ECONOMIC CONTRIBUTIONS OF THE CARABAO TO FARM HOUSEHOLDS AND RESOURCE PRODUCTIVITY ANALYSES

Nerelito P. Pascual and Edgardo A. Pañares

Associate Professor, concurrently Assistant to the ViSCA President for Planning, and Research Assistant, Department of Agricultural Economics and Agribusiness, Visayas State College of Agriculture, ViSCA, Leyte, Philippines.

Portion of a research project entitled "Economics of Carabao Production in Iloilo, Bohol and Leyte", funded by the Philippine Council for Agriculture and Resources Research and Development.

ABSTRACT

Majority of the carabaos raised by farmers in Iloilo, Bohol and Leyte are intended primarily for draft purpose. Among the six types of farming systems, the carabao used for rice-based farming had the highest value of draft power and the lowest was in sugarcane-based farming. The value of work done per year was highest in medium-sized farms, followed by those in large farms and small-sized farms based on both on-farm and off-farm operations in the three provinces. The animal work days per year ranged from an average of 23 days in small-sized farms to 37 days in medium-sized ones with an overall average of 30 days. Only three farmer respondents with one carabao each were milking their carabaos primarily for home use.

Multiple regression analysis showed no significant relationship between number of work days and items of expenditure like depreciation, biologics and fees. Labor and cost of supplies and materials were found to be positively related to the number of work days. Total value of the economic contribution to the farm household showed no significant relationships with depreciation, supplies and materials, biologics and fees. Labor cost had a significant negative effect while farms size showed a positive effect on the total value of the economic contribution of the carabao to the farm household.

Ann. Trop. Res. 6: 53-62

KEY WORDS: Carabao. Farming system. Farm size. Economic contribution.

INTRODUCTION

The contribution of the carabao to the Filipino farm household cannot be overlooked. It is highly valued as a draft animal and also for its meat, milk, hide and horn. However, carabao production in the country is characterized by a subsistence method of operation.

Although there has been an increase in the use of machines to replace carabao in land preparation during the last 10 years, there has recently been a shift in the decision-making of small farmers because of the oil crisis.

Backyard farmers contribute more than 90% to the carabao production in the country (MA, 1979). It was also reported that the level of carabao production technology is very low and that the farmers themselves acknowledge a need to improve management practices and increase production.

This study was conducted to: (1) estimate the value of work done by the carabao in various farming systems and farm sizes, and determine the animal work days, (2) estimate the value of other economic contributions of the carabao, (3) determine the resource allocation for carabao production, and (4) estimate the productivity of inputs used in carabao raising.

METHODS

The study was done in the provinces of Iloilo, Bohol and Leyte. Selection of provinces in each region was based on carabao population and the peace and order situation in the area.

Secondary data were gathered from the provincial offices to determine the five leading municipalities in terms of carabao production. In each municipality, two barangays were selected based on the highest carabao population; then 10 to 12 carabao raisers per barangay were chosen using the simple random sampling technique.

Physical, biological and economic data as well as other related information were gathered through personal interviews with 353 respondents (115 in Iloilo, 120 in Bohol and 118 in Leyte) using pre-tested questionnaires. Actual observation was also done to determine whether the information obtained during the interview jibed with the observable practice/situation. Information that was considered questionable after actual observation was not included in the analysis.

The economic contributions of the carabao considered in the analyses included the value of work done, by-products and other uses, and offspring. The valuation of the carabao's work (draft power) was based on both on-farm and off-farm activities while the valuation of its other uses and by-products included milk, hide, horn and manure. The accounting of the value of the carabao's contribution as a source of draft power included its work in plowing, harrowing, furrowing, levelling, cultivating, hauling and threshing.

Resource productivity analyses were confined mainly to the use of the multiple regression model with

the number of work days and value of carabao's economic contribution as the dependent variables, and items of expenditure as the main independent/explanatory variables.

RESULTS AND DISCUSSION

Value of Work Done

Based on Farming System. The average value of draft power per carabao per year based on the six types of farming systems was ₱268.86 (Table 1). Plowing and harrowing were found to be the dominant work of the carabao in both on-farm and off-farm operations.

Among the six types of farming systems, the carabao used for rice-based farming had the highest value of draft power while that used in surgarcane-based farming had the lowest value.

Based on Farm Size. The average value of work done per year was highest in medium-sized farms (₱340.91), followed by those in large farms (₱268.76) and small-sized farms (₱198.99) based on both on-farm and off-farm operations in all the three provinces (Table 2).

Generally, the number of carabaos raised was inversely proportional to the average value of work done. The higher the number of carabaos utilized by a farmer in farm operations, the lesser was the value of draft power contributed by a single carabao.

Table 1. Value of work done per carabao per year in various farming systems based on 353 carabao raisers in the Visyas in 1982.

Farming Systems	On-Farm		Off-Farm		Total	
	Animal Day	Value (₱)	Animal Day	Value (₱)	Animal Day	Value (₱)
Rice-based (n=320)	29.28	262.38	1.27	12.10	30.55	274.48
Corn-based (n=22)	27.48	239.51	1.29	10.63	28.77	250.14
Coconut-based (n=3)	5.67	42.67	–	–	5.67	42.67
Sugarcane-based (n=1)	2.00	20.00	–	–	2.00	20.00
Rootcrop-based (n=2)	26.50	198.00	2.50	19.00	29.00	217.00
Vegetable-based (n=5)	20.60	158.40	2.00	39.60	22.60	198.00
Weighted Average (n=353)	28.75	256.57	1.26	12.29	30.01	268.86

Table 2. Value of work done per carabao per year in various farming systems by farm size based on 353 carabao raisers in the Visayas in 1982.[1/]

Farming Systems	Farm Size			Overall Average
	Small	Medium	Large	
Rice	(n=149)	(n=143)	(n=28)	(n=320)
On-farm	189.01	333.84	287.72	262.38
Off-farm	14.37	10.88	6.00	12.10
Total	203.38	344.72	293.72	274.48
Corn	(n=8)	(n=12)	(n=2)	(n=22)
On-farm	133.51	328.59	129.00	239.51
Off-farm	22.50	4.50	–	10.63
Total	156.01	333.09	129.00	250.14
Coconut	(n=1)	(n=1)	(n=1)	(n=3)
On-farm	0	30.00	98.00	42.67
Off-farm	–	–	–	–
Total	0	30.00	98.00	42.67
Sugarcane			(n=1)	(n=1)
On-farm			20.00	20.00
Off-farm			–	–
Total			20.00	20.00
Root crop	(n=1)	(n=1)		(n=2)
On-farm	30.00	366.00	–	198.00
Off-farm	–	38.00	–	19.00
Total	30.00	404.00	–	217.00
Vegetables	(n=4)	(n=1)		(n=5)
On-farm	165.50	130.00	–	158.40
Off-farm	47.50	8.00	–	39.60
Total	213.00	138.00	–	198.00
Overall Total	602.39	1,249.82	540.72	1,002.29
Average	198.99	340.91	268.76	268.86

[1/] Values under each farm size are weighted averages for the three provinces.

Animal Work Days

In rice-based farming system, the animal work days per animal per year ranged from 23 days in small-sized farms to 37 days in medium-sized ones with an average of 31 days (Table 3).

It was noted that the carabao in the medium-sized corn farms worked for the longest duration (38 days). However, the average of the three farm-size categories was only 29 days.

The average number of work days for carabaos of coconut farmers was 6 animal days per year wherein the carabaos were used only in plowing and harrowing. Fewer days were spent in the medium-sized farms (4 days) than in the large-sized farms (13 days).

The lone sugarcane farmer respondent utilized his carabao solely for plowing for 2 days in a year since he depended on hired animal labor for his sugarcane field operations.

The number of animal work days in root crop farms was 4 days in the small-sized farms and 54 days in the medium category, with an average of 29 days.

Vegetable-based farmers utilized their carabaos mainly for plowing. The animal spent about 25 work days in small farms and 14 days in medium-sized farms. The average animal work days per carabao per year was 23 days.

Value of Other Economic Contributions

Other Uses and By-products. Only three farmer respondents (two in Iloilo and one in Leyte) with one carabao each were milking their carabaos (Table 4). The three raisers claimed to have milked their carabaos primarily for home consumption. Of the three carabaos being milked, a total of about 244 liters of milk was

Table 3. Animal work days per carabao per year in the six types of farming systems.

Type of Farming System	Small (n=163)	Medium (n=158)	Large (n=32)	Average (n=353)
Rice	23	37	35	31
Corn	18	38	17	29
Coconut	0	4	13	6
Sugarcane	–	–	2	2
Root crop	4	54	–	29
Vegetable	25	14	–	23
Average	23	37	32	30

Table 4. Value of other uses of the carabao and its by-products.

Other Uses	Peso/Animal/Year ($n=n_1$)	Peso/Animal/Year (n=all)
Milk (n_1=3)	324.67	3.28
Hide	–	–
Horn	–	–
Manure: Fertilizer (n_1=79)	15.52	1.99
Total	340.19	5.27

produced with an average value of ₱ 324.67 per milking animal per year when priced at ₱ 4 per liter. It was also noted that only 44 farmer respondents used the animal manure as fertilizer. The raisers utilized 613 sacks of manure from 79 carabaos. At ₱ 2 per sack, the computed average value was ₱ 15.52 per year.

If all the farmers had utilized the milk and manure of the carabaos, each animal could have contributed an additional amount of ₱ 340.19 per year to the farm household. However, since only a few respondents actually took advantage of these products, the average contribution was only ₱ 5.27. No respondent reported to have used the hide and horn for any purpose.

Offspring. Among the respondents from the three provinces, those from Bohol had the highest number of carabao offsprings produced in 1982, followed by Leyte and Iloilo (Table 5).

The value of offspring was highest in Leyte (₱ 562.50), followed by Iloilo (₱ 437.50), and Bohol (₱ 276.47). The average value per offspring was ₱ 384.85. However, the average contribution of carabao offspring per household was only ₱ 35.98.

Resource Allocation

The resources used in raising carabaos were categorized into feeds, labor, tools and equipment, supplies and materials, biologics and service fees and are presented in Table 6.

Feeds. The farmers did not spend any amount for feeds since the carabaos were just tethered or herded in pasture areas. No farmer respondent used commercial feeds.

Labor. All respondents utilized only family labor in raising the animals. The computed labor cost per animal per year was ₱ 217.39 (Table 6). This was obtained by multiplying the number of hours spent by the raiser and his family with the average labor cost in the area.

Table 5. Value of carabao offspring by province in 1982.

Item	Iloilo (n=115)	Bohol (n=120)	Leyte (n=118)	Overall Average (n-353)
Number of offspring	8	17	8	33.00
Total value	3,500.00	4,700.00	4,500.00	12,700.00
Value per offspring	437.50	276.47	562.50	384.85
Value per household	30.43	39.17	38.14	35.98

Table 6. Resources used and cost of carabao raising.

Item	Cost (₱)
Feeds	0
Labor	217.39
Tools and equipment (Depreciation)	22.24
Supplies and materials	29.24
Biologics	10.96
Fees	5.09
Total	285.21

Tools and Equipment. Tools and equipment employed in raising the carabaos included pails, feeding troughs, scythes, shed house, cart, shaving knife, sled, shovel, scissors and comb. The computed depreciation cost for using these items per animal per year was ₱22.24.

Supplies and Materials. Most respondents used nylon rope in tethering their carabaos because of its durability. Findings revealed that the raiser spent ₱ 29.24 for the rope per animal per year.

Biologics. Tablets (usually Latigo 500) were given to some animals for deworming while other respondents gave their animals coconut milk and chicken egg. The computed cost for these biological products per animal was only ₱10.96.

Fees. Fees for expert services rendered included those for vaccination, castration, and registration of carabaos. It was noted that in Leyte and Bohol, the farmers did not pay anything for vaccination, but in Iloilo, some raisers gave donations to the

livestock inspectors who vaccinated their animals. The expert service fee was ₱5.09 per carabao.

Input-Output Analysis

Table 7 shows that labor cost had a significant positive effect on the number of work days ($P<0.05$). It was observed that as the labor expenditures in carabao raising increased, the number of days that the carabaos worked also increased. Total value of the economic contribution to farm household (on-farm and off-farm activities + other uses + offspring) also showed a significant positive relation with the number of work days ($P<0.01$). The value of work done accounted for a major component of the total value of the economic contribution to the farm household.

The effect of cost of supplies and materials on the number of work days per animal was positive and

Table 7. Partial regression coefficients and related statistics of number of work days per animal.[1/]

Independent Variable	Regression Coefficient	Standard Error
Cost of feeds (X_1)	[2/]	
Labor cost (X_2)	0.0303**	0.0083
Depreciation (X_3)	-0.0160^{ns}	0.0351
Supplies and materials (X_4)	0.0788*	0.0342
Biologics (X_5)	0.0018^{ns}	0.0561
Fees (X_6)	-0.2113^{ns}	0.1349
Total value of economic contribution to household (X_7)	0.0505***	0.0030
Constant	6.6979	
Standard error of estimate	21.5698	
R^2	0.4724	

[1/] The regression equation was of the form:

$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_7X_7$$

where:

Y = number of work days
X_i = explanatory variables
b_i = regression parameters

[2/] Feed was not included as a regressor because no respondent spent for this item.

*** – Significant at P=0.01
** – Significant at P=0.05
* – Significant at P=0.10
ns – Not significant at P=0.10

significant ($P<0.10$). With all other variables held constant, an increase of ₱1 on the cost of supplies and materials would increase the number of work days by 0.0788.

The regression coefficient showed a positive and significant effect ($P<0.01$) of the number of work days on the total value of the economic contribution to the farm household (Table 8). This means that as the number of work days increased, the higher was the value of the animal's economic contribution.

Farm size had a positive regression coefficient which is significantly different from zero ($P<0.05$). This implies that the total value of the animal's economic contribution was affected by farm size. The carabaos in small-sized farms were associated with less economic contribution while those in large-sized ones were associated with greater contribution to the farm household.

Cost of labor showed a significant negative coefficient ($P<0.05$). This indicates that the higher the cost of

Table 8. Partial regression coefficients and related statistics of total value of the economic contribution of carabao to farm household.[1/]

Independent Variable	Regression Coefficient	Standard Error
Number of work days (X_1)	8.7883***	0.5204
Farm size (X_2)	18.5414**	5.4202
Labor cost (X_3)	-0.2760**	0.1102
Depreciation (X_4)	0.0351^{ns}	0.4595
Supplies and materials (X_5)	-0.4213^{ns}	0.4489
Biologics (X_6)	0.0354^{ns}	0.7328
Fees (X_7)	0.7890^{ns}	1.7657
Constant	80.2042	
Standard error or estimate	281.4013	
R^2	0.4718	

[1/] The regression equation was of the form:

$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_7X_7$$

where:

Y = total value of carabao's economic contribution to farm household

X_i = explanatory variables

b_i = regression parameters

*** – Significant at P=0.01

** – Significant at P=0.05

* – Significant at P=0.10

ns – Not significant at P=0.10

labor in raising the carabaos, the lower was the total value of the carabao's economic contribution to the household. The negative coefficient of labor cost could also indicate an overinvestment on this production factor, i.e., labor for carabao raising was employed even at the third stage of the production function.

BIBLIOGRAPHY

ALICBUSAN, L.C. 1964. The rate of substitution of man-hours by animal of machine horsepower-hours in rice production. Mimeo. Sheets, IRRI, Los Banos, Laguna.

ALVIAR, N.G. 1970. An economic comparison between tractor-operated and carabao-cultivated rice farms. Phil. Agric. 53: 504-517

ARARAL, D.K. 1981. Farmer's knowledge, attitude and practices in carabao raising in selected rural communities in Pangasinan. Unpublished Ph.D. dissertation, UPLB, College, Laguna.

DE GUZMAN, JR. M.R. 1981. Feeding and management practices, physical characteristics and utility of carabao (swamp buffaloes) in five provinces in Luzon. Unpublished Ph.D. dissertation, UPLB, College, Laguna.

MINISTRY OF AGRICULTURE. 1979. Philippine Agriculture Fact Book and Buyer's Guide. 2nd ed. Phil. Almanac Printer, Inc. pp. 54-72

QUINTANA, E.U. 1960. Resource productivity estimates of five types of Philippine farms. Unpublished Ph.D. dissertation, Purdue University

RIGOR, T.V. 1967. The role of carabao in rice production. Mimeo. Sheets, Bureau of Animal Industry, Philippines

ROSEGRANT, M. 1977. Risk and farmer decision-making: A model for policy analysis. IRRI Seminar Paper, Los Banos, Laguna.