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Feeding Management of Backyard Goats in Northern Mindanao, Philippines

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Abstract: ***A survey was conducted to assess the feeding management of goats among backyard raisers in Northern Mindanao, Philippines. There were 34 backyard goat raisers included in the survey taking into account the production systems employed, the kind of feed materials provided/are available for their goats and the usual supplementation practices. From the 34 farmers, 13 or 38.23% practiced rapid rotational tethering (RRT) while 10 (29.41%) maintained free grazing (FG). Accordingly, some realized the need and the benefit to shift to partial (17.65%) and complete confinement (5.82%). The shift is due mainly to the limitedgrazing area and the better growth performance when animals are confined. However, backyard goats in the region (Northern Mindanao)are still characterized by the low dam and kid performance with high pre-weaning mortalities. Supplementation is practiced whenever supplemental feed is available. The abundance of forages is noted during the wet season but the sustainability of supply during dry season remains a problem. Nutrient deficiency is perceived throughout the year due to low digestibility of forages even during the rainy season and to the limited forage during the dry season. The condition will worsen if dry spell extends into drought. Supplementary feeding is necessary.***

Keywords: production system, feed materials, supplementation

1. Introduction

Goat plays a minor role but has been an essential component in the farming system in the Philippines. The country's goat population stands at 3.71 M, of which 98% (PSA 2016) is in the hands of the smallholder farmer. It is a low-input, low-output production system where goats are raised to provide additional income. However, goat is now a commodity of economic importance that gained favour among investors due to the high demand for chevon and even goat's milk nowadays. As with other ruminants, goat production enterprise is dictated by the demand of its edible products such as meat and milk.

Feed is an item of expense which usually constitute 70-75% of the total cost of production so that in goat raising, an area suitable for crops from which to produce quality forages must be a priority. Under Philippine condition, however, everyone seems to agree that in a per unit area of land, grain production and other high valued crops is generally more profitable than in any ruminant production endeavour, the reason why large areas are devoted to these crops. Preferential attention to human food is always the primary objective. This is similar to the finding of Hogan (1996) in Australia. Some engaged in a mixed production system where the bulk of the income is derived from crops and the crop by-products as feed to livestock to maximize land use. However, areas that are unsuitable for crop production are utilized for grazing.

In Northern Mindanao, most of the backyard farmers managed their goats under the traditional methods particularly if the type of land is suited for grain production or for other crops seen/perceived to be more profitable. However, the economic viability of this traditional method has yet to be assessed. Some ventured on a mixed farming system (crop-livestock) to derive extra benefits.

Generally, the study aims to assess the feeding management of goats among backyard goat raisers in Northern Mindanao considering the feed materials available in a given production system.

2. Review of Related Literature

Feed supply determines the kind of feeding practices adopted. Grazing is common if a large area is available, otherwise feeding is done through cut- and-carry system. However, during prolonged dry season, raisers need to walk certain distance to collect fodder crops for their goats because there is so much time spent in herding than would be spent on cut-and-carry (Santoso and Dharsana,1993). Whatever feed material available are being used to feed goats in the backyard. This may involve feeding crops or household residues to stallfed goats, tethering individual goats to verges or allowing goats to scavenge (Steele, 1996). They eat leaves, small branches, weeds, herbs but they also feed on grasses, hay, silage, roots and concentrates normally consumed by other ruminants. High intake of grasses are normal when they are grazing in the paddocks whereas large percentage of weeds are contained in their diet when they are browsing over waste land. They can graze grasses down to the roots or simply nibble-off their inflorescence depending on their palatability. When there is abundance of feed, goats are selective, but as the quantity of feedstuff diminishes, they become unselective to avoid starvation. Goats can survive in a fragile ecosystem very well because of their feeding habits. They can withstand dehydration and exist in an arid to humid zones (Steele, 1996). Grazing or in combination with cut-and-carry is usually adopted to sustain productivity.

Traditionally, goats in the Philippines are sustained on unimproved management system, mostly through tethering and extensive grazing resulting in low growth rate. Average daily gain (ADG) is less than 50g and the market weight (8 months) is somewhere between 10-12kg only. Reproductive performance of the doe has a major impact on the sustainability and profitability of a goat enterprise. As observed, natural conception was very low and pre-weaning

mortality is as high as 60-100%. When diarrhea strikes, especially at the onset of the rainy season, goats are sold at a bargain price (Alo, 2008).

3. Methodology

Selection of Project Sites – Out of 4 provinces the region has, only the top 3 goat producing provinces were considered in this study. These are the provinces of Bukidnon, Misamis Oriental and Misamis Occidental. From these provinces, municipalities were identified based on the concentration of backyard goat raisers.

Site of Implementation

1) Selection of Goat Raisers/Farm – Pre-selection of farmer –cooperator was made using the data provided by the Department of Agriculture(DA) technicians or the Provincial Veterinary Office(PVO) following these criteria:
   - Availability of 5-24 breeder does (under Philippine condition, goat farming with less than 5 does was found to be unprofitable)
   - Willingness of the farm owners to share farm records
2) Orientation Meeting with LGU's and Goat Raisers – To discuss the rationale of the project, a meeting with the officials of the local government units (LGU's) usually represented by the Municipal Agricultural Officer (MAO), the livestock technicians together with the pre-selected farmer were held.
3) A one-shot survey to determine current inventory and management practices employed in goat farming was conducted.
4) Gathering of data:
5) A total of 34 backyard goat farmers were interviewed and the following information were recorded.
   - Type of management system employed in relation to feeding
   - Grass species available in their grazing area
   - Legume species available in their grazing area
   - Crop residues available in a particular cropping season if any
   - Type/kind of concentrate provided if any

4. Results and Discussion

Type of Production System Employed

The way goats are raised in a given region differs. It is greatly affected by the raiser's main source of livelihood and goats are usually tethered within the house vicinity for safe keeping and for easy monitoring. Farmers tend to consider those practices that require less labour, time, money and the one which is easier to apply. In general, backyard goats in Northern Mindanao rely almost entirely on natural vegetation that abounds in the grazing area. Table 1 presents the production systems.

Table 1: Production system adopted by backyard goat raisers in Northern Mindanao, Philippines

Production System	Frequency (N=34)	Percentage (%)
Free grazing (FG)	10	29.41
Rapid rotational tethering (RRT)	13	38.23
Partial confinement (FC)	6	17.65
Complete confinement (CC)	2	5.82
Integration with plantation crops	3	8.82

- Free Grazing - In free grazing, animals are let loose in an open area, vacant lots or in crop fields after harvest where they have the freewill to scavenge on whatever edible material they can find even in the roadside. Sometimes animals are guided to distant places where they have free access to large grazing area for an unlimited period of time during the day. During night time, animals are kept in the shed (Alo, 2014). Input is low and is premised on the fact that goats can subsist purely on grasses courtesy of the microorganism in the first 2 compartments of their stomach. Animals kept under this system grow very slowly and reach market weights at an average of 15 kg after about 7 to 8 months (Alo, 2008). Of the 34 farmers, 29.41% practiced this system.
- Rapid Rotational Tethering - In this method, choices of plant material to consume is very much dependent on how far the rope could allow the animal to graze and how lush the pasture the animal is being tethered in. Usually, a 5-meter long rope is tied around the neck of matured goats and they are transferred to another area at least twice a day. Sometimes cut grasses are hand fed. In general, except for table salt, supplemental feeding is rarely done. Similar to free grazing, animals kept under this system grow very slowly. About 38.23% of those interviewed found this practice practical if a large grazing area is unavailable. This is also a means of preventing animals from destroying other crops.
- Partial Confinement- This is done if access to grazing areas is limited. Goats are partially confined during the rainy season and stallfed with grasses, legumes, tree leaves, and shrubs and allowed to graze only for 2-4 hours when it is not raining and the ground is dry. Ideally, planted grasses and legumes must be available for stallfeeding to sustain this production system. In Northern Mindanao, about 17.65% of the farmers employed this system.
- Complete Confinement- This is also known as zero grazing where animals are totally confined in a pen on a year-round basis and fed with either freshly harvested grass, silage or hay. There must be a ready to harvest forage to sustain the feed requirement or a substantial amount of forages for conservation purposes. The use of agro-industrial by-products for animals in complete confinement had gain popularity in areas where these feed resources are available. Rice bran, corn bran, and

other concentrates are provided together with vitamins and minerals. In some instances, corn stover and rice straws are used as basal feed. Only 5.82% of the backyard goat raisers in Region 10 (Northern Mindanao)employ this method due to high labour requirement.

- Integration with plantation crops – a number of goats are integrated into plantation crops (rubber, coconuts and fruit trees). Under these crops is a substantial amount of green forages, but its carrying capacity is determined by the amount of regrowth this largely shaded vegetation can make. Although considered as shade tolerant, these species are still dependent on the amount of sunlight that is able to penetrate to the ground and their ability to withstand frequent defoliation or high grazing pressure. Nevertheless, this method is an excellent alternative to a traditionally low-input production system. In Northern Mindanao, only 3 or 8.82% practice this integrated system, one is under coconut and 2 in the orchard.

Status of the Backyard Goats in the Northern Mindanao Region

The previous study of Intong, et al (2013) covering the 3 provinces of Northern Mindanao, namely: Bukidnon, Misamis Oriental and MisamisOcidental as shown in Table 2, revealed that the average doe per farm in Northern Mindanao Region is 7.33 with Misamis Oriental having the most number of does followed by the Bukidnon province and the least is Misamis Occidental. Average kidding interval is 246.7 days, while kidding index (number of kiddings per year) is 1.48 with a kidding size (number of kids per kidding) of 1.44. It registered a minimal incidence of kids born dead of only 1% during the period of study.

Table 2: Goat farm performance of backyard goats in Northern Mindanao, Philippines.

Parameters	Provinces			
	Bukidnon	Misamis Oriental	Misamis Occidental	Total/ Average
No. of Farms	10	18	6	34
No. of Does	80	126	37	243
Ave. doe per farm	8	7	7	7.33
Dam Performance				
Kidding index	1.55	1.48	1.41	1.48
Kidding size	1.42	1.45	1.44	1.44
Kidding interval	234.85	246.83	258.43	246.70
Type of Birth (%)				
Single	60.00	60.18	55.88	58.69
Twin	37.78	35.40	44.12	39.10
Triplet	2.22	4.42	-	3.32
Sex of Kids (%)				
Female	52.34	54.54	36.00	47.63
Male	47.66	45.45	64.00	52.37
Birth Status (%)				
Alive	100.00	96.99	100.00	99.00
Dead		3.01		1.00
Growth Performance:				
Weight of kids(kg)				
At birth	2.14	2.06	2.71	2.30
At 3 months	9.41	9.80	12.70	10.64
At 8 months	18.85	18.43	19.81	19.03
Average Daily Gain (grams)				
At 3 months	80.86	85.32	112.42	92.87
At 8 months	69.87	66.96	72.27	69.70
Mortality (%)				
Below 1 month	9.93	5.62	14.29	9.95
1-3 months		2.25		2.25
Weaning	2.84	2.25		2.55
Adult	1.25	1.59		1.42

Growth performance was measured in terms of birth weight, weaning weight and matured weight. Weaning and matured weights are taken at 3 and 8 months from birth respectively. Data showed that the average birth weight is 2.3kg and the average weaning weight was 10.64 kg. Meanwhile, the average weight at 8 months is 19.03 kg. The average daily gain (ADG) taken at 3 and 8 months were 92.87 and 69.70 grams respectively.

Mortalities which were classified according to the age of the animals such as below 1 month old, 1-3 months, weaning age and adult showed that those below 1month old had a mortality of 9.95% while those 1-3 months had only 2.25. On the other hand, weaning age and those classified as adult had 2.55% and 1.42% respectively.

Feed Materials Available

Feed materials goats used to relish on are presented in Table 3. These were classified into grasses, forage legumes, tree legumes and crop residues. Nutrient composition of some of these feed material is shown in Table 4.

Table 3: Roughages mostly consumed by goats in Northern Mindanao, Philippines

Grasses	Forage legumes	Tree legumes	Crop residues
Brachiariamutica	Arachispentoi	Cajanuscajan	Arachis hypogea(tops)
Dicanthiumaristatum	Centrosemapubescens	Desmodiumceneria	Bambusaspp (leaf)
Cynodonplectostachyus	Stylosanthesgracilis	Gliricidiasepium	Glycine max(straw)
Imperata cylindrical	Stylosanthesguianensis	Flemingiamacrophyla	Ipomeabatatas(tops)
Macroptiliumatropurpureum	Stylosantheshumilis	Indigoferaanil	Manihutesculintam(tops)
Panicum maximum		Leucaenaleucocephala	Musa sapientum(leaf)
Paspalumcojugatum		Sesbaniasesban	Oryzasativum(straw)
Penisitumpurpureum			Saccharumofficinarum (tops)
Setariasphacelata			Zea mays (stover)
Themedatriandra			

Table 4: Chemical composition of some roughages feed to goats in Northern Mindanao, Philippines expressed in percentage of the dry matter

Forage species	Percentage(%)							
	Age (days)	TDN (%)	NDF (%)	ADF (%)	Lignin (%)	CP (%)	Silica (%)	Ash (%)
Grasses								
Brachiariamutica (freshly cut)	20	57	60	34	4.2	11	5.6	13.3
	40	49	65	39	5.4	6.5	6.1	11.5
	60	51	67	38	5.3	4.2	4.7	9.7
Cynodonplectostachyus	20	65	69	39	4.9	10.8	3.5	9.9
	40	57	71	42	6.7	9.1	3.8	9.1
	60	45	74	47	8.9	5.5	4.9	9
Dicanthiumaristatum	20	70	63	41	3.6	10.2	5.7	11.4
	40	63	68	47	5.7	6.4	5.8	10.4
	60	57	73	51	6.8	4	5.6	9.1
Imperata cylindrical	20	57	77	46	5.6	8.5	3.9	6.7
	40	50	75	47	5.8	6.7	5	7.8
	60	41	74	46	8.5	5.2	4.7	7.7
	90	36	73	50	8.7	4.3	6.7	8.7
Panicum maximum	20	63	62	41	5.6	11.2	6.2	12.3
	40	55	65	45	5.6	8.5	6	12
	60	47	72	51	8	5.5	5.9	11.5
Pennisetumpurpureum	20	59	54	36	3.3	7.3	7	14.9
	45	54	62	43	6.3	7.5	5.9	15.3
	60	51	66	47	8.8	6.7	5.6	13.8
Setariasphacelata	20	61	56	33	2.7	11.1	4.9	14.1
	40	55	63	42	6.6	8.5	3.5	11.6
	60	51	71	47	8.6	5.3	4.9	11.7
Legumes								
Calopogoniummuconoides	75	47	54	41	13.4	16.8	0.3	7.4
Centrosemapubescens	75	38	63	45	15.6	17	0.3	7
Macroptiliumatropurpureum	75	46	55	44	12.3	13.9	0.7	7
Stylosanthesgracilis	75	55	57	44	13.8	9.7	0.6	5.2

Source: Grant, 1973.

Table 5: Nutrient composition of some feed supplements by backyard goat raisers in Northern Mindanao

Supplements	DM(%)	Ash(%)	CP(%)	NDF(%)
Rice bran	89.00	7.20	10.00	73.14
Corn bran	88.60	3.20	9.00	74.80
Common table salt				

Supplemental Feeding

The basal feed for goats at the backyard in Northern Mindanao region are the native grasses, legumes and shrubs. During wet season, reasonable amount of these plant materials are available in contrast to dry season, where supply diminishes which is always part of the normal production calendar, and goats normally suffer from extended period of nutritional deficiency.

Similar with legumes and shrubs, as grasses mature they become fibrous and less digestible. The woody component of these vegetation comprise the bulk of the diet, thus their potential for animal production is low. Dependence on matured forages made the animal suffer from nutrient deficiency as a result of reduced intake and digestibility. This suggests that on a year round basis, native forages, shrubs and legumes will only be able to supply nutrients for a low level of production. Animals will be in the same situation during dry season when access to quality forage is less. Body condition of the animal will further worsen if the dry period extends into drought affecting not only the productive but the reproductive cycle of the animal as well. Farm wastes (corn stover and rice straw) and agro-industrial by-product will then form part of the basal feed. The use of these agro-industrial by-products-has gained popularity among farmers in the region. Some had access to spent grain from brewery, while those in rice or corn producing municipalities used rice straws and corn stover respectively. Banana peelings, leaves, bracts, mongo pods are also utilized. Though these feed materials are considered inexpensive if not priceless in some cases, the same is confronted with the problem of digestibility.

Supplemental feeding is dictated by the need of the animal to improve production for economic reason or for survival when animals are in extreme nutrient deficiency. However, supplementation entails cost so that the economics of doing it must be seriously considered and whenever possible, cheaper feed resource should be used.

Prioritization of animals that should be given supplemental feed may also be done.

In Northern Mindanao region, supplementation is a common practice among goat raisers whenever supplemental feed is available. Types of supplemental feeds differ from farm to farm depending on what is available nearby. They usually provide rice bran, corn bran and common table salt as shown in Table 5.

5. Conclusion

Given the abundance of forages from the natural vegetation and from some improved grasses during wet season, there is still a perceived nutrient deficiency due to the inferior feeding value of these feed materials as an effect of low digestibility. The situation worsens during dry season due to the limited supply and worst is expected specially if dry spell extends into drought.

Supplementary feeding is the sound if not the best solution. This is the only way were extra nutrients can be provided and imbalances can be corrected. An acceptable feeding systems and supplementation must be developed to address the varying degree of nutritional deficiencies among goats between dry and wet season periods. Production system employed must also be factored in. However, unless farmers are convinced of a cost effective and easy to implement supplementation strategy that could bring notable increase in animal productivity, this practice will not be easily accepted.

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