessary to identify the elements transmitted through this livestock activity, such as production strategies to reduce the use of external supplies, traditional treatments for diseases, sales strategies, etc.

In developing countries, livestock activities have been mainly focused on generating income and meeting the growing needs of the production units. These efforts prioritize technologies that maximize individual animal productivity, technology transfer, and thus, the dissemination of technical information^(29,30). However, these actions should not only focus on increasing the yield of poultry production and income, because the FFPU are not necessarily developed under a capitalist logic and, therefore, may not correspond to the context in which they are developed⁽⁴⁾. Actions must be accompanied by a comprehensive understanding of the bird role and the context in which it develops so that the design and implementation of programs or strategies respond to the problems and concerns of the producers and are consistent with their objectives and production strategies^(20,25).

Conclusions and implications

Producers from the rural community La Cuchilla could assign up to six different roles, not mutually exclusive, to their poultry: nutritional, environmental, cultural, economic, social, and recreational. Each of the roles assigned contributed to the family welfare in five different spheres: food security, availability of economic resources, strengthening of social relationships, link to the market, and transmission of vernacular knowledge. This study concludes that poultry can have multiple roles beyond their contribution to food security (nutritional role) and economic resources (economic role). These roles can be used as strategies by the producers to achieve family welfare in five different spheres. Comprehensively understanding the concept of role is essential to design development strategies based on the production aims and logic of the producing family.

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