ECONOMIC ANALYSIS OF IPIL-IPIL FEED SUPPLEMENTATION OF NATIVE CARACOWS, GANDARA, SAMAR

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ABSTRACT

The average milk and cheese production was significantly higher in treated caracows than in untreated ones due to the increase in the protein intake of the treated animals thus increasing the solid content of the milk. Gathering and feeding ipil-ipil leaves to caracows, milking the caracows, and processing milk into cheese were the activities affected when ipil-ipil feed suppiementation was introduced.

Partial budget analysis shows that net benefits derived from ipil-ipil feed supplementation were significantly higher in treated caracows than in the untreated ones. Marginal rate of return was very high indicating that ipil-ipil feed supplementation in Gandara, Samar is economically feasible, *ceteris paribus*. Sensitivity analysis gave an estimate of the benefits a carabao raiser gets as prices of output and cost of input change.

Ann. Trop. Res. 10:37-46

KEY WORDS: Economic analysis. Feed supplementation. *Leucaena leucocephala*. Carabao production.

INTRODUCTION

In most parts of the Philippines, ipil-ipil (*Leucaena leucocephala*) grows abundantly and wildly along river banks, creeks and on hillsides. It is either grown commercially or used as a material for soil conservation especially in hilly areas.

Ipil-ipil leaf meal is also a good source of protein and carotene. It is an important ingredient in the manufacture of feeds for both livestock and poultry. It contains 89% dry matter, 24% crude protein, 13% crude fiber and 16% ether extract (Thongchan and Baula, 1979). It has a high protein content compared to other plant protein sources. Ipil-ipil utilization as livestock feed is economically significant because the plant is a good source of cheap, locally available and abundant protein for animals.

Gandara, Samar, one of the Farming Systems Development Project in Eastern Visayas (FSDP-EV) sites, is an ipil-ipil growing area. Carabao raising is common in the place and one of its major industries is cheese production from carabao's milk. Milk production from native carabao has been practised by most farmers for quite a long time already. However, the potential milk yield of the animals could not be attained probably because most farmers just tether their carabaos or let them loose in vacant areas such that the main feedstuffs of the carabaos are native grasses, rice straw and other crop residues which are not highly nutritive. Thus, this feeding trial using ipil-ipil as feed supplement was conducted to evaluate the economic performance of caracows fed with ipil-ipil herbage.

MATERIALS AND METHODS

Two methods of feeding caracows, namely: farmers' practice (control) and farmers' practice plus ipil-ipil supplementation were evaluated in this study. Twelve lactating caracows were used in the control and 15 caracows were ipil-ipil supplemented.

Ipil-ipil leaves were taken from existing trees of farmers located along roadsides, farm borders and near their houses, and from established ipil-ipil hedgerows along contours of the FSDP-EV cropping pattern trials. Two kilograms of fresh ipil-ipil leaves were given to the caracows daily between 5:00-7:00 a.m. The leaves were gathered a day prior to feeding. Supplementation started a week after parturition.

Collection of milk commenced 15 days after parturition (the usual farmers' practice). Prior to milking, calves were allowed to suckle for a few seconds to stimulate milk let down after which they were separated from the dam and hand milking was done. After milking, calves were allowed to join the dam and feed on the residual milk.

Both treated and control animals were milked daily. However, milk production was monitored daily for the ipil-ipil supplemented caracows and only twice a week in the control. The difference in monitoring is due to the very slight change in milk

production within 3-4 days in the latter. Cheese production, management practices and other pertinent data were gathered using actual observations and personal interviews with the carabao-raiser cooperators. The total number of cooperators was 15 for treated carabaos and 12 for the untreated ones.

The t-test was used to determine whether average volume of milk/ cheese production differ between treatments. Partial budget analysis, marginal analysis and sensitivity analysis of data on net benefits and their changes as affected by the change in the price of output and cost of input were also done.

RESULTS AND DISCUSSION

Milk Production

The average milk production was 1.61 kilograms per day for treated caracows and 1.28 kilograms for the untreated ones. The volume of milk produced in the two treatments was significantly different at 1% level of probability. Ipil-ipil supplemented caracows have higher average milk production than the untreated ones especially during the first few months of lactation (Fig. 1). It continued until the fifth month of lactation and then as caracows became drier, difference in milk production became closer.

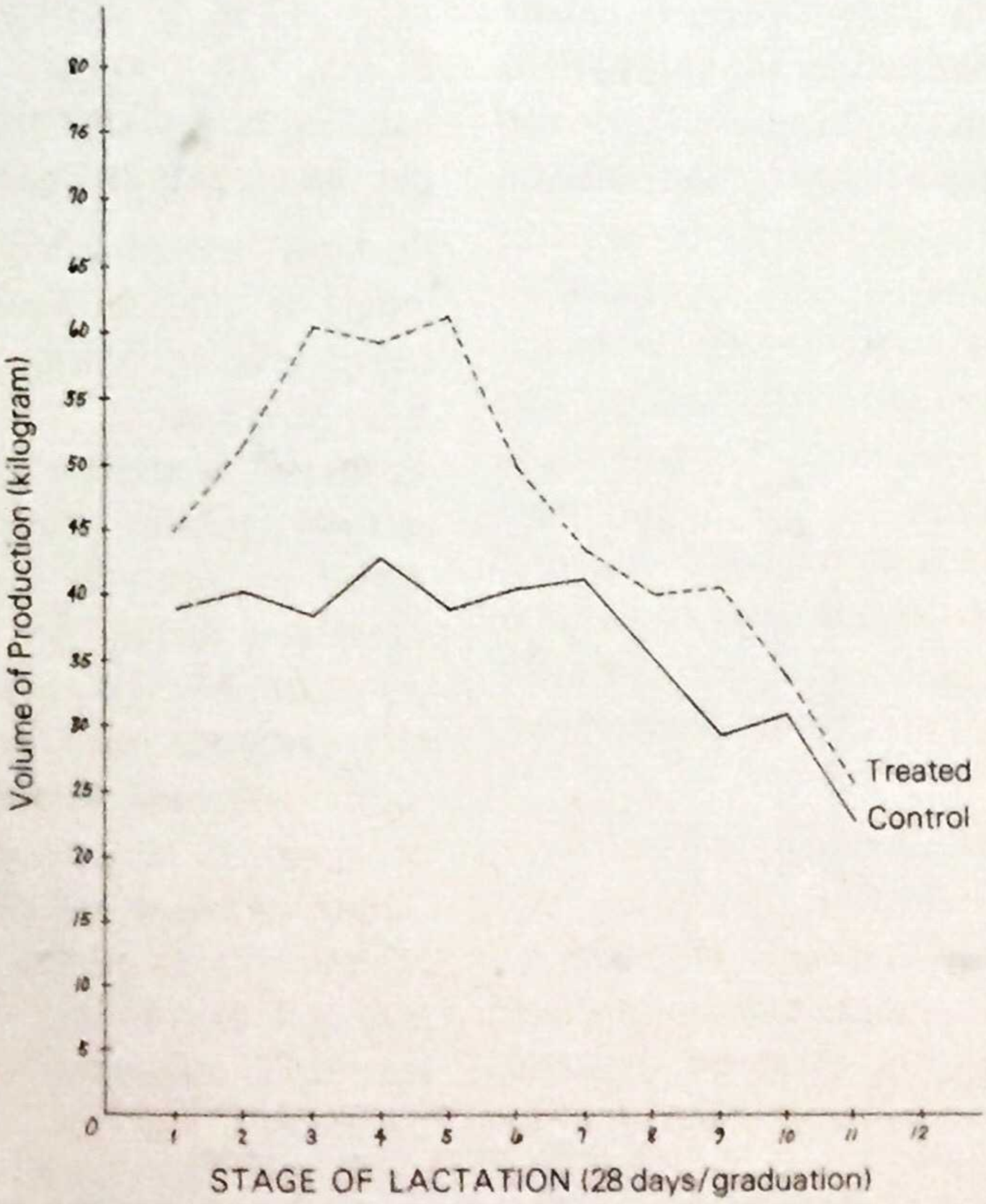

Figure 1. Volume of milk production among caracows with and without ipil-ipil feed supplementation.

Milk production was affected by many factors like the number of functional teats, weather condition, rough estimates of the milk produced and retained for the calf, stress condition of some animals used for draft, and other management practices.

Cheese Production

The average cheese production was 38.96 patties per day for the treated caracows and only 18.59 patties per day for the untreated ones and these values are significantly different at 1% level of probability. Moreover, the number of patties produced per unit of milk processed was higher in treated caracows than in untreated ones (Fig. 2). This could be explained by the increase in solid contents of the milk from the treated caracows due to the ipil-ipil ration taken by the animals which contained high level of protein.

Cost of Material and Labor Inputs

Ipil-ipil herbage is available in Gandara but nobody buys it. People in this locality do not know the economic value of ipil-ipil leaves before the implementation of the project. They used the ipil-ipil trunks for firewood and sometimes as posts for temporary shades. For the purpose of the study, an opportunity cost of ₱0.50 per kilogram of dried herbage was used. In the neighboring provinces, ipil-ipil herbage costs ₱0.50 at the farm level.

Vinegar utilized for processing 100 patties was worth ₱3.00 (573 mL) while a cupful of salt cost ₱1.00. The average cost of vinegar used in milk processing was ₱391.74 per head per cropping for treated

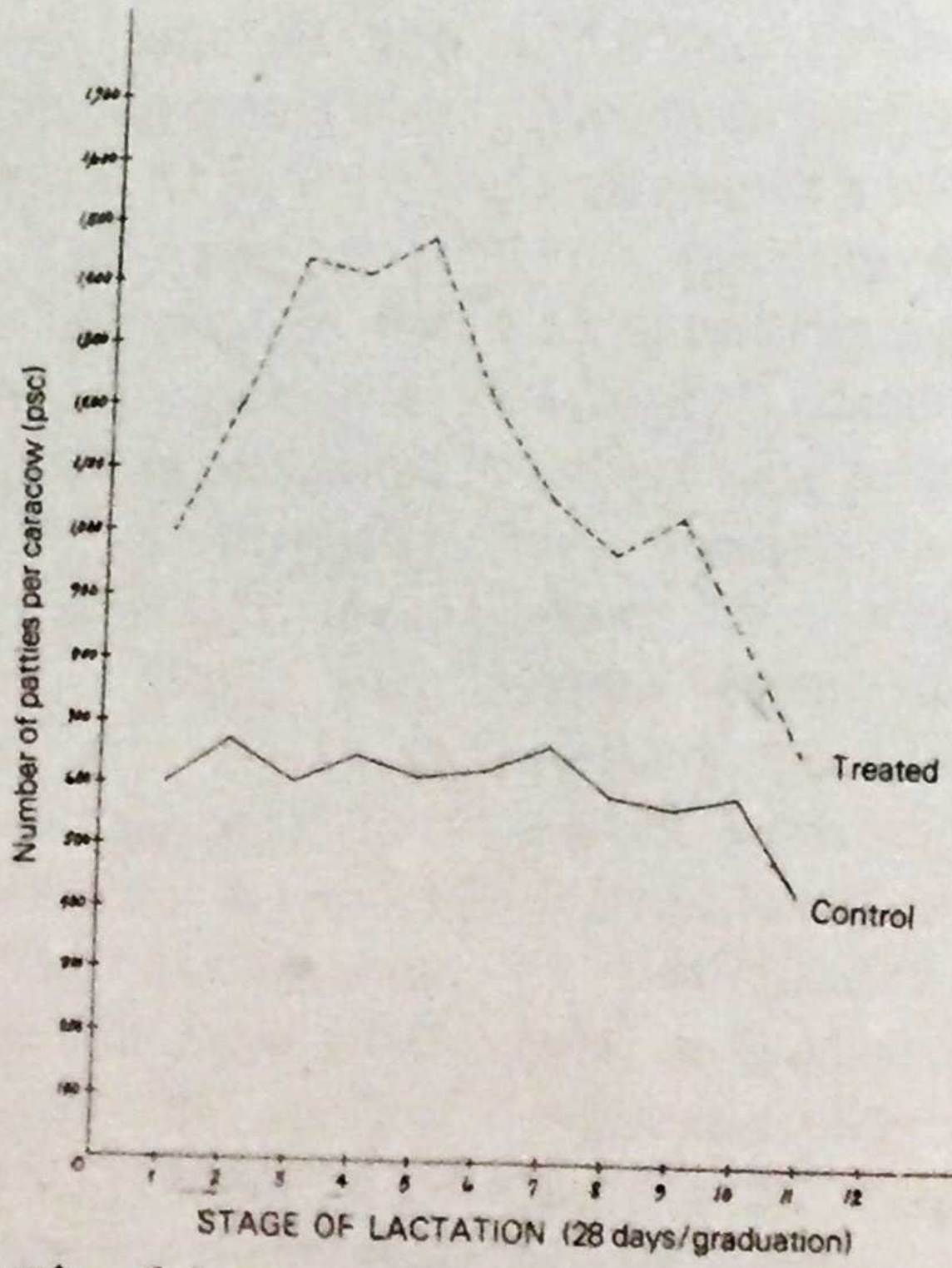

Figure 2. Number of patties of cheese produced per caracow per lactation period for animals with and without ipil-ipil feed supplementation.

caracows and ₱187.73 per head per cropping for untreated ones. On the other hand, salt utilized was worth ₱130.91 and ₱62.50 per head per cropping for treated and untreated caracows, respectively.

Labor inputs included in the analysis were labor in feeding and gathering ipil-ipil, milking and processing. These were the activities affected when ipil-ipil supplemented feeds were introduced. Collection of 2 kg of fresh ipil-ipil leaves takes about 15-17 minutes while feeding takes 15-20 minutes. The hiring rate was ₱20.00 per day - the rate used by the site staff of the FSDP-EV project in the area.

In milking, an opportunity cost of labor equal to one-third of the milk production was used. In the locality, if the male heads of the family or their older sons are not available, neighbors or friends are hired to do the job and one-third of the milk produced is given to them as payment for that day. However, this case seldom happens in the locality. The male head or his older son usually does the milking. On the average, milking services are worth ₱2,181.90 and ₱1,042.95 per head per cropping for treated and untreated caracows, respectively. The cost of the service between treatments differed due to increase in milk production of treated animals.

When milk production increases, naturally time consumed in milk processing also increases. The cost of processing services increased from ₱117.33 to ₱250.38 per head per cropping per lactation period. Labor for processing milk was valued at ₱10.00 per day, the local hiring rate. It takes about 25 - 35 minutes to process one kilogram of milk.

Benefit Analysis

Partial Budget Analysis. Table 1 presents the partial budget analysis of ipil-ipil feed supplementation of caracows. At an average price of ₱0.50 per patty, gross receipts for treated animals were greater than those for untreated ones. Variable cost comprised the cost of cash and non-cash inputs. Cash inputs included vinegar and salt while non-cash inputs included ipil-ipil herbage and labor used in gathering and feeding ipil-ipil, milking and processing. Considering the volume of milk produced per head of caracow for every cropping, treated animals required bigger cash and non-cash expenses than the control. However, subtracting the overall cost of variable inputs from gross receipts, one can still get a higher net benefit from treated caracows than from the control. The difference in the net benefits between treatments corresponds to the benefits derived from adopting the practice of ipil-ipil feed supplementation.

Marginal Analysis of Net Benefits. Marginal analysis was used to reveal how the net benefit of the investment increases as the amount invested becomes higher. Marginal rate of return to a given increment in expenditure is the marginal net benefit divided by the marginal cost times 100. Based on the net benefits

Table 1. Partial budget analysis of ipil-ipil feed supplementation in caracows (per head per cropping), Gandara, Samar.

Item	Treated		Control	
A. Receipts		₱6,545.68		₱3,128.84
1. Cheese produced (no. of patties)	13,091.37		6,257.68	
2. Price of cheese per unit (₱)	0.50		0.50	
3. Gross receipts (₱)	₱ 16,545.68		₱3,128.84	
B. Expenses (Variable)		₱3,265.06		₱1,410.59
1. Cash inputs				
1.a Vinegar	₱ 391.74		₱ 187.73	
1.b Salt	₱ 130.91		62.58	
1.c Sub-total	₱ 522.65		₱ 250.31	
2. Non-cash inputs				
2.a Ipil-ipil herbage	₱ 142.13		0	
2.b Labor				
2.b.1 Milking	₱ 2,181.90		1,042.95	
2.b.2 Cheese preparation	₱ 250.38		117.33	
2.b.3 Gathering and feeding ipil-ipil herbage.	168.00		0	
2.c Sub-total	₱ 2,742.41		₱1,160.28	
C. Net benefits above all variable cost (A - B)		₱3,280.62		₱1,718.26
D. Net benefits above all variable material cost [A - (B.1.c + B.2.a)]		₱5,880.90		₱2,878.54
E. Net benefits above cash variable cost (A - B.1.c)		₱6,023.03		₱2,878.54

Note:

1. Opportunity cost of ipil-ipil herbage is ₱0.50 per kilogram.
2. Opportunity cost of labor:
   Milking = ⅓ of the milk production
   Cheese preparation = ₱10.00 per day
   Gathering and feeding ipil-ipil herbage = ₱20.00 (laborer hiring rate of the project)

found in Table 1, the marginal rate of return to the increment in total variable cost is 84 percent; marginal rate of return to the increment in total variable material cost is 766 percent; and the marginal rate of return to the increment in total cash variable cost is about 1,155 percent. These findings imply that for every peso invested for fresh ipil-ipil feed supplement to lactating caracows, the benefits will increase by the above mentioned figures.

Variability and Sensitivity Analysis

Risk aversion in adopting a new technology is important to farmers. Thus when recommending a technology, researchers should consider the variations in net benefits which the farmer can get from it.

Variability of prices from year to year, from season to season and from farmer to farmer is one factor which must be considered when planning to invest. One cannot anticipate the price of the product or input for a given time due to the variability of the factors affecting it such as the supply and demand of the product in an area.

Risk aversion and variability limits the precision of recommendations for new technology. Hence, confidence limits should be known to researchers and farmers. Researchers should know what technology is economically feasible in the area and its alternatives. Likewise, farmers should know when and how much to invest given the variabilities affecting his business.

In this study, the net benefit derived from the intervention changes as prices of the product (Table 2a) and input (Table 2b) change. Net benefit increases as price of the product (cheese) increases, assuming a constant production cost and vice versa. Similarly, as price of the input increases, net benefit derived from the intervention decreases (Table 2b) and vice versa if the price of the product per unit remains constant. The technique used to estimate the change in net benefits as price changes is called sensitivity analysis, hence its use in this study.

The study further revealed another variable condition that affects the net benefit received by carabao raisers and this is the tenure of ownership. Results show that among the 30 heads of sample caracows, 22 heads (73%) were shared and only 8 heads (27%) were owned. This implies that only the raisers of 27% of the caracows could get 100% net returns of their enterprise while the rest share their net returns with the animal owners.

Table 2a. *Sensitivity analysis*

Item	Unit Price of Cheese					
	₱0.60		₱0.50		₱0.45	
	Treated	Control	Treated	Control	Treated	Control
	₱	₱	₱	₱	₱	₱
Gross Receipts	7, 854.82	3,754.61	6,545.68	3,128.84	5,891.12	2,815.96
Total Variable Cost (TVC)	3,265.06	1,410.59	3,265.06	1,410.59	3,265.06	1,410.59
Total Variable Material Cost (TVMC)	644.78	250.31	644.78	250.31	644.78	250.31
Total Cash Variable Cost (TCVC)	522.65	250.31	522.65	250.31	522.65	250.31
Net Benefit Above TVC	4,589.76	2,344.02	3,280.62	1,718.25	2,626.06	1,405.37
Net Benefit Above TVMC	7,210.04	3,504.30	5,900.90	2,878.53	5,226.34	2,565.65
Net Benefit Above TCVC	7,332.17	3,504.30	6,023.03	2,878.53	5,368.47	2,565.65
Marginal Net Benefit[1]						
TVC	2,245.74		1,562.37		1,220.69	
TVMC	3,705.74		3,022.37		2,660.69	
TCVC	3,827.87		3,144.50		2,802.82	
Marginal Rate of Return[2]						
TVC	121.10%		84.25%		65.82%	
TVMC	939.42%		766.18%		674.50%	
TCVC	1,405.55%		1,154.62%		1,029.16%	

[1]Marginal net benefit = Net benefit from treated animals - Net benefit from untreated animals

[2]Marginal rate of return = $\frac{\text{Marginal net benefit}}{\text{Marginal cost}}$

Table 2b. Sensitivity analysis

Item	Unit Price of Ipil-Ipil Herbage per Kilogram					
	₱0.50		₱0.80		₱1.00	
	Treated	Control	Treated	Control	Treated	Control
Gross Receipts @ ₱0.50/ patty	6,545.68	3,128.85	6,545.68	3,128.85	6,545.68	3,128.85
Total Variable Cost (TVC)	3,265.06	1,410.59	3,324.53	1,410.59	3,374.93	1,410.59
Total Variable Material Cost (TVMC)	644.78	250.31	724.25	250.31	774.65	250.31
Total Cash Variable Cost (TCVC)	522.65	250.31	522.65	250.31	522.65	250.31
Net Benefit Above TVC	3,280.62	1,718.26	3,221.15	1,718.26	3,170.75	1,718.26
Net Benefit Above TVMC	5,900.90	2,878.54	5,821.43	2,878.54	5,771.03	2,878.54
Net Benefit Above TCVC	6,023.03	2,878.54	6,023.03	2,878.54	6,023.03	2,878.54
Marginal Net Benefit[1]						
TVC	1,562.36		1,502.89		1,452.49	
TVMC	3,022.36		2,942.89		2,892.49	
TCVC	3,144.49		3,144.49		3,144.49	
Marginal Rate of Return[2]						
TVC	84.25%		78.52%		73.94%	
TVMC	766.18%		620.94%		551.64%	
TCVC	1,154.62%		1,154.62%		1,154.62%	

[1] Marginal net benefit = Net benefit from treated animals - Net benefit from untreated animals

[2] Marginal rate of return = $\frac{\text{Marginal net benefit}}{\text{Marginal cost}}$

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