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Tracing the Dairy Goat Industry: Profiling of Dairy Goat Farms in the Philippines

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Abstract

The Philippine dairy goat industry remains a developing sector with fragmented data and information. Thus, a concerted effort to create baseline information on these dairy goat farms (DGF) is needed to situate technology interventions and consequently, improve dairy goat production. Out of the three main geographic areas of the country, 43 dairy goat farms were identified. Primary data were collected through qualitative and quantitative surveys using a structured questionnaire. The results showed that there are eight known goat breeds in the Philippines. Among the dairy goat breeds, Anglo-Nubian (95%), Saanen (54%), and Alpine (26%) were predominantly raised. Nearly one-third of the dairy goat farms include upgraded goats in the milk line. The total number of dairy goats in the participating farms reached 6,977 heads during the survey period. However, less than one percent of the total dairy goat population or equivalent to 689 are being milked. Farmers reported an average of 1.17 liters per day with an average 172-day lactation period or equivalent to 200 liters per lactation. Dairy goats in the Philippines, therefore, can produce over 137 MT of milk per year. Even though these farms are milking their goats, only 44% process and market the milk collected. Hence, this baseline information on the country's dairy goat production provides a historical point of reference in assessing change and progress in the implementation of future dairy goat development programs.

Key Words: baseline information, dairy goat, goat farm, milk yield, Philippines

Introduction

Goats that would serve as dairy animals were first introduced in the Philippines by the Ministry of Agriculture and Food in the early seventies. Among the earliest dairy goat (DG) breeds introduced by the Philippine government were the Anglo-Nubian, Saanen, and Toggenburg (Mangalindan, 1982). The infusion of these exotic bloodlines into the native stocks had paved the way to increase goat productivity, specifically, the production of milk. However, the absence of a sustainable breeding plan and performance recording makes the development of the industry dependent on the importation of breeder stocks.

Development strategies to improve DG production include proper selection and intensification of appropriate breeds (Devendra, 2012). For the past decades, the government and private sectors played a critical role to improve the performance of goats in the country. The country's total goat population was 3.6 million heads but less than 1 percent was of dairy type (Philippine Statistics Authority [PSA], 2015). About 98% of goats were raised in backyard farms keeping three to five head native and upgraded stocks. On the other hand, DG

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breeds were predominantly raised in commercial farms. Hence, only 3% of the total milk production came from goats (PSA, 2016).

The Philippines produces less than one percent of its total annual dairy requirement and virtually imports the balance. In actual fact, for every three glasses of fresh liquid milk only one glass is produced locally. Today, with an estimated per capita milk consumption of 22 kg a typical Filipino family spends PHP 4,000 per year for dairy products (National Dairy Authority [NDA], 2015). Hence, with a rapidly expanding market for milk, the Department of Agriculture continues to make developments on improving local milk supply through importations of dairy animals with special emphasis on dairy goats.

Goats are assets that can easily be liquidated for cash in times of need (Hossain et al., 2004). Throughout the world, the goat is known as the cow of the poor. Its economic contribution to farmer's livelihood has been rigorously studied and recognized in most of the developing countries (Kumar, 2007; Liang & Paengkoum, 2019; Teufel et al., 1998). In the Philippines, several development programs had been carried out to expand local dairy goat production. At the heart of this strategy was the DG herd build-up program (NDA, 2015). Nowadays, goat raisers that are producing breeder and slaughter goats have engaged in goat dairying.

However, despite of these initiatives, the Philippine dairy goat industry remains a developing sector with fragmented data and information. Hence, this study was extensively implemented nationally to provide baseline information on the country's dairy goat farm (DGF) as well as its production. This gathered information will serve as a basis for instituting technological options to further improve production and provide realistic information on industry status for future project implementations. Therefore, this study captures the status of the dairy goats in multiple farms in different locations of the country with reference to reproduction and lactation.

Methodology

Study Location

The study covers 43 DGFs from the three main geographic areas (Luzon, Visayas, and Mindanao) of the Philippines. The list of the country's DGFs was accessed from the central office of the Department of Agriculture-Bureau of Animal Industry (DA-BAI). Consequently, the list was verified through the regional offices of DA-BAI to assess if the enlisted DGFs are still operating. A total of 16 DGFs from Luzon, 13 from Visayas, and 14 from Mindanao were identified during the study period.

Data Collection

Primary data to characterize DGFs were collected through qualitative and quantitative surveys using a structured questionnaire. The survey instrument was carried out on the basis of personal interview method. Prior to the conduct of the interview, pre-testing was performed to determine if the respondents understood the questions and to validate questionnaire data. The content, ordering of the questions, as well as duplication were also comprehensively assessed. Accordingly, the questionnaire was designed to capture information on demographic variables of the DG farmer and of the farms. Data on the performance of DGs, such as total milk yield (TMY), lactation length (LL), growth and reproductive performance, and farm inventory were also collected. Additionally, animal husbandry and management practices were also documented.

Data Analysis

Data obtained from the questionnaire were tabulated and summarized using Microsoft Excel (2010). The collected data were analyzed using the procedure for Statistical Package for Social Science (SPSS) for Windows, Version 20. Simple descriptive statistical tools like mean, frequency, and percentage were used for analysis. Furthermore, the collected data from the three main geographic areas of the country were collectively analyzed as a representation of the national performance of the country's dairy goat farm.

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Results

Demographic Characteristics of Dairy Goat Farm

The Philippines is characterized under tropical and maritime climate having relatively high temperatures, high humidity, and abundant rainfall (Department of Science and Technology-Philippine Atmospheric, Geophysical, and Astronomical Services Administration [DOST-PAGASA], 2015). Using the rainfall distribution as basis, the country has four types of climate that vary from one region to another.

During the year of the survey, the country's temperature ranged from 23.02 ºC to 31.5 ºC (DOST-PAGASA, 2015). Average rainfall of 4,109 mm (Type I), 1,607 (Type II), 1,052 mm (Type III), and 2,047 mm (Type IV) were observed in the same period. Low rainfall pattern in some regions was the reason for some farmers becoming dependent on irrigation facilities to sustain forage pastures. Hence, it was interesting to note that the type of climate affects the farmers' assessment on the type of DG house to be built and forages to be planted.

Table 1

Climatological characteristics in three geographical locations of the DGF

Climate Type	Luzon	Visayas	Mindanao	National	Annual Rainfall	Average Temperature
I	13	0	0	30.2	4,109.00	23.4 – 31.3
II	3	2	0	11.6	1,607.00	23.2 – 31.0
III	0	11	3	32.6	1,052.00	23.5 – 31.6
IV	0	0	11	25.6	2,047.00	22.0 – 32.1

Type I- Two pronounced seasons: dry from November to April and wet during the rest of the year.
Type II- No dry season with a pronounced rainfall from November to January
Type III- Seasons are not very pronounced, relatively dry from November to April, and wet during the rest of the year
Type IV- Rainfall is more or less evenly distributed throughout the year.

A broad view of the 43 DGF owners showed that men (95%) were the predominant holders of DG. Most of the DG holders were at their economically active stage aged between 36 to 60 years old. The majority of them were married. It is notable however, that the head of the family was more actively involved in milking goats on top of the planning and decision making. On the contrary, the farmers' view on traditional roles in dairying and the failure to value women's work in dairying are among the factors that make women unaware of their roles as potential contributors in the dairy industry (NDA, 2005).

The literacy level among DG farmer was 100%. It can be inferred that venturing to goat dairying is a conscious decision; 81% of respondents have completed their college degree while the rest had finished their basic education program (Table 2). About half of the farmers (54%) were self-employed who exclusively manage their own business. Furthermore, a significant proportion of the DG farmers were employed full time in government (23%) and private sector (23%). Nevertheless, livestock farming served as their supplementary profession.

Hence, it is quite essential to note that DGFs in the Philippines were mostly managed by educated farmers who also show a willingness to adopt technological advances in goat dairying. Relative to this, Burton (2014) and Auesten et al. (2000) stated that the higher the literacy level of the farmer, the more likely they will engage with environmental programs and approaches to agriculture as they have more complex understanding of different farming systems.

The majority of the DG farmers have been keeping goats for more than 10 years. About 16% of them started to raised goats as early as 1970 (Table 2). A high rate of increase in the number of individuals that ventured into goat farming was observed from the period 2000 to 2009. However, it took them an average of five years before they ventured into goat dairying. The demand for goat milk, goat milk nutritional benefits, and availability of DG stocks were among the reasons identified by DGFs who ventured into the business. Contrariwise, in India and Kenya, provision of milk for home consumption was the main reason of

farmers for keeping DG (Ogola et al., 2010; Teufel et al., 1998). Similarly, in China only 5% of the milk produced is marketed and the remainder is for household consumption (Lou, 2009).

Table 2

Socio-demographic characteristics of DG farmers

Variables	Respondents			
	Luzon	Visayas	Mindanao	National
Gender (%)				
Male	94	100	93	95
Female	6	0	7	5
Marital status (%)				
Single	6	8	7	7
Married	94	92	93	93
Divorced	0	0	0	0
Widow	0	0	0	0
Age (%)				
Below 35 years	0	0	7	2
36-50 years	50	46	43	47
51-60 years	50	38	50	47
Over 60 years	0	15	0	4
Education (highest degree earned) (%)				
Elementary graduate	0	0	0	0
High School Graduate	6	15	7	9
Vocational course	6	8	14	9
College graduate	88	77	79	81
Employment (%)				
Government Employee	3	4	3	23
Private Employee	4	2	4	23
Self employed	9	7	7	54
Unemployed	0	0	0	0
Year the farms were started (%)				
1970-1980's	13	23	14	16
1990-1999	31	0	14	16
2000-2009	50	46	57	51
2010-2015	6	31	14	16
Average Years engaged in goat raising	14	12	13	13
Average Years engaged in goat dairying	7	4	11	7

Animal Husbandry and Management Practice

The majority of the DGFs (40/43) were classified under commercial production with a typical 20 to 100 doe level. Relatively, these progressive farmers have the capability to finance the additional expenditures of the business that was in accordance with the findings of Kumar (2007). This is inverse to slaughter goat production where majority of the goat farms are in the backyard.

The constant infusion of bucks from elite herd abroad have been the center of interest of some progressive DG farmers in recent years. The present study revealed that 81% of DGFs had sourced their breeder stocks from Australian and American importations. Remarkably, DGFs in Mindanao were the top direct importers of goats during the survey period. This direct importation by DG farmers was purposively done to ensure that their breed preferences for producing quality breeder stocks were taken into account. Meanwhile, about 79% of the DG farmers revealed that they also sourced out their breeder stocks from other DGFs in the country. This is for the reason that importation of animals is a lot expensive than buying island born goats with good pedigree record. It was also evident that 42% of the DGFs were recipients of the national government livestock improvement programs (Table 3).

The size and type of housing varied depending upon the classes of agro-ecology, production systems, physiological stage, and inventory of goats (Tegegne, 2013). Thirty-two (32) out of the 43 DGF have constructed elevated/raised-floor structures to house their dairy goats. As mentioned by the DG farmers, elevation of housing more than 1 meter eased the cleaning of houses and disposal of waste materials. This type of housing was also adopted by most of the DGFs in Visayas and Mindanao where rainfall is distributed throughout the years. The flooring was constructed made from cement, wood, and plastic. It could be inferred from the result that a higher percentage of DGFs (47%) use slatted wood as the type of flooring (Table 3). Furthermore, in Visayas and Mindanao, lumber is a more common and cheaper material used in most parts of the goat house such as floors, posts, rafters, pen divisions, and even slatted walls. Meanwhile, the used of plastic matting as flooring material was commonly observed in DGFs of Luzon. This is mainly due to the high cost of lumber in the region.

Table 3

Source of stocks and housing designs of DGF, % farm reporting

Parameters	Luzon	Visayas	Mindanao	National
Source of stocks				
Direct Importation	81	62	100	81
Breeder Farm	81	92	64	79
Government Farm	16	16	11	42
Own Farm	16	16	11	42
Type of Housing Design				
Elevated	69	54	100	74
Not-elevated	31	46	0	26
Type of Flooring Design				
Concrete	25	31	0	19
Slatted Wood	31	38	71	47
Plastic Matting	38	15	29	28
Compacted Earth	6	15	0	7

The size of the DGF holdings ranged from 5 to 12 hectares. The majority of the DGF (40/43) declared that they own the farm landholdings, while others were leaseholders. On the other hand, partial and complete confinement were the production systems being employed in most of the DGFs. Reasonably, pure confinement eased the handling, monitoring, and feeding of DG as stated by DG farmers of Mindanao. About half of the farmlands were allocated for forage production.

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Feed Resources and Nutrition

Forages are the most important feed resource for ruminants (Dynes et al., 2003). In the tropics like the Philippines, most of the native grasses are fast-growing but have a short growing period. Along with this characteristic is the steep decline in quality when it reaches maturity. The crude protein (CP) of native pastures can be as low as 4% during the dry season (Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development [PCAARRD], 2004), a far lesser degree to which forage meets the animal's nutritional needs. It is very important that good quality forage should have at least 12% CP to support nutrient requirements of growing goats. Among the forages, tree legumes have been particularly popular due to high crude protein content and economic advantages in feeding. Olafadehan and Okunade (2018) specified that in the Philippines, legumes are grown naturally on smallholder farms for feeding the small ruminant.

Among the legume species, *Leucaena leucocephala* (86%), *Gliricidia sepium* (74%), and *Indigofera zollingeriana* (74%) were the top three species (Table 4) fed to goats. These legumes have 26%, 27%, and 30 % CP content based on the study of Orden et al. (2005) and Abdullah (2010). For this reason, these legume species are supplemented to dairy goats to increase milk production. In the farms that practice zero concentrate feeding, cut-and-carry legumes are fed as partial substitution for concentrates or even 100% of the daily ration. The minimum annual rainfall of 600 mm for these tree legumes to survive and be productive are well above the different climate types in the Philippines. For this reason, farmers could have selected these legumes because of other agricultural traits. Similar characteristics of these perennial tree legumes are long lived, coppices readily and are tolerant to repeated cutting which translates to long term use as fodder source and minimal costs for reestablishment. Although *D. cinerea* is readily relished by goats, its short-lived characteristic could be the reason why it is less favored by farmers. Meanwhile, *F. macrophylla* have drought and shade tolerance, adaption to acidic and infertile soils, water logging tolerance, and vigorous growth after cutting (Cook et al., 2005). Despite these multiple agronomic strengths, the unpopularity of feeding *F. macrophylla* could be because of unpalatability that is adversely affected by high tannin (McMahon et al., 1999) and fiber content. For farmers, unpalatability means greater feed refusals left in feed bunkers and suppressed feed intake.

Common to all farms, indigenous and improved grass species such as *Panicum maximum, Bracharia mutica,* and *Pennisetum purpureum* are propagated and maintained. All three identified grass species require a minimum of 1000 mm average annual rainfall. Among the three, *P. purpurem* and *P. maximum* are mostly cultivated and used under intensive production systems. The most productive is P. *purpureum* with yields reaching 10–30 tons per hectare per year (Cook et al., 2005), if fertilized. These forages do not tolerate prolonged dry periods of about 4 months which could mean that they are productive year-round in areas under the Type II, III, and IV. Some parts of Luzon may experience a decrease in growth and quality of these forages during the dry period. *B. mutica* may be of value during these periods as this forage usually are found in wetlands and poorly drained soils where water recedes during the dry seasons.

On average, farmers report feeding 0.03 to 1.0 kg of legumes and 4 to 5 kg of grasses under the cut-and-carry system. Furthermore, the daily roughage ration is complemented with concentrate feed of about 0.5 to 1.0 kg/hd/day. The survey showed that some of the DG farmers give feed supplementation of agro-industrial by-products (Table 4), such as copra meal sourced from coconut oil factories, spent grain from breweries, and fruit peel and trimmings from fruit canning factories. Feed supplements in the form of mineral block, salt, and molasses are also offered to dairy goats. Except for commercial feeds, all other supplements are offered whenever available and depend on seasonal supply.

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Table 4

Feeds offered to DG, % farm reporting

Parameters	Luzon	Visayas	Mindanao	National
Grass				
Native Grass	100	62	92	79
Improved Grass	94	85	86	88
Legume species				
Gliricidia sepium	75	69	78	74
Leucaena leucocephala	88	85	86	86
Indigofera zollingeriana	75	69	79	74
Desmodium cineria	13	15	7	14
Flemingia macrophyla	25	0	7	12
Tree leaves				
Morus nigra	44	39	7	30
Mangifera indica	13	16	0	9
Concentrates				
Commercial feed	100	69	64	79
Yellow corn	0	15	0	5
Agro-Industrial By-Product				
Banana peel	25	54	7	28
Mango peel	0	15	0	5
Spent grain	25	31	0	19
Copra Meal	25	31	0	14
Feed Supplements				
Mineral Block	56	46	0	35
Salt	44	15	36	31
Molasses	63	31	36	44
Processed Feeds				
Silage	0	0	1	5
Leaf Meals w/ gluten	0	0	7	2

Breeding Management and Practices

Dairy animals with different breeds, crosses, and strains were reflections of the type of breeding scheme used. Pure breeding (77%), crossbreeding (67%), and upgrading (21%) were the breeding scheme being practiced in the DGFs (Table 5). The selection of breeding scheme used by each farm relies on resources available and intended farm product. Some farms intentionally use crossbreeding of two dairy breeds to take advantage of hybrid vigor or immediate increase in milk production of offspring. Conventional farms that rely on revenues generated by the sale of young animals and already have purebred does will stick to pure breeding. It is not unusual for novice farm owners to use an upgrading scheme considering that majority of these farms will gain experience in raising goats using low-risk Philippine native goats. Native goats are one sixth the price of purebred animals and are easily managed by beginners.

A high buck-to-doe ratio of 1:35 was documented in DGFs in Visayas. This result was 40% higher in comparison to the recommended 1:25 standard ratio. The Visayas area also recorded the highest number of farmers using continuous breeding compared to Luzon and Mindanao. In this mating scheme, the buck is allowed to mate a batch of does for a particular period, usually 3–4 months or within the whole year. Moreover, to ensure the year-round continuous supply of goat milk for processing, 81% of the DGFs practiced controlled breeding. A set of does is deliberately mated to bucks to give birth every quarter of the year that will eventually be replacement milkers. This practice also ensures that kids are born during the months when most typhoons are over with observed increase kid survival. Typhoon season occurs between June and October regardless of climate types.

Table 5

Breeding management applied in DGF, % farm reporting

Parameters	Luzon	Visayas	Mindanao	National
Buck to Doe Ratio	1:14	1:35	1:16	1:23
Breeding Scheme				
Purebreeding	56	77	100	77
Crossbreeding	50	85	71	67
Upgrading	25	39	0	21
Breeding Practice				
Continuous	19	39	0	19
Controlled	81	62	100	81
Breeding Method				
Natural	100	100	100	100
AI	0	0	0	0
Willingness to adopt AI				
Yes	94	77	71	74
No	6	23	43	26
Criteria for culling and selection				
Production performance	100	100	100	100
Age	0	77	50	40
Physical appearance	25	31	0	28
Health Status	50	43	38	44

Natural breeding still stood as the most preferred breeding method because of reliable conception rates. Bucks were more periodically purchased than does through importations. With this method, a negligible number of re-breeding benefits farmers through synchronized kidding of does that meets the required number of milkers for a particular period and eventually maintain the milk supply. This also averts unnecessary feed cost for does

that did not get pregnant. Bucks are more periodically purchased than does through importations to prevent inbreeding and improve the performance of the general herd. Most of the dairy goat farms have multiple bucks to service several cycling does. An alternative reason why natural mating was more popularly used was the sire's physical presence, that brought credibility to the offspring produced. Nevertheless, 74% of the DG farmer expressed their interest to test artificial insemination despite being aware of lower conception rates

On the other hand, production performance (100%), age (43.7%), and physical appearance (12.5%) were reported as the most important criteria when selecting breeder stocks (Figure 3). Before buying breeding stocks, the majority of the commercial raisers assessed the pedigree and performance of the dam, usually from association records from abroad. The choice between structural and functional traits supported the intended breeding program by the farm.

Dairy Goat Inventory

The Philippines had eight well-defined breeds of goat during the survey period. Among the DG breeds, Anglo-Nubian ranked first with 95%. Relatively, Anglo-Nubian was one of the earliest imported DG breeds introduced in the country. Saanen is one of the known DG breeds with high milk production. Saanen registered 54% of DGFs that had this breed. Interestingly, about 33% of the DGFs had included upgraded goats in their milk line. Peacock (2008) cited that upgrading of the local breeds using DG increases growth rate and milk yield. Meanwhile, low importation and access to breeder goats could be the reason why 62% of the DGFs in Visayas used upgraded goats for milking purposes.

Table 6

Breeds of goat raised on DGF, % farm reporting

Goat Breeds	Luzon	Visayas	Mindanao	National
Native	13	0	0	4
Upgrade	38	62	0	33
Crossbred	56	46	50	51
Boer	44	39	50	44
Anglo-Nubian	88	100	100	95
La Mancha	38	8	7	19
Toggenburg	38	23	7	23
Saanen	63	39	57	54
Alpine	38	23	14	26
Oberhasli	6	0	0	2

The total number of goats within the 43 DGF surveyed was 6,977 heads (Table 7). Luzon had the highest total goat inventory of 3,711 heads, while Visayas had the lowest animal holding. This trend can be attributed to a large number of commercial DGFs established in Luzon. During the survey period, only 689 goats were in the milk line. The overall average number of does in the milkline of 36 does where higher than the overall average dairy farm size of 15 -20 goats in Thailand (Nakavisut & Anothaisinthawee, 2014). Remarkably, based on the total goat inventory, Mindanao (36%) and Visayas (33%) had a higher percentage of does intended for dairying than Luzon (23%). Selling female goats at higher prices instead of retaining these animals as replacement milkers was observed in Luzon. Generally, only 28% of the total goat inventory was intended for dairying.

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The small numbers of DGFs (19/43) that processed and marketed goat milk products possibly contributed to the above results. As mentioned by some of the DG farmers, their reluctance to process goat milk was due to its fluctuating market demand. Nevertheless, Food and Agriculture Organization (2002) reported that the strongest growth in demand for milk is anticipated in most of the developing countries due to the rapid increase of population.

Table 7

DG holding, does intended for milking and actual does on the milk line, heads

DG holding	Luzon	Visayas	Mindanao	National
Total Goat Inventory	3,711	1,552	1,714	6,977
Average Number of Goats/ Farm	265	119	143	179
Total Number of Does Intended for Dairying	843	507	612	1,962
Total Number of does in the milking line	297	109	283	689
Average number of does in the milking line/farm	42	22	40	36

Milk Production Performance

Based on the data gathered, mean daily milk yield (DMY) per doe in Luzon, Visayas, and Mindanao were at 1.25 L, 1.16 L, and 1.10 L, respectively. The national DMY averaged at 1.17 L. This milk production is lower in comparison to the production of DG in Botswana having DMY of 2.0 L (Dipheco et al., 2016) but higher than Beetal and Jamnapari goats in India, Barbari, Damari, Kamori, and Malabar goats in Pakistan (Davendra, 1980) at 1.04, 0.92, 1.0, 0.99, 0.52, and 1.0 L, respectively. Meanwhile, lactation length (LL) of the 43 DGF was recorded at 172 days. LL may greatly be affected by the owner's decision to cease milking activities or prolong milking periods and may not always be a result of the animal's ability to give milk. Farmers can decide to extend lactation when demand for milk is increasing or when milk price proves to be profitable. On the contrary, an early termination of lactation could be a result of low farm gate price of milk, decrease demand or preparation of animals for the next kidding season. Generally, goats loose body mass during lactation which affects estrus and milk performance for the next season. In general, the estimated total milk yield (TMY) of DGs in the country was 200 liters at 172-day LL. This result is lower compared to the findings of Lallo et al. (2019) having TMY of 209, 272, and 234 L with 180 day LL for Saanen, Alpine, and Toggenburg. Thus, the differences in the milk production performance of DG across the regions could be related to the genetics of the animals and the management system applied.

Table 8

Milk production performance

Milk Production Parameters	Luzon	Visayas	Mindanao	National
Ave. Herd Milk Yield, (L/hd/day)	1.25	1.16	1.10	1.17
Ave. Start of Milking of Herd, (days)	52	20	33	38
Ave. Herd Lactation Length, (days)	188	127	184	172
Ave. Dry Period of Herd, (days)	102	94	66	84
Ave. Volume of milk produced (L/day)	37	19	33	31

On the other hand, once-a-day milking was being practiced by 27 DG farmers. Farmers reported that milking twice a day was tedious and difficult. Furthermore, though it was common for DG operations to practice zero suckling (5–7 days after kidding), DG farmers allowed the newborn kids to be with the doe for almost 60 days. On the overall average, does were milked 38 days after kidding, while DG farms in Visayas started to milk

their goats as early as 20 days after birth Maiden does on their first freshening could suffer uneven development of udders particularly those with single births. Single born kids tend to suckle milk from one particular udder more frequently.

The Constraints in DG Production

The DGFs in the Philippines have also been hampered by multifaceted problems in terms of feed, health, and some management practices. Twelve (12) out of the 43 DG farmers specified that one of the main constraints in DG farming was the shortage of forage feed, particularly during the dry season. This observation could be attributed to the low rainfall patterns which resulted to slow regrowth of foliage. Similar findings have been reported by Manalili et al. (2018) in forage Pigeon pea. According to Terefe et al. (2014), shortage of feed was a bottleneck in dairy development programs.

Meanwhile, nine out of the 43 DGF frequently experienced cases such as diarrhea and pneumonia. The prevalence of these diseases was common in pre-weaning kids, specifically during the wet season. This constraint was partnered by the unavailability of veterinary drug supplies in some areas. Furthermore, it was quite revealing that the majority of the commercial DG operation had experienced problems with goat paralysis.

Twenty-three (23) out of the 43 DGF owners also mentioned that they lack technical knowledge and skills on goat milk processing. In addition, some respondents have problems with unstable market demand for goat milk which made some DG farmers hesitant to venture into the milk-processing business.

Conclusion

The analysis of the DGF characteristics provides a realistic baseline information on the country's DG production. Out of the 16 regions of the country, 43 DGF had been identified. These numbers are expected to increase because of the increasing number of interested individuals and government support. Interestingly, players from the industry are characterized to be middle-aged and educated owners but have informal knowledge of milk processing. Capacity-building activities should be focused on value-adding and adhering to milk processing standards. A wider promotion on the nutritional benefits of goat milk can also be diversified to create more opportunities that DG farmers can invest. Laying market foundations in support of a lack of skill set in marketing dairy products is also recommended to address the low numbers of DGF in engaging in the milk business.

Hence, there is a need to carefully define the country's DG programs to have a sustainable DG production. Philippine goat dairying has low output compared to other countries. The performance is highly variable with the difference mainly because of genetics and nutrition. Seasonal feed shortage is still a significant problem, as with the slaughter goat industry but the effect on dairy performance is more pronounced. Moreover, a long-term program for the identification of productive animals through proper recording of productive traits must be considered as it plays a vital role in developing a dairy sector. These baseline results can be taken into account in the application of future project implementation and the introduction of technological options for the improvement of Philippine DG production.

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