

PASTURE DEVELOPMENT IN THE PHILIPPINES

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INTRODUCTION

Agriculture plays an important role in the economy of the Philippines. Combined with fishery and forestry, it accounts for 30 percent of the gross domestic product (GDP) and contributes 40 percent of the export revenues. During the period of 1983-85, the average share of agriculture's gross value added (GVA) to GDP was 27%. It also constitutes 50 percent of the country's working force and serves as a means of livelihood to 60 percent of the country's populace.

Table 1. Livestock Inventory (in million heads)

Livestock	1982	1983	1984	1985	1986	1987	1988
Cattle	1.94	1.94	1.85	1.79	1.81	1.69	1.63
Carabao	2.91	2.95	3.02	2.98	2.98	2.86	2.78
Hog	7.79	7.98	7.61	7.30	7.27	6.95	7.64
Goat	1.78	1.86	2.36	2.19	2.18	2.02	2.01
Poultry							
Chicken	59.71	62.25	59.29	52.10	53.00	50.42	55.94
Duck	4.9	5.42	5.76	5.28	5.21	5.26	6.27

Growth Rates (in percent)

Livestock	82-83	83-84	84-85	85-86	86-87	87-88
Cattle	0	-4.64	-3.24	-1.12	-6.63	-2.68
Carabao	-1.37	-2.37	-1.32	0	-4.03	-0.32
Hog	-2.44	-4.64	-4.07	-4.41	-4.40	-3.02
Goat	-4.49	-26.88	-7.2	-0.46	-7.34	-3.27
Poultry						
Chicken	4.25	-4.88	-12.01	-1.73	-4.87	-3.16
Duck	-10.61	-6.27	-8.33	-1.33	-0.96	-1.64

Source: BAS/DA

Average Growth Rates, 1976-88 (%)

Livestock		Poultry		
Cattle	-	0.49	Chicken	- 2.15
Carabao	-	0.85	Duck	- 3.78
Hog	-	1.64		
Goat	-	8.49		

Among the agricultural sector, crops play the major role in production while livestock industry remains in the dwindling phase or if not a negative growth rate through the years (Table 1). This could be figured out by the very low animal production and the high extraction rate of animal products. Table 2 shows that the average annual liveweight production of livestock covering 1980 - 1987 is 778.61 thousand metric tons with the biggest share coming from the production of pork. Beef and carabeef were second and third while chevon contributes only a fraction to the industry. Poultry contributes 215.99 thousand metric tons annually.

Table 2. Production and Value of Livestock and Poultry

ITEM	Average (Liveweight, '000MT)	Value (Million Pesos)
LIVESTOCK (Total)	778.61	8,550.71
Carabeef	56.98	606.36
Beef	118.41	1,721.90
Pork	369.61	7,660.32
Chevon	31.07	215.24
Dairy	2.55	9.39
POULTRY (Total)	215.99	7,538.73
Chicken	206.67	7,356.92
Duck	7.51	181.81
EGG PRODUCTION		
Chicken	116.35	2,680.62
Duck	15.29	257.26

* Average for 1980-1987 as estimated by BAS

Source: Selected Statistics on Agriculture
Bureau of Agricultural Statistics, April 1988

As the number of Filipinos increases at 2.3 percent annually, there is a shortfall of supply of animal products. Minimum required per capita consumption for meat stands at 14.0 kg. with deficiency consumption of 7.68 kg. For nutritional reason alone, there is an immediate need to develop the country's animal industry by increasing the number of animals coupled with high production per unit head of animals. This could be achieved by utilizing our idle/underutilized land and feed resources coupled with improved animal feeding, breeding and disease management.

The commercial production of poultry and hogs has dominated growth of the livestock industry during the 70's and in the 80's, but these two sectors of the industry is constrained by limited domestic supplies and high costs of feed concentrates. With these problems, a greater emphasis is now given to ruminants, for they can utilize pastures and crop residues and we`ds associated with crop production which cannot otherwise be used as human food.

LAND RESOURCES AND USE

The Philippines has a total land area of 29.5 M hectares, 30 percent of which is devoted to agriculture (Table 3). Grasslands occupy 1.8 M hectares of which only 361 thousand hectares are reported to be under the Forest Land Grazing Lease Agreement. Grasslands used to be about 11 percent of the country's total land.

Table 3 shows that crop cultivation has encroached the brushland and grassland areas, in addition to planting of intercrops in coconut areas and other plantations. This indicates that the country's growing population has exerted pressure to turn a major portion of underutilized lands to food crop production.

Table 3. Existing land use (Philippines)

Land Cover (sq.km.)	Area (sq. km.)	Percentage
Forest and Mangrove	7.135	24.15
Grassland	1.813	6.14
Cultivated area mixed with bushland & grassland	10.114	34.23
Coconut & other plantation	1.223	4.14
Cultivated croplands	4.392	14.86
Croplands mixed with coconut and other plantation	4.113	13.92
Fishponds	0.207	0.70
Eroded areas, riverbeds, quarries and other barren land	0.101	0.34
Built-up areas, marshy areas and Lakes	0.449	1.52
Total	29.540	100.00

Source: NAMRIA - Department of Environmental and Natural Resources (DENR), 1987

FEED RESOURCES

An estimate of roughage feed from existing crop lands, plantation and grassland areas shows that 37.2 M tons of dry matter is available to support over 10 M animal unit (A.U.) equivalent in the Philippines (Table 4). Estimate shows that only 43 percent of the feed available is being utilized, indicating that in the agricultural lands and grasslands alone the existing ruminant population could be doubled.

Table 4. Feed Resources ('000 tons) from crop lands and grassland areas, by region.

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Region	Rice straw	Corn Stover & Cobs	Beans & Peas hay	Camote Vine	Cassava Leaves	Peanut hay	Sugar cane tops	Ramie leaves	Native vegetation under carrying				Capacity (A.U)	Total A.U.	% Utilization
									Coconut	Rubber	Grassland	Total			
Ilocos	873.30	85.30	12.40	15.40	1.10	8.60	20.00	.	15.50	.	3,338	4,369.60	1,181	460.1	38.96
Cagayan Valley	1,162.10	440.80	3.70	10.40	0.40	30.20	14.00	.	6.80	.	4,103	5,771.40	1,250	468.4	30.02
Central Luzon	1,593.00	11.60	7.20	13.00	0.60	1.50	167.50	.	2.40	.	2,829	4,625.80	1,250	346.2	27.70
Southern Tagalog	932.90	300.12	3.00	17.20	4.00	3.50	175.50	.	551.00	.	1,703	3,690.20	997	505.2	50.67
Bicol Region	637.30	161.30	0.60	72.00	31.60	1.30	19.00	.	456.00	.	1,234	2,613.10	706	489.3	69.30
Western Visayas	1,143.70	63.24	5.80	16.00	4.70	2.10	705.00	0.85	106.00	.	780	2,827.30	764	413.6	54.14
Central Visayas	148.60	311.80	2.20	45.20	21.80	3.10	127.50	0.10	162.80	.	746	1,569.10	424	386.1	91.06
Eastern Visayas	407.30	256.90	0.40	76.80	14.60	1.80	53.00	.	336.50	.	124	1,271.30	344	196.3	57.06
Western Mindanao	350.40	254.80	0.90	12.80	23.50	2.10	.	.	477.50	.177.00	79	.1378.00	372	179.7	4831
Northern Mindanao	331.50	314.00	1.40	20.80	6.00	0.70	47.50	0.20	369.50	56.50	1,452	2,600.10	703	301.4	42.87
Southern Mindanao	630.00	1,516.90	6.10	20.40	3.60	0.90	30.00	4.15	553.80	22.00	1,073	3,860.85	1,043	331.0	31.74
Central Mindanao	747.50	1,101.20	430	7.20	13.60	1.20	12.50	0.10	320.70	123.00	670	3,001.30	811	291.5	35.94
Total	8,957.60	4,517.80	48.00	327.20	125.50	57.00	1,371.50	5.40	3,358.50	378.50	18,131	37,278.00	10,075	4,368.8	43.36

Based on cattle, carabeo and goat population in 1987

IMPROVEMENT OF NATIVE PASTURES

Grassland plays and would further play a great role in the development of the Philippine livestock industry. The country's growing population would exert pressure to transform livestock production in these areas from extensive system to semi-intensive or intensive system.

Use of Legumes.

Philippine grasslands are mostly rolling to hilly and generally with poor soil and introduction of legumes had been shown to be the quickest and most practical approach to large-scale improvement of these areas. Overseeding is done after burning or heavy grazing non-accessible areas or by disking the more accessible areas. Shrub or tree legumes can be introduced by transplanting seedlings during the rainy season.

Most grassland soils have been found to be acidic and deficient in phosphorus and therefore a problem in introducing legumes. Establishment of legumes has been improved by liming and phosphorus fertilisation. However, the stylos have been found to be tolerant to acidic and low phosphorus soil.

Liveweight Gains in Native Pastures With and Without Legumes.

Introducing legumes in pasture has been found to increase productivity by providing more and higher quality herbage to grazing animals even during the dry season.

Table 5. Liveweight gains on Imperata and Imperata/legume pastures

Location/	Pasture	Stocking rate (a.u./ha)	ADG (kg)	LWG/hd (kg)	LWG/ha (kg)
Masbate					
(Cattle	Imperata	0.5	0.12	43.2	21.6
.	Imperata	1.0	0.07	26.6	26.6
.	Imperata/Stylo	1.0	0.32	116.6	116.6
.	Imperata/Centro	1.0	0.25	91.8	91.8
Bukidnon					
(Cattle)	Imperata	1.0	0.21	77.4	77.4
.	Imperata/Centro	1.0	0.26	94.1	94.1
Bohol					
(Carabeo)	Imperata-Themedata	0.5	0.24	85.4	42.7
.	Imperata-Themedata	1.0	0.22	78.9	78.9
.	Imperata-Themedata/Stylo	0.5	0.35	127.0	6.30
.	Imperata-Themedata/Stylo	1.0	0.25	92.2	92.2
Bohol					
(Carabao)	Imperata	0.75	0.22	68.1	51.1
.	Imperata/Leucaena	1.5	0.35	111.9	167.9
.	Imperata/Leucaena	2.0	0.28	87.4	174.8

Table 5 shows the animal liveweight of cattle and buffaloes from different locations in the Philippines.

In Masbate province (Siota, et. al. 1979) Imperata pastures produced 22 to 25 kg/ha/yr at stocking rates of 0.5 and 1.0 au./ha, respectively, while Imperata/Centro and Imperata/Stylo pastures at 1.0 u.a./ha produced 92 to 117 kg/ha/yr, respectively. Periodic herbage samples taken during the grazing period indicated that the Imperata/legume pastures could still support 0.5 a.u./ha. Animals on Imperata pastures lost weight during the dry season while those in Imperata/legume pastures did not.

In Bohol province Castillo et al (1987) reported that buffaloes in both Imperata-Themedra and Imperata-Themedra/Stylo pastures at stocking rates of 0.5 and 1.0 u.a/ha lost weight during the dry season. Liveweight gains obtained from pastures with stylo were higher than the pastures without stylo. In the same location, Moog et al (1981) worked on Imperata/Leucacna pastures and observed that buffaloes did not lose weight during the dry season even if stocking rates used were slightly higher than in the other experiment. Liveweight gains of buffaloes grazed on Imperata/Leucacna pastures were three times that of Imperata pastures because of the capacity of the former to produce more herbage and support more animals. Leucacna comprised over 50 percent of the herbage on offer throughout the grazing period.

In Bukidnon province (higher elevations with higher rainfall that is more evenly distributed than in Masbate and Bohol) higher liveweight gain of cattle grazed on Imperata pastures was observed.

Role of Improved Grass/Legume Pastures

Several studies have shown that improved grass/legume pastures support more animals and produce more beef than native pastures (Table 6).

Napier/Centro pasture fertilized with 654-45-45 NPK produced 128 to 148 tons of fresh herbage per year in a study conducted at ANSA farms. This pasture safely carried three animals per hectare with beef production of 475 kg liveweight gain per hectare per year. With four animals, the pasture had 806 kg liveweight gain per hectare but ran out of grass for 37 days when corn-stover supplementation was needed.

In another study conducted at Bukidnon, beef production on Para pastures showed that on mixed Para grass/Centro pastures fertilized with 50 kg phosphorus/hectare/year and stocked with 2 a.u's, 305 kg of beef liveweight gain resulted. Pure pure grass fertilized with 100 kg N that year produced only 200.4 kg of beef liveweight gain.

In Bohol, Guinea/Cook Stylo pasture stocked at 2.5 a.u the produced 250 kg LWG/ha/yr.

Current Research and Development Activities

Pasture research and development is the primary responsibility of the Bureau of Animal Industry (BAI) through its Forage and Pasture Research Section. The BAI has a network of stockfarms and breeding stations with facilities for research and seed production, in collaboration with the Department of Agriculture field technicians, it extends assistance to livestock raisers by providing technical advice and forage seed and planting materials.

Table 6. Liveweight gain in improved grass/legume pasture

Location	Pasture	Fertilizer rate (kg/ha/yr/ N-P-K)	Stocking rate (a.u./ha)	ADG kg	LWG/hd kg	LWG/ha kg
Bukidnon	Para grass/ Centro	0-50-0	2.0	0.423	155.87	311.75
.	Para grass/ Centro	0-50-0	2.0	0.419	150.00	305.80
ANSA Farm	Napier/ (South Centro Cotabato)	65-45-45	2.0	0.428	156.50	313.00
	Napier/ Centro	64-45-45	3.0	0.431	158.00	474.00
Bohol	Guinea/Cook Stylo	24-24-24	2.0	0.240	86.40	172.80
	Guinea/Cook Stylo	24-24-24	2.5	0.280	100.80	252.00
	Guinea/Cook	24-24-24	3.0	0.220	79.20	237.60

The agricultural colleges and universities, particularly those within the PCARRD Research Network are also involved in pasture research. The more active ones are Central Mindanao University (Bukidnon), Central University of Southern Mindanao (North Cotabato), Visayas State College of Agriculture (Leyte), Pampanga Agricultural College (Pampanga), Central Luzon State University (Nueva Ecija) and Cagayan State University. Most of these colleges are working on animal utilization and management of pasture.

The University of the Philippines at Los Banos (UPLB) with its Institute of Plant Breeding (IPB) is working on varietal collection and screening, while its Institute of Animal Science and Dairy Training and Research Institute have been active on nutritive evaluation of forages.

Current research work in the BAI include evaluation of a wide range of grasses and legumes in different environment, improvement of native pasture production through overseeding of legumes and assessment of animal production in improved pasture with cattle, carabao and goats in stocking rate experiments.

The BAI has an on-going pasture seed production and distribution project. It produces seeds in selected farms and the distribution of seeds is done in collaboration with the Department of Agriculture's regional offices through the provincial agricultural production technicians.

DIRECTIONS IN FORAGE AND PASTURE RESEARCH

The agency that coordinates and monitors forage and pasture research in the country is the Philippine Council for Agriculture and Resources Research and Development (PCARRD) through its Forage, Pastures, Grassland Commodity Team under its Livestock Research Department. During the initial years of PCARRD, forage and pasture research focused on the incorporation of legumes into native pasture while studies on crop-livestock integration were given priorities in the last five years.

Long term program had been drawn up by the team identifying the research areas in general as follows:

1. Varietal collection, evaluation, selection and seed technology.
2. Regional evaluation trials for forage and pasture crops.
3. Seed production of recommended species.
4. Ecology and management of native grasslands.
5. Management and utilization of improved grass and grass/legume pasture
6. Integration of forages with existing cropping system and plantation crops.
7. Utilization and improvement of feeding values of crop residues for smallholder livestock production systems.
8. Socio-economic and extension strategies.

REFERENCES

- Castillo, A.C., E.C. Macalandag, F.A. Moog and C.B. Salces. 1987. Pasture and carabao (*B. bubalis*) producing from native and native/stylo pastures at two stocking rates in Bohol province. Paper presented at the 25th PSAS Annual Convention, PCARRD, Los Banos, Laguna.
- Magadan, P.B. 1974. Beef production on native *Imperata cylindrica* and Para grass (*Brachiaria mutica*) pastures. M.S. Thesis, UPLB.
- Moog, F.A., A.C. Castillo, R.G. Tibayan and H.P. Tombocon. 1981. Carabeef production on native and native/ipil-ipil pastures at different stocking rates. *Phil. J. Ani. Ind.* 36(14): 24-33.
- Sadise, P.E., N.M. Orlido, J.S. Lales, L.C. Castillo and R. Atabay. 1976. The Ecology of Philippine Grasslands: I. Floristic composition and community dynamics. *Phil. Agr.* 59: 317-334.
- Siota, C.M., A.P. Castillo, F.A. Moog and E.Q. Javier. 1977. Beef production on native, native stylo and native centro pastures.
- Valenzuda, F.G., F.A. Moog, R.G. Tibayan and H.P. Tombocon. 1982. Productivity of guinea grass/cook stylo mixed pastures at different stocking rates. *Phil. J. Ani. Ind.* 37(14).