



RESEARCH PAPER

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Pasture establishment and management practices of smallholder dairy farmers in Cagayan Province, Philippines

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Abstract

Proper pasture management plays a major role to produce higher productivity of livestock, thus, this study was conducted to determine the current pasture establishment and management of smallholder dairy farmers in Cagayan province. In terms of the profile of respondents, Dairy farmers are dominated by male, married, small family size, mean age of 47, elementary graduates, and have an income of PhP4,000- PhP5,000/month. On their present practices, most Cagayanos dairy farmers have 3 ha. field cultivated, most of them have Carabao (Murrah buffalo) as livestock owned when compared to cow (Brahman bree) and goat (*Anglo lubian*), in terms of years of handling, the shortest year ranging to 20-25 years, and the longest handling year is 60-65 years. For land preparation, respondents engaged themselves in zero tillage rather than cultivation, most of them have no planting materials while other farmers used forages, they more practiced asexual propagation and adopt pasture cut and carry procedure. On the Attitudes and motivation of dairy farmers, they strongly agreed that forages increase milk and livestock production, agrees that forages confer resistance to diseases, produced supply and quality forages, and increases carrying capacity. With all the above results, the study has shown that dairy farmers in Cagayan province have a very small proportion of land available for pasture development, lack of dairy technology, trainings, and seminars, the high opportunity cost of labors are some of the main constraints recorded and must be addressed.

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Introduction

Livestock farming system have a number of characteristics that contributes for sustainable rural development by providing high quality of marketable products, also improve livelihood rural population and increase nutritional and agricultural productivity, therefore, it's been considered as an element to reduce hunger and poverty (Hemme and Otte 2010).

Implementation of good pasture management practices lead to increase forage quality and yield, it also a wholesome place for the grazing of cow and buffaloes and improves there performance. It is also known to prevent the occurrence of nutritional problems in the animals eventually affect their productivity. In addition to these, dairy experts noted that healthy pastures are beneficial to the owners, animals, and the environment by preventing soil erosion, water loss, and maintain a good and healthy pasture. Also, pH and soil nutrients can be managed well, and forages and animal growth are closely monitored (Agrimag 2018). Because of the high requirements of Dairy animals, more nutritious forages will almost always require feed supplementation, because of this, high-quality grasses and legumes have been and are being identified for the need of this ruminant sector. The importance of the establishment and management improved pasture and fodder species and its importance for the promotion for better development and utilization of crop by dairy cattle in a small scale farming system (Mohd *et al.*, 1994). Growing forage crops for livestock production is not a traditional activity for the majority of smallholder in Cagayan. Consequently, the spread of systems incorporating forage and pasture activities has been seen as constrained by essential and non- negotiable demand of intensive cropping systems. Among livestock owners, one of the constraints is the very small proportion of land area available for pasture development. Another is the high opportunity cost of labor. In the present situation, native or naturalized pastures, usually dominated by grasses make up the bulk of the forage consumed by the dairy animals reared by smallholders in Cagayan. Very small and almost insignificant proportion grow improved pasture either on communally grazed or privately-

owned areas, on roadsides, as “backyard” or home plot pastures near to dwelling or in association with crops. This research considered the current pasture establishment and management practices of smallholder dairy producers in Cagayan province, Specifically, to determine (1) the profile of smallholder dairy producers in Cagayan in terms of Age, Sex, Civil status, Monthly income, Family size, Area for livestock production, Training related to livestock production, Breed of Livestock and Years of Handling, (2) to know the present practices of smallholder dairy producers on forage development in terms of land preparation, Planting materials, Planting preparation and Management of the forage crop during the establishment period, (3) to know the grazing management practices and (4) What is the attitude and motivation of smallholder dairy producers in the development of pasture and fodder areas. The result of this research shall use as a basis for introducing pasture development intervention or management practices in the province to increase pasture's quality and productivity, which ultimately result to increase livestock meat and milk production in the province.

Materials and methods

Study Area

The study identified Twenty (20) respondents per municipality in Piat, Tuao, Sto Nino, Solana, Tuguegarao, Iguig, Ballesteros, Rizal, La-lo, Sanchez Mira, Gonzaga, and Lasam were identified as smallholder dairy farmers.

Study Tools

A questionnaire was developed keeping in view the objectives of the study which independent variables such as Age, Sex, Civil status, Monthly income, Family size, Area for livestock production, Training related to livestock production, Breed of Livestock and Years of Handling were selected. After conducting the survey, the data were analysed using descriptive analysis and Pearson r. A descriptive correlational research design was used in the study. This study makes the farmers aware of the relevance of improved forage development to increase milk production and become a basis in implementing a project in extension works.

Result and discussion

A. Profile of respondents

Table 1 shows the distribution of respondents according to age, As reflected in the table, most of the smallholder dairy farmers in Cagayan are from 50-55 years of age compose of 15.2% of the total number of respondents, followed by an age bracket 35-40, 40-50, and 40-45 composing of 13.6%, 13.0%, and 12.5% respectively, age bracket 30-35, 55-60 composing of 10.3% and 8.7% of the total number of respondents, age bracket 25-30, 65-70, and 70-75 composed of 4.9% and 3.3% respectively, age 20-25 and 75-80 garnered the least percentage with 2.2% and 1.6% of the total number of respondents.

The mean age for the farmers is 47.38 as reflected in the table, study reflects that dairy farmers in Cagayan Valley are still young and capable of doing farm works. A study conducted by Kendra (2016) farmers in the age group of 20-30 years old are more interested in attending training, dairy farm demonstrations, and exposure visits and acquired a high level of knowledge as compared to the elder group of more than 40 years of age, however, adoption of various management practices was found to be higher in elder than the young group.

Table 1. Frequency and Percentage Distribution of Respondents According to Age.

Age	Frequency	Percentage
20-25	4	2.2
25-30	9	4.9
30-35	19	10.3
35-40	25	13.6
40-45	23	12.5
45-50	24	13.0
50-55	28	15.2
55-60	16	8.7
60-65	20	10.9
65-70	6	3.3
70-75	6	3.3
75-80	3	1.6
80-85	1	0.5
Total	184	100
Mean Age	47.38	

Table 2 reflects the profile of respondents according to gender. As gleaned from the table there are more Male farmers engaged in dairy farming with a total number of 163 or a percentage of 88.6% of the total number of respondents, and 21 females are into dairy farming. A study conducted by Kimaro *et al.*, (2013)

that women must also engage themselves in dairy farming, also the formation of groups should be encouraged in rural communities to motivate women's participation in dairy farming for sustainable livestock agriculture.

Table 2. Frequency and Percentage Distribution of Respondents According to Gender.

Gender	Frequency	Percentage
Male	163	88.6
Female	21	11.4
Total	184	100

Table 3 shows the civil status of the smallholders' dairy farmers in Cagayan. As seen from the table 95% of respondents are married, 2.72% and 2.17% are single and widow.

Table 3. Frequency and Percentage Distribution of Respondents According to Civil Status.

Status	Frequency	Percentage
Single	4	2.17
Married	175	95.11
Widow	5	2.72
Total	184	100

Table 4. Shows the Frequency distribution of the respondents based on their educational attainment. Most of the farmers finished elementary education which has a total Frequency of 87 or 47.3% of the total respondents.

Meanwhile, farmers who graduated in high school and College represent 32.6% and 20.01% respectively. It can be inferred that respondents are literate, or they can write and read. According to Chavva (2008), knowing the literacy level of dairy farmers, will help to identify farmer's friendly methods, and to design effective message for dissemination of specific intervention like dairy production, forages or crop choices, decisions, and sustainable pasture management.

Table 4. Frequency and Percentage Distribution of Respondents According to their Educational Attainment.

Status	Frequency	Percentage
Elementary	87	47.3
High School	60	32.6
College	37	20.1
Total	184	100

Table 5 revealed the Frequency and percentage distribution of dairy smallholders in Cagayan in terms of their monthly income. Most of the farmers have an income ranging from 3000- 5000 (147 or 79.89%) followed by 14 and 16 respondents where income range from 600-10000, and 15000-20,000 respectively. Mean income as reflected from the table of farmers is 4767.66 in Philippine peso which reflects that farmers- respondents earn low monthly income. This indication shows that pasture management has not been identified as the main source of income of dairy farmers in Cagayan, this evidence is shown, when compared to rice and other High-Value crops planted in the province.

Table 5. Frequency and Percentage Distribution of Respondents According to their Monthly income.

Income (thousand)	Frequency	Percentage
3000-5000	147	79.89
6000-10,000	16	8.69
15,000-20,000	14	7.61
25,000-30,000	6	3.26
31,000- 40,000	0	0
41,000-50,000	1	0.54
Total	184	100
Mean Income	Php 4767.66	

Table 6 shows the distribution of respondents according to family size, as reflected in the table, most of the smallholder dairy farmers in Cagayan have a family size of 4 and 5 composing of 44 and 40 or 23.9% and 21.7% of the total number of respondents, followed by 3,6,2 and 8 family size composing of 13.0%, 12.0%, and 7.6% respectively.

The mean family size of dairy smallholder in Cagayan is 4.8 which indicates that farmers have relatively a small family size. In the economic context, the efficiency of family size being a human capital takes advantage as a provider of labor, which enables to reduced marketing costs, family labor is a key element in providing profitability and competitiveness to small-scale dairy production systems, and its economic importance is directly related to the herd size (Posadas *et al.*, 2013).

Table 6. Frequency and Percentage Distribution of Respondents According to their Family size.

Family size	Frequency	Percentage
2	22	12.0
3	24	13.0
4	44	23.9
5	40	21.7
6	24	13.0
7	9	4.9
8	14	7.6
9	2	1.1
10	2	1.1
11	1	0.5
12	2	1.1
Total	184	100
Mean Family size	4.8 or 5	

B. Present practices of smallholder dairy producers

As to area cultivated by farmers, Table 7 shows, that most of the farmers cultivate 4 ha (44 or 23.9%) followed by 40 respondents with an area of 5 hectares. A few numbers of the respondents cultivate more than 9 hectares. The mean area of 3.83 shows that respondents are smallholder dairy producers. The study showed that Dairy farmers have a small area of production which one of the constraints reported, given that Cagayan province has a vast area of land. According to McDonald *et al.*, (2020), large dairy operations have significant financial advantages over small- and midsized- farms, primarily because of lower average production costs per pound of milk produced. Therefore, larger farms can earn profits during times when smaller farms bear losses.

Table 7. Frequency and Percentage Distribution of Respondents According to their area of production.

Area (ha)	Frequency	Percentage
2	22	12.0
3	24	13.0
4	44	23.9
5	40	21.7
6	24	13.0
7	9	4.9
8	14	7.6
9	2	1.1
10	2	1.1
11	1	0.5
12	2	1.1
Total	184	100
Mean Area	3.83ha.	

Table 8 reflects the breed of cow, carabao, and goats raised by dairy farmers in Cagayan. For cow, farmers raise most Brahman breeds (64 or 41.56%) while on

carabao 61 or 39.61% most of them raised Murrah buffalo, and for goat, they raise Anglo lubian breed (29 or 18.83%). Brahman breeds are good mothers and produce a very satisfactory milk flow under conditions that are adverse for best performance (The Dairy Site 2020) while Murrah Buffalo is a most productive water buffalo breed and they are resistant to diseases and easily adapts to south climatic conditions. All these factors make Murrah Buffaloes highly suitable for professional and organized dairy farming (Bharati Dairy Farm 2017).

Table 8. Frequency and Percentage Distribution of Respondents According to breed of livestock.

Breed	Frequency	Percentage
Cow (<i>e.i. Brahman</i>)	64	41.56
Carabao (<i>e.i. Murrah buffalo</i>)	61	39.61
Goat (<i>e.i. Anglo lubian</i>)	29	18.83
Total	179	100

Table 9. reveals the Frequency and percentage distribution of dairy smallholder in Cagayan in terms of year of handling livestock. As gleaned from the table most farmers handled livestock for almost 20-25 years composed of 20.7% of the total number of respondents in Cagayan. The longest years of handling which range from 60-65. The mean number of years of handling livestock by the dairy smallholders is 19.82 which reflects that respondents are experienced farmers.

Table 9. Frequency and Percentage Distribution of Respondents According to Year of Handling.

Year	Frequency	Percentage
0-5	23	12.5
5-10	20	10.9
10-15	24	13.0
15-20	24	13.0
20-25	38	20.7
25-30	7	3.8
30-35	14	7.6
35-40	9	4.9
40-45	10	5.4
45-50	8	4.3
50-55	4	2.2
60-65	3	1.6
Total	184	100
Mean No.	19.82 years	

Table 10. reflects the method of land preparation adopted by farmers. As gleaned from the table, most of the farmers practiced zero tillage (143 or 77.7%) while only 41 or 22.2% practiced cultivation method of land preparation. This means that dairy farmers in Cagayan Valley know that zero tillage used in land preparation makes the soil more resistant to erosion caused by wind and water. This is especially true when an abundance of mulch cover (stalks, straw, leaves, pods, chaff) is maintained on the soil surface (Exapta 2020).

Table 10. Frequency and Percentage Distribution of Respondents According to Land Preparation.

Land Preparation	Frequency	Percentage
Cultivation	41	22.3
Zero Tillage	143	77.7
Total	184	100

Table 11. as gleaned in the table most of the farmers has no planting material used for livestock production (134 or 72.8%) this shows that these farmers utilize natural grazing grasses, while some farmers use planting materials such as forages (35 or 19.0%), followed by fodder trees (5 or 2.7%) and Combination or mixed planting materials (9 or 4.9%). It can be inferred in some cases; farmers were found to have improved grazing areas.

Table 11. Frequency and Percentage Distribution of Respondents According to Planting Material used.

Planting Materials	Frequency	Percentage
None	134	72.8
Forage	35	19.0
Fodder Tree	5	2.7
Legumes	1	0.5
Combination/Mix	9	4.9
Total	184	100

Table 12 reflects the planting materials used by respondents. As gleaned from the table most of farmer has no planting materials used for livestock production (134 or 72.8%) while some farmers practiced Asexual propagation as mode of planting with a 19.02% of the number of respondents, followed by sexual propagation with 8.15%. Both modes of reproduction have often been viewed as adaptations to temporally or spatially variable environments (Yang *et al.*, 2016).

Table 12. Frequency and Percentage Distribution of Respondents According to planting.

Planting	Frequency	Percentage
None	134	72.83
Sexual	15	8.15
Asexual	35	19.02
Total	184	100

Table 13 shows the Frequency and percentage distribution of respondents to grazing Management Practices, as gleaned to the table most of farmers practicing Pasture Cut and Carry (40.53% and 28.16%) of the total numbers of respondents. It was followed by threshing (98 or 23.79%). Free range and paddocks are also practicing by some of farmers (4.61% and 1.94%). Garnering the least grazing management is Supplementation (4 or 0.97%).

Its indicates that some farmers are not fully aware on some different grazing practices. Proper grazing allowing livestock to consume directly on the growing forages, grasses, legumes, and forbs this is to provide good nutrition and other benefits to the animal and can lead to more productive forage growth.

Table 13. Frequency and Percentage Distribution of Respondents According to Grazing Management Practices.

Practices	Frequency	Percentage
Threshing	98	23.79
Pasture	167	40.53
Cut and Carry	116	28.16
Paddocks	8	1.94
Supplementation	4	0.97
Free range	19	4.61
Total	412	100

Table 14 reflects the attitudes and motivation of small holders' dairy producers. Respondents strongly agree that "forage increase milk production" with a weighted mean of 2.43. On the other hand, all the respondents "agree" that forage increase mean production, confers resistance to diseases, continuous supply and quality forage and increases carrying capacity with corresponding weighted means of 2.06, 2.05, 2.23 and 2.22 respectively. An overall weighted mean of 2.19, indicates that all the respondents agree in all indicators of attitudes/motivation as reflected in the same table.

Table 14. Attitudes and Motivation of Smallholders of dairy producers.

Attitude/motivation	Weighted Means	Adjective Value
Forage increase milk production	2.43	Strongly Agree
Forage increase meat production	2.06	Agree
Confers resistance to diseases	2.05	Agree
Continuous supply and quality forage	2.23	Agree
Increases carrying capacity	2.22	Agree
Overall Weighted Mean	2.19	Agree

Legend:

1:00- 1:66- Disagree

1.67- 2:33- Agree

2.34- 3:00- Strongly Agree

Conclusion

From the above findings, the following conclusions are drawn; respondents are still young to do farm works, most of the respondents are married with children utilize for farm labor, study showed also that Cagayan dairy farmers are low-income earner, grazing practices were not being practiced, farmers have lack of knowledge on the different type of forages that are available in the area. However, respondents have relatively good attitudes towards forage and pasture development. Furthermore, it was also shown that dairy farmers have a very small proportion of land available for pasture development. Other constraints recorded which includes high opportunity cost of labor, technology needs, Climate, edaphic factors, and lack of training/seminars. It was recommended from the finding that more female should engage in dairy production, additional knowledge in term of seminars and training must be undertaken for the awareness of the different forages available in the community, breeding of cows and goat must be the priority when engaging on dairy production and lastly, educational tour of farmers to visit establish forage pasture area for to imitate or to adopt.

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