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Characterization of the factors associated with the growth phase of dairy cattle in family farming

Levantamento dos fatores associados à cria e recria de fêmeas bovinas de propriedades leiteiras familiares

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Abstract

The aim of this study was to characterize the factors associated with the growth phase of dairy cattle used in family farming. We investigated 20 family-run milk production systems located in the Conceição de Ipanema municipality, MG, Brazil. Farmers were interviewed using a semi-structured survey form containing 152 questions. The questions were aimed at characterizing the farmer, herd, and husbandry system at pre- and post-weaning phases. Data were processed by using Sphinx® software, and descriptive analyses were performed in MS Excel® software. The results showed strengths, including navel healing (100%), location of the calf housing above (45%) or next to the pen (35%), and existence of a sanitary calendar (90%). However, several limitations in the management of calves and heifers were identified, such as lack of zootechnical bookkeeping (55%), manual milking with calf at the foot (65%), absence of herd sizing (100%), no routine weighing of calves (95%), incorrect colostrum management (80%), non-supply of transition milk to calves (85%), and likely failure to diagnose diseases by a fraction of the farmers. Thus, training regarding adequate management practices by extension technicians is imperative, along with the formulation of public policies that comply with the aspirations of family farmers, while promoting their economic and social sustainability.
Key words: Calf. Dairy farming. Family farming. Heifer. Rural extension. Survey.

Resumo

O objetivo deste estudo foi caracterizar os fatores associados à cria e recria de fêmeas bovinas de propriedades leiteiras em regime de economia familiar. Foram investigados 20 sistemas de produção de leite familiares localizados no município de Conceição de Ipanema, MG, Brasil. Os produtores rurais foram entrevistados utilizando-se um formulário de diagnóstico semiestruturado contendo 152 perguntas. As questões abordadas envolveram a caracterização do produtor, do rebanho e do sistema de criação de bezerras e novilhas. Os dados foram processados no software Sphinx® e as análises descritivas foram realizadas no software MS Excel®. Os resultados demonstraram pontos fortes, incluindo realização de cura de umbigo (100%), localização dos bezerreiros acima (45%) ou ao lado do curral (35%) e existência de calendário sanitário (90%). Porém, diversas limitações no manejo da criação de bezerras e novilhas foram identificadas, como a não realização de escrituração zootécnica (55%), ordenha manual com bezerro ao pé (65%), ausência de dimensionamento do rebanho (100%),

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não execução da pesagem rotineira das bezerras (95%), manejo da colostragem incorreto (80%), não fornecimento do leite de transição para as bezerras (85%), além de possível falha no diagnóstico de doenças por parte dos produtores. Assim, é imperativa a disseminação de práticas de manejo adequadas pelos técnicos extensionistas e a formulação de políticas públicas que atendam as aspirações e promovam a sustentabilidade econômica e social dos agricultores familiares.
Palavras-chave: Agricultura familiar. Bezerra. Diagnóstico. Extensão rural. Novilha. Pecuária de leite.

Introduction

Milk production is distributed across almost all Brazilian regions, but the heterogeneity in the production process is striking, both in terms of production techniques, as well as herds and type of producers (STOCK et al., 2011). The state of Minas Gerais is the largest milk producer in Brazil, with approximately 8.97 billion tons of milk production per year, representing 26.68% of the national production (IBGE, 2016). Despite the high milk production, the dairy segment in Minas Gerais mostly comprises family production units, which represent about 80% of the total milk production volume in the state (IBGE, 2006).

Dairy farming is a highly competitive and globalized activity, which requires from producers a permanent search for technical and economic efficiency. In this context, despite the importance of improving management practices and productivity indices, restructuring productive capacity, controlling milk quality, and examining the forms of relationship among the various dairy chain actors for seeking better market insertion alternatives, family farming is still characterized by traditional rural establishments, low levels of productivity, lack of technical and managerial property knowledge, strictly empirical decision-making, low adherence or poor use of available technology, and low economic performance (ALTAFIN et al., 2011; FAEMG, 2006; GUANZIROLI et al., 2013). In this study, the criterion for defining family farming was "a farm that is directly and personally operated by the farmer and his family, to absorb their entire workforce, providing them with subsistence and social and economic progress, with a maximum area fixed for each region and type of operation, and occasionally worked with the help of others", in accordance with Law No. 4504 (BRASIL, 1964).

High efficiency in the rearing of calves and heifers is of paramount importance for the success of dairy farming. During the suckling phase to the first calving, young animals do not contribute to direct income of the dairy farm, while accounting for 15% to 20% of the total milk production cost (MOURITS et al., 1997, 1999). Thus, an optimum management of the growth phase is crucial, so that expenses and mortality are minimized and growth is optimized, aiming anticipation of the age at first calving, and consequently, greater profitability.

Previous studies have attempted to understand how farmers rear replacement animals in some regions of Brazil (HÖTZEL et al., 2014; MACHADO NETO et al., 2004; SANTOS; BITTAR, 2015). However, despite the extensive participation of family farms in the milk production in Minas Gerais, the practices adopted by these farmers in the pre- and post-weaning phases of bovine females are little known. In addition, proposals for intervention in family farms should include a thorough analysis of the property, as well as the background in which the producer is inserted (LAZZAROTTO; FIORAVANÇO, 2012). Therefore, the objective of this study was to characterize the factors associated with the pre- and post-weaning phases of dairy cattle in a family-run economy in the municipality of Conceição de Ipanema, MG. This survey has an important practical implication, as it provides information on the rearing model and management practices adopted by this group of producers, with an aim to improve the means of intervention by extension technicians and to support the development of actions and policies specific to the region.

Material and Methods

Area of study and sampling

This study was carried out in 20 family-run dairy farms, located in the municipality of Conceição de Ipanema, MG, Brazil (19°55'40'' S, 41°41'38'' W), during the period from May to July 2016. The municipality has a total area of 253.94 km^2 and a population of 4,456 inhabitants. A total of 315 dairy farms are located in the municipality, producing around 5,353 thousand liters of milk per year, from the milking of 4,330 cows (IBGE, 2006). The study region is characterized by altitude ranging from 493 to 1,340 m above sea level and altitude tropical climate. The mean annual precipitation and temperature are 1,163 mm and 24.6 °C, respectively.

Farmers were contacted by the Technical Support and Rural Extension Company of the State of Minas Gerais (EMATER - MG). We selected farmers based on their availability and consent to participate in the survey, without any financial incentives. The characterization of the familial production systems used in the study is described in Table 1.

Table 1. General characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Husbandry system	Pasture-based	14	70.0
	Semi-confinement	6	30.0
	Confinement	0	0.0
Daily volume of milk produced*	Less than 50	1	5.3
	From 50 to 99	5	26.3
	From 100 to 149	4	21.1
	From 150 to 199	2	10.5
	From 200 to 249	4	21.1
	250 or more	3	15.8
Milking	With calf at the foot	18	90.0
	No calf at the foot	2	10.0
Type of milking	Manual	13	65.0
	Mechanical	7	35.0
Area for dairy farming	Less than 20 ha	4	20.0
	From 20 to 39 ha	9	45.0
	From 40 to 59 ha	3	15.0
	From 60 to 79 ha	0	0.0
	From 80 to 99 ha	3	15.0
	100 ha or more	1	5.0
Use of pasture lease*	Yes	7	36.8
	No	12	63.2
Farm has electric power	Yes	18	90.0
	No	2	5.0
Lives at the farm	Yes	12	60.0
	No	8	40.0

continue

continuation

Farmer education	Not literate	1	5.0
	Elementary-school education	8	40.0
	Secondary-school education	10	50.0
	Superior-school education	1	5.0
Time in dairy activity	Up to 10 years	7	35.0
	From 10 to 20 years	5	25.0
	More than 20 years	8	40.0
Receives technical assistance	Yes	10	50.0
	No	10	50.0
Type of technical assistance	Public	4	40.0
	Provided by dairy/cooperative	3	30.0
	Private	3	30.0
Technical assistance meets farmer's needs	Yes	10	100.0
	No	0	0.0
Seeks training	Yes	11	55.0
	No	9	45.0

In the cases where the frequencies differ from the total cases: *One farmer did not answer the question.

Interviews

A qualitative descriptive approach was used in this study. A single interviewer carried out face-to-face interviews with the farmers. A semi-structured questionnaire containing 152 questions (LOPES et al., 2016), which had been tested previously in dairy farms for corrections and adjustments, was used. The questionnaire addressed different issues related to the family production system, including newborn care, colostrum and nutritional management, animal identification method, zootechnical bookkeeping, husbandry practices, housing, and health management (main vaccinations and diseases). The duration of the interviews varied according to each specific case, with an average length of 3 h. At all times, farmers had the opportunity to clarify questions and add personal information and remarks.

Data processing and analysis

The data obtained from the interviews were tabulated with the help of Sphinx® software (version 2011, SPHINX, Canoas, RS, Brazil), in order to facilitate registration and to obtain a relatively uniform response. Thereafter, the responses were grouped into tables, aiming at better presentation, comparison, and discussion of the results. All descriptive analyzes were performed using MS Excel® software (EXCEL 2013, Microsoft Corp., Redmond, WA, USA).

Results and Discussion

The factors associated with the growth phase of dairy cattle in family economy were characterized in this study, which revealed important indicators for understanding the rearing model of young animals by this segment of animal production and its possible implications. The fact that dairy farming is prevalent throughout the Brazilian territory, along with the marked heterogeneity of the production process, points to the need for regional studies. The present study included 20 family-operated systems of milk production in the municipality of Conceição de Ipanema, located in the mesoregion of Zona

da Mata, MG. The geographical delimitation and choice of this region are justified because it represents a dairy basin traditionally composed of family farmers (IBGE, 2006).

Most farms (70%) were characterized by pasture-based systems, whereas semi-confinement systems accounted for 30% of the total number of farms. Pasture-based systems included traditional farms, comprising crossbred animals, degraded pastures, and restricted supplementation throughout the year. On the other hand, semi-confinement systems were characterized by improved systems, intensive grazing, and concentrated supplementation during the summer, and roughage and concentrate supplementation during winter. The stratification of farms by the volume of milk and area showed a predominance of small-scale production units (up to 250 L day^{-1}) and establishments with area less than 60 ha, which is consistent with previous estimates that 78% of the farms in the region have an area of less than 100 ha (IBGE, 2006). The type of milking was identified as mostly manual (65%) and with calf at the foot (90%), indicating the low level of technification in the family production systems. The results also showed that most of the farmers (60%) resided in the property and had been in the business for up to 20 years (60%). Residing on the property allows management and close monitoring of the activity, easy identification of problems, and the possibility of making decisions quickly. On the other hand, the low level of education among rural producers is likely to contribute to the difficulty of introducing new technologies. In addition, although only half of the farmers received technical assistance, in the interviewees' perception, it was sufficient to meet their needs (Table 1).

Adequate sizing of the herd aims at rational exploration of the area destined to the production system (LOPES et al., 2008). The studied herds comprised 200 calves (up to 12 months of age) and 157 heifers (over 12 months of age), with an average of 10 calves and 7.9 heifers per property. However, analysis of the number of animals per category indicated that the herds were not correctly sized (Table 2). Some properties showed a higher number of calves and heifers, whereas others showed a lower than ideal replacement of animals, which may be due to the high mortality of young animals, sale of animals without adequate planning for replacement, and absence of herd sizing. In addition, 21.1% of the herds raised male calves, a practice that may compromise the economic efficiency of the activity if conducted without planning, due to the high cost and low performance of dairy males.

Table 2. Infrastructure characterization used for calf rearing of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Housing system	Individual shelter	1	5.0
	Individual stall	2	10.0
	Collective stall	6	30.0
	Collective paddock	11	55.0
Shadow on installation	Sombrite	0	0.0
	Individual shelter	1	5.0
	Natural	9	45.0
	None	10	50.0

continue

continuation

Place of housing	Above the pen	9	45.0
	Below the pen	1	5.0
	Away the pen	0	0.0
	Next the pen	7	35.0
	Inside the pen	3	15.0
Housing system post-weaning	Individual shelter	0	0.0
	Individual stall	5	55.6
	Collective stall	0	0.0
	Collective paddock	4	44.4

A minority (18.8%) of the properties used individual housing systems (Table 3). The advantages of individual housing systems include control of milk, concentrate, and water consumption for each animal, facilitated perception of behavioral changes, and minimizing the contact between individuals, thereby, reducing the spread of diseases and the mortality rate. Despite the benefits of individual housing systems, the handling of cows with calves at foot makes it difficult to incorporate. Thus, in this case, it is important to distribute the calves according to age in small batches to ensure good observation and minimize promiscuity among animals (COELHO, 2005). Furthermore, the housing systems were located predominantly above (45%) or alongside the pen (35%), which is an important practice to reduce the risk of contamination and infection challenges.

Table 3. Zootechnical control characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Zootechnical bookkeeping	Yes	9	45.0
	No	11	55.0
Method of animal identification	Earring	7	30.4
	Hot iron	5	21.7
	Name	10	43.5
	Photo	1	4.3
Time of animal identification	On the day of the birth	11	55.0
	In the dehorn	4	20.0
	15 days	1	5.0
	30 days or more	3	15.0
	After weaning	1	5.0
Weighing of the calves	Yes	1	5.0
	No	19	95.0

continue

continuation

Criteria for weaning	Weight	3	15.0
	Age	8	40.0
	Concentrate consumption	3	15.0
	Mother rejects	5	25.0
	9 months	1	5.0
Criteria for grouping of heifers	Gender	2	10.0
	Age	5	25.0
	Weight	2	10.0
	Does not separate	9	45.0
	Does not have	1	5.0
	Separation	1	5.0
Age at first service	13 to 15 months	1	5.0
	16 to 18 months	1	5.0
	19 to 21 months	1	5.0
	22 to 24 months	5	25.0
	More than 24 months	12	60.0
Weight at first service*	250 to 300 kg	4	26.7
	301 to 350 kg	10	66.7
	351 to 400 kg	1	6.7
	450 to 500 kg	0	0.0

In the cases where the frequencies differ from the total cases: *Five farmers did not answer the question.

Zootechnical bookkeeping, which is a limiting factor in the management of milk production systems, was not performed in 55% of family farms (Table 4), lower than the average of 82% in Minas Gerais state (FAEMG, 2006). The absence of zootechnical bookkeeping, as evidenced in this research, makes it difficult to manage the results and hampers effective decision-making. For example, milk recording enables the monitoring of individual production, which ensures that cows are grouped in batches according to production, in addition to provide subsidies for culling of cows with low lactation persistence. It was observed that the use of name was the main method of animal identification in the family economy properties studied (43.5%), which may be related to the small size of the herds, since the conventional ear earring is the main method of identification in larger herds (LOPES et al., 2013). Another limiting factor for zootechnical control was the absence of routine weighing of calves, identified in 95% of the properties of this study. Hence, not only the monitoring of the growth phase is impaired, but also the proper grouping of the batches and establishment of the ideal time for the first service of the heifers. In addition, although age was used as the main criterion for the weaning calves in this study (40%), the daily intake of concentrate and calve weight have been recommended (GREENWOOD et al., 1997; JASPER; WEARY, 2002), aiming at better standardization of the batch of weaned calves.

Table 4. Colostrum feeding and suckling practices characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Clean the udder before colostrum milking	Yes	3	15.0
	No	17	85.0
Time to receive first colostrum, diurnal calving	2 h	3	15.0
	6 h	1	5.0
	Next milking	0	0.0
	Dam	16	80.0
Time to receive first colostrum, overnight calving	Next milking	3	15.0
	Dam	17	85.0
Colostrum volume fed to calves that did not perform the suckling themselves	Up to 2 L	13	65.0
	2 to 3 L	5	25.0
	3 to 4 L	0	0.0
	Freely	2	10.0
Quality control	Yes	0	0.0
	No	20	100.0
Use transitional milk	Calf feeding	3	15.0
	Other calves	6	30.0
	Throw away	3	15.0
	Other animals of the farm	8	40.0
Colostrum storage	Yes	1	5.0
	No	19	95.0
Feeding system	Dam	15	75.0
	Bottle	2	10.0
	Individual bucket	3	15.0
Milk replacer	Yes	1	5.0
	No	19	95.0
Volume of liquid diet until 30 days of age	2 L	1	20.0
	3 L	2	40.0
	4 L	2	40.0
	More than 4 L	0	0.0
Volume of liquid diet for 31 days until 60 days	2 L	2	40.0
	3 L	2	40.0
	4 L	1	20.0
Volume of liquid diet for 61 days until weaning	2 L	3	60.0
	3 L	1	20.0
	4 L	1	20.0
Method of cleaning utensils	Water	0	0.0
	Water and soap	14	70.0
	Water and chlorine	6	30.0
Use milk from cows treated with antibiotics	Yes	17	89.5
	No	2	10.5

Colostration plays a key role in ensuring the passive transfer of immunoglobulins to newborn calves, in addition to being a source of nutrients and energy (GODDEN, 2008). In the familial milk production systems involved in this study, it was observed that colostration was not performed correctly. In most of the farms (80%), the amount of colostrum ingested after birth was not monitored, whereas, in the calves that did not performing the suckling themselves, the volume of colostrum provided was limited to 2 L (65%). It was also observed that only 15% of the farmers provided transitional milk for the calves. Although studies have shown that the absorption of immunoglobulins present in colostrum through the intestinal epithelium to the neonate's circulation occurs within the first 24 h after birth (WEAVER et al., 2000), the supply of transition milk may hinder the adhesion of bacteria to the intestinal wall, leading to reduction in incidences of diarrhea during the first weeks of life (COELHO, 2005), and economic advantage (LOPES; VIEIRA, 1998). In addition, neither of the farms evaluated the quality of colostrum and only one of them froze colostrum for emergencies, practices that are widely recommended for successful rearing of young animals (McGUIRK; COLLINS, 2004), especially in small dairy farms (<200 L/day), whose susceptibility to disease is higher due to the use of colostrum with low nutritional and microbiological quality (SANTOS et al., 2017). The results also showed that the majority (75%) of the family properties used natural suckling. For those who used artificial liquid-feeding system, it was identified that the volume of daily milk supplied to calves until weaning ranged from 2 to 4 L. The utensils used to feed calves were washed with water and soap in 70% of the farms and the milk supply of cows treated with antibiotics occurred in 89.5% of the farms (Table 5), a factor that may cause bacterial resistance, given the supply of antibiotic sub-doses from the milk of treated cows and the high bacterial load present in discarded milk (MAYNOU et al., 2017).

Table 5. Feeding management characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Age at water access	From first day	12	60.0
	From 7 days	5	25.0
	From 15 days	3	15.0
Age at concentrate access	From first day	8	40.0
	Other	12	60.0
Age at forage access	From first day	3	15.0
	From 7 days	6	30.0
	From 15 days	6	30.0
	From 30 days	3	15.0
	After weaning	2	10.0
Type of forage	Hay	0	0.0
	Grass chopped	5	25.0
	Corn silage	1	5.0
	Sugar-cane	1	5.0
	Pasture	13	65.0

In the present study, the practice of water supply from the first day of life in calves occurred in 60% of the farms, whereas, in 25% and 15% of the properties, the water was offered only from the seventh and the fifteenth days, respectively. Concentrate was offered from the first day in 40% of the properties and from the second to the fifteenth day in the others. The early water supply is important because it affects the initial consumption of concentrate (KERTZ et al., 1984). On the other hand, the consumption of concentrate as early as possible stimulates rumen development and enables early weaning of calves (QUIGLEY et al., 1991). Forage was available for the calves from the first day of life in 5% of the properties, whereas 30%, 30%, 15%, and 20% of the properties offered the forage from the seventh, fifteenth, thirtieth day, and after weaning, respectively. The type of forage offered to the calves consisted predominantly of grass (64.7%) and chopped forage (23.5%), while females older than 12 months had access to pasture (42.5%) or received sugar-cane (*Saccharum officinarum*) in the trough (22.5%). Although the forage intake during the suckling phase supports the physical development of the rumen (HILL et al., 2008), the altered fermentation profile slows down the growth of ruminal papillae (KHAN et al., 2011). In contrast, recent studies have supported the use of forage for calves during the suckling phase as a strategy to increase the concentrate intake and weight gain, and reduce abnormal calf behavior (CASTELLS et al., 2012; IMANI et al., 2017; TERRÉ et al., 2013), especially in intensive rearing systems. In addition, as the physical form of the forage may influence the development of the rumen (CASTELLS et al., 2012; MONTORO et al., 2013), the availability, digestibility, and percentage of leaves are important factors to be considered for optimizing the development of calves.

Among the management practices adopted in calf rearing are navel healing, dehorning, and removal of extra teats. Although all the interviewed producers performed navel healing, 55% of them performed umbilical antisepsis for 1 to 2 days, a practice that could be extended for at least three consecutive days (COELHO, 2005). In a previous study, there was a significant reduction in the risk of umbilical infection when umbilical cord care was performed (GROVER; GODDEN, 2011). While the use of 7% alcohol-iodine solution or, alternatively, 2% chlorhexidine gluconate solution has been considered standard for navel healing (ROBINSON et al., 2015; WIELAND et al., 2017), in the present study, a fraction of the farmers (46.6%) used inappropriate treatment (e.g., repellent spray and iodine solution used for post-milking dipping), which may lead to treatment failure, consequently leading to omfalitis, omphalophlebites, hernias, and umbilical myiasis, besides allowing the entry of pathogens in ascending pathway. Dehorning of calves, considered essential practice to facilitate the management of the herd and to prevent injuries to other animals and to the handlers, has been widely used in dairy cattle rearing (PHILLIPS, 2002; RUSHEN et al., 2008). In this study, dehorning was performed by all producers, with variation in the timing (20 to 45 days). The interviewed farmers exclusively used either the hot iron (42.1%) or the hot electric iron method (57.9%). On the other hand, extra teat removal was performed by only 31.6% of the family producers (Table 6). The objective of this procedure is to reduce the incidence of mastitis in adulthood by eliminating an additional route of microorganism contamination, which could also harm the milking and impair the appearance of the animal (MACHADO AUAD et al., 2010).

Table 6. Calves rearing practices characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Raising male calves	Yes	4	21.1
	No	15	78.9
Navel healing	Yes	20	100.0
	No	0	0.0
Times of daily navel healing	Once	14	70.0
	Twice	6	30.0
Duration of navel healing	1 day	9	45.0
	2 days	2	10.0
	3 days	5	25.0
	More than 3 days	1	5.0
	Until it drops	3	15.0
Practice for navel healing	Cut	10	50.0
	Burn	0	0.0
	Cut and burn	2	10.0
	Drop by itself	8	40.0
Treatment used for navel healing	Repellent spray	6	30.0
	Iodine 10%	11	55.0
	Iodine post-milking solution	3	15.0
Time to dehorning*	Up to 30 days	1	5.3
	More than 30 days	13	68.4
	Varies	5	26.3
	Does not dehorning	0	0.0
Method of dehorning*	Hot iron	8	42.1
	Electric hot iron	11	57.9
Extra teats removal*	Yes	6	31.6
	No	13	68.4

In the cases where the frequencies differ from the total cases: *One farmer did not answer the question.

Regarding the health management of calves and heifers, 90% of interviewed farmers stated that there is a sanitary schedule on the property. Vaccines used were restricted to foot-and-mouth disease (100%), rabies (100%), brucellosis (95%), and clostridiosis (65%). The criteria for tick control was based mainly on the degree of infestation (60%), followed by fixed interval (35%). Deworming was performed in suckling phase (43.6%), after weaning (33.3%), or after 12 months (23.1%), using fixed (73.8%) or visual (26.3%) criteria. Surprisingly, none of the properties used in vitro bioassays to identify cattle-tick resistance or egg test per gram of stool (EPG), which could be because of the lack of knowledge and/or lack of technical assistance to farmers. The most prevalent diseases were, in descending order, diarrhea (55%), tick fever (45%), umbilical infection (10%), pneumonia (5%), and worms (5%). A survey conducted by Santos and Bittar (2015) in commercial herds of MG, PR, and SP showed that the main diseases were: diarrhea (48%), pneumonia (22%), tick fever (21%), and worms (5%). The discrepancy noted here could be associated with neglected inspection of animals and the lack of technical knowledge by family farmers for appropriate detection of diseases such

as pneumonia and umbilical infection. Diarrhea has been identified as the most important calf disease, being responsible for low performance and high mortality rates (CHO; YOON, 2014). In general, it affects the animals in the first three weeks of life (BENDALI et al., 1999; SVENSSON; LIBERG, 2006), and among its several related risk factors are natural suckling, poor hygiene practices, presence of other animal species on the farm, high density of calves, and occurrence of respiratory diseases (BENDALI et al., 1999; FRANK; KANEENE, 1993; KLEIN-JÖBSTL et al., 2014; SVENSSON et al., 2003). All these factors were identified in this study, and therefore, should be considered in preventive management. In addition, half (50%) of the properties routinely isolated diseased calves (Table 7). In fact, there is a close relationship between the environment where the animals are and the occurrence of diseases (DRACKLEY, 2008), as the diseased calves are a potential risk to the health of the other animals that share the facility.

Table 7. Health management characterization of the 20 familial milk production systems in the region of Conceição de Ipanema, MG.

Item	Category	N	%
Sanitary schedule	Yes	18	90.0
	No	2	10.0
Major vaccines used	Foot-and-mouth disease	20	27.4
	Rabies	20	27.4
	Brucellosis	19	26.0
	Clostridiosis	13	19.2
Criteria for tick control	Degree of infestation	12	60.0
	Fixed interval	7	35.0
	Varies with product used	1	5.0
In vitro bioassays to identify cattle-tick resistance	Yes	0	0.0
	No	20	100.0
Deworming	Suckling calves	17	43.6
	Weaned calves	13	33.3
	Only heifers	9	23.1
Criteria for deworming*	Visual	5	26.3
	Annual	1	5.3
	Semestral	8	42.1
	Each 4 months or less	5	26.4
EPG test[1]	Yes	0	0.0
	No	20	100.0
Major diseases	Diarrhea	11	55.0
	Tick fever	9	45.0
	Umbilical infection	2	10.0
	Pneumonia	1	5.0
	Worms	1	5.0
Separates diseased calves	Yes	10	50.0
	No	10	50.0

[1] EPG = egg per gram of feces
In the cases where the frequencies differ from the total cases: *One farmer did not answer the question.

Milk production is a complex primary activity. Therefore, it must be managed with professionalism. Among many variables, the rearing of calves and heifers is an essential factor for the balance of milk activity. This study highlights the lack of technical knowledge regarding the practices of raising young animals by family farmers. Thus, understanding the challenges in rearing of dairy calves and heifers provides opportunities for development of effective actions for training and qualification of rural producers, which could contribute to the dissemination of adequate management practices and health programs. It is necessary and urgent to adopt technical assistance services (public or private) and implement training programs for family farmers for dissemination of knowledge in the milk production rural units. Such strategies could help in social equity and sustainability assurance by incorporating small-scale dairy farmers into the market in a competitive way.

Conclusions

In conclusion, the results of this study represent the local reality of traditional family farms of the region and demonstrate several limitations with respect to the rearing of calves and heifers that need to be overcome or minimized. The following strengths can be highlighted: navel healing, calf housing above or next to the pen, and the existence of a sanitary calendar in the farm. On the contrary, deficiencies in calf and heifer rearing management were identified, which include absence of zootechnical bookkeeping, manual milking with calves at the foot, absence of herd sizing, non-execution of routine weighing of calves, failure to diagnose diseases, incorrect colostrum management, and non-supply of transition milk to the calves by a fraction of the farmers. Therefore, it is imperative to disseminate adequate management practices by extension technicians and formulate public policies that meet the aspirations and promote the sustainability of family farmers, who are responsible for a large part of the statewide milk supply.

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