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Production status of dairy cattle farms in the Province of Isabela, Philippines

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ABSTRACT

The Philippine dairy sector heavily rely on importing milk and dairy animals; thus, the government continuously strengthen the sector by establishing new dairy farms and by importing dairy animals. The Province of Isabela, Philippines, agriculture-based community has invested in dairy production. In order to evaluate the current production status of the dairy farms, the current production performance of the five (5) selected dairy cattle farms was conducted. To preserve confidentiality, codes are assigned to each farm. Structured surveys were conducted with dairy cattle farmers to collect quantitative data on milk yield, cattle health, nutrition, and management practices. The results of the study revealed that 100% of the farms belonged to commercial-scale of production. The total inventory was dairy cattle is recorded at 933 heads of livestock, on breeding, 80% of the farms utilized artificial insemination following continuous breeding. On feeds and feeding, 60% of the farms relied on natural vegetations as sources of grasses. Aside from this, 80% of the farms utilized improved species of grasses, 30% fed the animals with shrubs and 20% of the farm utilized recommended legumes. It is noted that only 20% of the studied areas fed the animals with concentrates; while other farms also provided UMMB (30%) and molasses (30%), and vitamin-mineral administration (40%). Forage processing or silage production is also practiced. It is noted that 60% produced corn silage; while 80% utilized Napier grass. On production system, 60% follow confinement production management. All farms reported pneumonia as major caused of mortality. Lastly, all farms kept records on farm production but the data was not analyzed. Because of these inadequate production practices, a significant difference was observed on milk yield of the animals raised in different farms, with the highest yield recorded from Farm 01 at 7.50 L; while the least was noted from Farm 04 at 4.79 L. Based on the results presented, the management is the farm is inadequate which needs immediate interventions to improve the overall status of the dairy animals.

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INTRODUCTION

The Food and Agriculture Organization of the United Nations (2013) has identified milk as one of the most valuable agriculture commodities. At present, the dairy sector is rapidly growing and projected to increase up to 177 million tons this year, and it is forecasted to increase at an 1.8% average growth rate of per annum in the next 10 years. The increase in demand is fueled by increase in per capita from 0.8% to 1.7% per year in developing countries (Brit *et al.*, 2018), and between 0.5% and 1.1% in developed countries.

The Philippine dairy sectors heavily rely on importing milk and dairy animals. The sector's total production contributes to less than 2% of the national demand. The dairy industry is composed of cattle, which is the most dominant dairy animal, followed by water buffalo locally known as carabao, and goats. The Philippine government is importing dairy cattle from Brazil to increase herd population and reduce dependency on dairy products import. In 2023, the dairy animal inventory in the Philippines was estimated to be 152,619 heads, an increase of 59.4% as compared to 2022 inventory. At present, dairy products are currently the country's third largest agricultural import after wheat and meal.

The Philippine government implements several programs to achieve 5% milk sufficiency by 2028. To achieve this, the governments continuously import dairy animals. Once acclimatized, the animals are distributed to local dairy farmer or farmer association and cooperatives. The present study seeks to identify the current production status of dairy cattle farms in the Province of Isabela, Philippines.

MATERIAL AND METHODS

Study site

The Province Isabela (with GPS coordinates 18° 30' 2.793" N and -67° 1' 27.646 E). in Northern Philippines is one of the five provinces of Cagayan Valley. The province is the largest province in Luzon and the second largest province across the country in terms of land area.

The province is divided into different physiographic areas, at the eastern area, straddled by the Sierra Madre Mountain range and in western area is a fertile valley hemmed by the Central Cordillera. The province is rated as first-class province and considered among the richest and most progressive province in the Philippines. The province is known for agricultural production, especially corn and rice and other high value crops include mangoes, bananas, and various vegetables. Livestock and poultry are also important industries, to include dairy, hogs, cattle, and poultry.

Research design

A survey was administered in five dairy farms in Isabela Province, Philippines. To preserve confidentiality, codes are assigned to each farm. Structured surveys were conducted with dairy cattle farmers to collect quantitative data on milk yield, cattle health, nutrition, and management practices.

Data analysis techniques

The data collected from interviews and on-farm observations was analyzed using descriptive method; while Analysis of Variance (ANOVA) using Statistical tool for Agricultural Research (STAR) Program is utilized to determine the difference on production performance of the farms under study.

RESULT

Farm characteristics and animal inventory

The result of the study reveals that 100% of the respondents belonged to commercial-scale of production. The farms were established using loan (20%); while majority of the farms declared that the capital as sourced out in other means.

Table 1 shows the data of the stock information from the 5 Municipalities of Isabela. There is a total of 933 heads of livestock. The majority of the livestock consists of cows, making up 52% of the total. Calves follow with 27%, heifers with 15%, and bulls with 6%. This distribution indicates a significant presence of cows in the livestock population of Isabela.

Table 1. Farm information and inventory.

Farm Information	Farm 01	Farm 02	Farm 03	Farm 04	Farm 05	Total	Frequency
A. Cattle Farm Production							
Production Scale							
Backyard							
Commercial	√	√	√	√	√	5	100%
Source of Capital							
Loan		√				1	20%
Personal Investment							
Other Sources	√		√		√	3	60%
B. Stock Information							
Bull (24 months and above)		22	15	15		52	60%
Cow (24 months and above)	36	148	78	98	126	486	100%
Heifer (18-23 months)	1	33	21	26	63	144	100%
Calf	9	62	35	56	89	251	100%
Total	46	265	149	195	278	933	

Among the municipalities, Farm 05 has the largest number of livestock heads with 278, followed by Frm 02 with 265, Farm 04 with 195, Farm 03 with 149, and Farm 01 with 46.

Production management

Breeding Management

In terms of breeding method utilized in the farm, 80% of the study sites utilized artificial insemination (AI); while 20% utilized both natural mating and AI. On breeding strategy, 80% of the farms implemented continuous breeding; while 20% followed control breeding.

Feeds and Feeding

On the forages utilized in the farm, 60% of the farms relied on natural vegetations as sources of grasses. On the other hand, it is also noted that 80% of the farms utilized improved species. In terms of leguminous tree utilization, 30% fed the animals with shrubs and 20% of the farm utilized recommended legumes.

The farms also utilized farm by-products to feed the animals. It is observed that 40% of the farms utilized rice straw and corn stover. On the other hand, it is noted that only 20% of the studied areas fed the animals with concentrates. Moreover, the study also revealed that 40% of the farms utilized Urea Molasses Mineral Block (UMMB), salt, and mineral blocks and 30% used molasses. In like manner, 40% of the farms administered vitamins and minerals.

The farms also practiced processing of forages to become silage. As presented, 60% produced corn silage; while 80% utilized Napier grass.

On feeding system practiced in the farm, it found that the management followed is diverse. As shown in the table, 60% follow confinement. Likewise, 60% of the farms grazed the animals, thus partial confinement (20%) is followed when rainy season commenced.

Health Management

In terms on health management, 20% of the farms studied utilized herbal medicine; 60% chemical-based biologics; while 40% utilized both.

Mortality is also observed in the farms. As noted, among the diseases observed in cattle, pneumonia (100%) is identified as major caused of mortality; followed by scouring (60%), and other diseases (20%).

Management-related mortalities were also recorded in the farms. As reported, 20% of the mortality is caused by bloat and 20% as due to dystocia.

Table 2. Current farm production management

Production Management Information	Farm 01	Farm 02	Farm 03	Farm 04	Farm 05	Total	Frequency, %
A. Breeding							
Breeding Method							
Natural							
Artificial Insemination	√		√	√	√	4	80%
Both		√				1	20%
For AI:							
Awareness: Yes or No	√	√				2	40%
Willing to try: Yes or No	√	√				2	40%
Willing to adopt: Yes or No	√	√				2	40%
Breeding Strategy							
Controlled					√	1	20%
Continuous	√	√	√	√		4	80%
Sources of Bull							
Own farm	√	√	√	√		4	80%
B. Feeds and Feeding							
Types of feeds consumed?							
Grass							
Natural vegetation		√		√	√	3	60%
Improved species		√	√	√	√	4	80%
Legumes							
Shurbs, flemengia, rensonii		√		√	√	3	60%
Recommended legumes		√		√		2	40%
Farm by products							
Rice straw		√	√	√	√	4	80%
Corn stover		√	√	√	√	4	80%
Concentrates							
Bran							
Commercial feeds		√			√	2	40%
Agro-industrial by-products							
Supplement							
UMMB		√	√	√	√	4	80%
Salt		√	√	√	√	4	80%
Mineral Block		√	√	√	√	4	80%
Molasses			√	√	√	3	60%
Vitamins and Minerals		√	√	√	√	4	80%
Silage							
Corn silage			√	√	√	3	60%
Napier grass silage		√	√	√	√	4	80%
Feeding system							
Confinement		√	√		√	3	60%
Grazing	√	√		√		3	60%
Partial confinement	√			√		2	40%
Tethering							
C. Health management							

Treatment done							
Herbal	√					1	20%
Chemical	√	√	√			3	60%
Both				√	√	2	40%
None							
Practices, per year							
Vaccination	√		√	√	√	4	80%
Deworming	√		√	√	√	4	80%
Deticking	√		√	√	√	4	80%
Delousing	√		√	√	√	4	80%
Disease							
Pneumonia	√	√	√	√	√	5	100%
Parasitism							
Scouring		√	√	√		3	60%
Others	√			√		2	40%
Management							
Bloat		√			√	2	40%
Dystocia		√				1	20%
Record keeping	√	√	√	√	√	5	100%
If yes, type of records keep:							
Production	√	√	√	√	√	5	100%
Reproduction	√	√	√		√	4	80%
Economics	√	√				2	40%
Health	√	√	√		√	4	80%
Others	√					1	20%

Record Keeping

On record keeping, 100% of the farm under study property documented the important data related to the farm operation. As presented, 100% of the respondents kept data on production; 80% on reproduction and health concerns; and 20% on economics. Other data as also kept and 20% of the farm recorded it.

Production status

The milk yield (L) of the participating farms was assessed to determine the production performance. As presented in Table 3 significant difference was observed between the milk yields of the animals raised in different farms. The highest data was recorded from Farm 01 at 7.50 L; while the least was noted from Farm 04 at 4.79 L.

DISCUSSION

According to Lucy (2007), controlled breeding programs improve reproductive efficiency in confinement-style dairy herds and can be combined with post-insemination treatments to enhance fertility. In controlled breeding, selection of stocks with emphasizes on milk production and milk compositions have been the main selection goals in dairy cattle-breeding programs over the past few centuries (Brito *et al.*, 2021).

In dairy cattle production, artificial insemination (AI) is an important breeding tool. It is regarded as the first generation of reproductive biotechnologies which was feasible in cattle.AI has proven to be a very effective reproductive technology that selectively increases genetic gain through increased selection pressure on males. Moreover, AI ensures effective use of semen, leading to increase number of offspring from a superior sire can be produced when AI is employed. It is important to note from this study that the dairy cattle farms utilized AI as breeding tool, thus, merits on reproduction efficiency in male breeders can all be attained.

Feeding is recognized as one of the major constraints in livestock production. Traditional feeding system for cattle is based on rice straw and natural grasses supplemented with little concentrates. Shortage of forages during dry season may lead to crude protein deficiency and minerals. Proper feeding management for dairy cattle must be followed to produce high yield of milk, aside from the breed and genetic merit.

Based from published performance reports, Holstein cows can produce approximately 10,000 L/lactation; containing less than 4% fat and 3% protein. Hence, aside from the genetic merit of the dairy animal for milk production and composition, feeding management are major drivers of productivity (Elgersma, 2015).

Table 3. Milk yield of the dairy cattle raised in different farms

Farm Location	Milk Yield, L
Farm 01	7.50 ± 1.45[a]
Farm 02	5.13 ± 1.07[b]
Farm 03	5.83 ± 0.94[b]
Farm 04	4.79 ± 1.03[b]
Farm 05	5.82 ± 2.34[b]

Feed system significantly affects milk and milk solid yield (Bargo, 2002) among dairy animals. According to Mesgaran (2013), it is important to feed dairy cows with energy high- density diet to maximize milk production. Grazing management is widely utilized for dairy cattle production worldwide (FAO, 2009).

However, the main challenge to grazing is pasture management throughout the grazing period. A daily supply of dense herbage composed of young vegetable contains relatively high Dry Matter (DM) and energy is required to continuously provide the requirement of the herd. In this study, majority of the farms relied on natural vegetation, thus, the need to establish pasture areas is important. Confinement and providing the animals with processed forage to include silage and total mixed ration (TMR) are considered as the most advantaged system in milk production.

In dairy farming, the utilization of Urea Molasses Mineral Block (UMMB) is considered as excellent supplement to increase digestion of roughages, provide protein and energy (Greleta, 2013). It is also an important source of crude protein which is often deficient in dry feeds. The urea available in UMMB is converted to ammonia by the action of micro-organisms in rumen. The available ammonia is utilized to produce proteins (Upadhyay *et al.*, 2020). Likewise, molasses is a rich source of sulphur, calcium, and vitamin B complex. Thus, with UMMB consumption, it supports the growth of rumen micro-organism, increases the digestion and consumption of fibrous feeds which will lead to productivity.

Bovine respiratory disease or BRD encompasses pneumonia in cattle, caused by different infectious agents and environmental factors, resulting in a complex range of pulmonary lesions (Guzman and Taylor, 2015). The reported outbreaks of BRD resulted in significant economic loss worldwide. Bacterial pneumonia outbreak in dairy cows reflect common exposure to predisposing factors relevant to dairy cows to include co-mingling or movement of cattle, physiological stress induced by high production, poor air quality from inadequate ventilation, feed change, adverse climatic conditions (Biesheuvel *et al.*, 2015) or viral infections including bovine alphaherpes virus 1 (BHV-1), bovine respiratory syncytial virus (BRSV), bovine parainfluenza virus 3, or bovine viral diarrhea virus (BVDV) as reported by Guterbock (2014). Considering the pre-disposing factors, the farms should properly determine causes of stress; maintain adequate ventilation, and isolation of sick animals. Implementation of biosecurity measures safeguard

animal health, enhance productivity, and mitigate the risks associated with disease outbreaks (Brennan & Christley, 2013). The implementation of effective biosecurity protocols has become a critical component in ensuring the sustainability and profitability of dairy farms worldwide (Zanon *et al.*, 2024). Moreover, dystocia which is described as the difficulty or inability of a dam to deliver its young through its own effort eventually is resulting to calf loss (Abera, 2017). It is considered as common problem among dairy cows. It can result in reduced milk production, reduced fertility, and an increased risk of culling (Rasmussen, *et al.*, 2024).

Farm record is a document that is used to keep account of different activities, events, and materials regarding the farm operations, while record keeping is documenting or writing those activities on a recording material or with the aid of computer (Jeyabalan, 2010). Record keeping is a necessary element of good livestock business management in various business aspects to include financial planning decisions, providing data for government administrative and extension purposes, assisting in livestock management decisions, and evaluating overall activities of the dairy farm. As noted in this study, 100% of the farms were keeping records to track the activities of the farm.

Considering the data presented, it is evident that the success of dairy business depends on milk yield or the duration of the lactation and milk quality. In cows, these two indicators are not only influenced by its genetic capacity, but also environmental factors (Marumo *et al.*, 2022). As reported by Usman *et al* (2013), the milk production in tropical region is 60% lower than the expected performance under temperate environment. Moreover, the management practices employed in farms where the animals were kept and the unfavorable environmental conditions common in tropical areas render low milk yield production. Larger herd size will subsequently increase stocking density, stock per labor unit, and grain or forage requirement per day, which could reasonably be hypothesized to increase the risk in animal welfare unless carefully managed in the farm (Beggs *et al.*, 2019). In this study, it is apparent that herd size influenced milk productivity which is due to poor management.

CONCLUSION

The study reveals that dairy cattle farms implement inadequate production management and is currently facing different production challenges on breeding, feeding, and health, resulting in low dairy animal output.

RECOMMENDATION(S)

It is therefore recommended that management in the farms should be improved to make the operation profitable. A thorough study is recommended to be conducted in terms of animal productivity related to dairy performance to further determine the status of dairy production. Lastly, value chain analysis study is also recommended to determine gaps in each segment.

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