Madre de Agua (*Trichanthera gigantea*) Leaf Meal as Fed to Quails with Aloe Vera Extract and Acid Cheese Whey Supplementation

Feleciano R. Bejar
Northwest Samar State University San Jorge Campus
San Jorge, Samar
bejar_43@yahoo.com

Abstract

This study evaluated the effects of *Trichanthera gigantea* leaf meal in quail ration with *Aloe vera* extract and Acid cheese whey supplementation in drinking water. Three hundred quails distributed to 15 treatments, four replications in 3x5 factorial experiments using Randomized Complete Block Design (RCBD). Results showed highly significant differences among treatments. Birds fed with 15% of *T. gigantea* leaf meal in the diet performed well regarding final and gained weights, feed consumption, feed conversion ratio and water consumption than those birds in the control. Birds with 15% and 25% *T. gigantea* in their feed have a delayed point of lay than those in the control. The result showed significant effects on egg length, shape index, shell thickness, surface area, breaking strength, yolk color, and cholesterol contents. Levels of *Aloe vera* and cheese whey in drinking water did not affect egg qualities. However, the egg of birds supplemented with 15 ml *Aloe vera* extract had longer egg length than the other supplementation levels. The economic and financial analysis of the study showed that birds with 15% *T. gigantea* leaf meal had a higher return on investment than the quails fed with 25% *T. gigantea*. Fifteen (15%) percent inclusion of *T. gigantea* leaf meal is the maximum level beneficial for growth, production and egg qualities improvement of quails.

Keywords: *growth performance, production performance, egg qualities, economic viability*

I. INTRODUCTION

Feed represents 60-75% of the total cost of production in poultry (Chiba, 2014). Crude protein in feeds determines the quality and cost of feed given to animals. Plant proteins are abundantly available somewhere in the environment. One of the potential sources that has been introduced in the Philippines and may gain importance in the field of research due to its high crude protein content is the *T. gigantean.* It can be given as feed to animals in fresh or in leaf meal form and can be added as ingredient in the formulation of animal diets.

Likewise, supplementation of vitamins and mineral containing substances to farm animals especially commercial ingredients become a usual practice by common farmers, thus, increasing their cost of production. *Aloe vera* (*Aloe barbadensis*) extract, lactic acids, probiotics and other natural products are also gaining importance in human medicine and supplementation. Its natural characteristics can be added to the drinking water of poultry and livestock animals as substitute to synthetically and commercially prepared feed supplements.

Trichanthera gigantea contains proteins, fibers, calcium and saponins in their leaves (Rosales et al., 1996). Likewise *Aloe vera* (Fishback, 1996) and acid cheese whey (Ahmed, 2001) commonly contain protein, calcium minerals, and vitamins which might affect the growth, laying performance and qualities of eggs if present in the diet. Hence, this study was conducted to ascertain the effects of feeding varying levels of *T. gigantea* in the diets and supplementing *Aloe vera* extract and *cheese whey* in the drinking water of quail in terms of growth performance, laying performance, egg qualities and economic viability.

II. METHODOLOGY

Preparation and Formulation of Experimental Diets

Trichanthera gigantea leaf meal was obtained by harvesting the leaves from the *T. gigantean* plantation, drying the leaves in solar dryer and milling the dried leaves. Using

the feed mixer, feeds were formulated by mixing the *Trichanthera* leaf meal with other commercial feed ingredients at the Feed Mill Laboratory, and feed analysis were made at the Center for Analytical Services Laboratory (CASL) PhilRootcrops, Visayas State University, Baybay City. Amount of each ingredient was computed using Pearson's Square method (PHILSAN, 2005) of feed formulation basing the desired crude protein and other nutrient requirements of the feed in consideration with the stages of development of the birds and the percentage treatment levels of *T. gigantea* leaf meal of the formulated feed. Preparations for the experimental diets were made every two weeks while adjusting the CP, Ca, ME and other mineral contents until the quails reached laying stage. Other ingredients were made available at the Feed Mill laboratory. The composition of the micro-ingredients (Table 1) was based on recommended amounts for quail birds (PHILSAN, 2005).

Table 1. Composition of the Formulated Grower Mash for Quail

Ingredient (%)	Grower Mash Feed		
	T_0	T_1	T_2
Yellow corn	34.02	29.25	25.49
Rice bran	17.00	14.63	12.75
Fish meal	8.80	6.30	5.86
Soybean meal	26.00	22.68	19.54
Copra meal	9.20	7.23	6.66
T. gigantean	0	15.00	25.00
Dicaphos	0.60	0.20	0.15
Limestone	0.80	0.40	0.20
Lysine	1.30	1.30	1.30
DL Methionine	0.50	0.50	0.50
Oil	1.50	1.50	1.50
Vit. Premix	1.50	0.86	0.80
Salt	0.25	0.25	0.25
Total	100	100	100
Calculated Analysis			
CP %	24.00	24.00	24.00
Ca %	0.87	0.92	1.39
Available P %	0.33	0.24	0.25
Lysine %	1.30	1.30	1.30
Methionine %	0.50	0.50	0.50
ME (kcal/kg)	3032	2961	2816

Preparation of Aloe vera Extract and Acid Cheese Whey

Mature leaves of *Aloe vera* were collected from each plant, washed to remove dirt and other debris; using sharp knife the leaf was sliced at the center to open and divide the leaf such that the clear and glossy gel was obtained by scrapping and removing from the skin or pulp of the leaf. The gel was crushed using an electric blender or by hands. Separating the gel from other solid materials was made by straining with the use of cheese cloth or fine screen. One kilo of the *Aloe vera* leaves was able to produce 500-600 ml of gel and supplemented to quails in drinking water based on treatment levels. The unused gel was preserved in a refrigerator to avoid spoilage. Acid cheese whey used in this study was secured from the NwSSU (Northwest Samar State University) cheese project. As by-product of cheese-making, cheese whey was collected, allowed to settle for few hours, strained, refrigerated and used as an additive in the drinking water for the quails. Same levels of supplementation applied both for *Aloe vera* extract and acid cheese whey which were 0 ml, 15ml, and 25ml per gallon of water.

Table 2. Composition of the Formulated Layer Mash for Quail

Ingredient (%)	Layer Mash Feed		
	T_0	T_1	T_2
Yellow corn	37.14	32.27	28.50
Rice bran	18.76	15.46	14.50
Fish meal	6.75	5.67	4.10
Soybean meal	20.23	18.00	16.30
Copra meal	6.74	5.60	4.90
T. gigantean	0	15.00	25.00
Dicaphos	1.18	0.80	0.50
Limestone	4.88	3.50	2.50
Lysine	1.00	1.00	1.00
DL Methionine	0.45	0.45	0.45
Oil	1.50	1.50	1.50
Vit. Premix	0.50	0.50	0.50
Salt	0.25	0.25	0.25
Total	100	100	100
Calculated Analysis			
CP %	20.00	20.00	20.00
Ca %	2.53	2.62	2.75
Available P %	0.30	0.33	0.29
Lysine %	1.15	1.15	1.15
Methionine %	0.45	0.45	0.45
ME (kcal/kg)	2993	2835	2798

Experimental Birds, Design, and Treatments

A total of 300 quail birds were randomly divided into 15 treatment combinations in a 3x5 factorial experiment and distributed using Randomized Complete Block Design (RCBD). At growing stage, the quails were distributed into four blocks corresponding to four replicates with five quails per replicate. At laying period, 146 birds have distributed in two blocks; 5 females and 1 male with similar treatment distribution with the birds at growing period. Treatment

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levels of *T. gigantea* leaf meal in this study was higher than the study of Bitancor (2008) who used only 2%, 8% and 10% levels of *T. gigantea* leaf meal. Levels of *Aloe* extract in drinking water of quails was based on the previous studies of Bejar (2005), Alcantara (2004), and Cowden (1992), which only used 2-10 ml of aloe extract per gallon of water for their broilers. Similar treatment levels of both factors of the study were determined by the researcher to obtain a justifiable result.

The two (2) factors evaluated in the experiment were:

Factor T (Amount of T. gigantea leaf meal)

T_0 = 0% *T. gigantea* leaf meal

T_1 = 15% *T. gigantea* leaf meal

T_2 = 25% *T. gigantea* leaf meal

Factor 1- 5 (Amount of Aloe vera and acid cheese whey)

1 = No *Aloe Vera* and no *Acid cheese whey drinking water*

2 = 15ml. *Aloe vera* extract/gallon of water

3 = 25ml. *Aloe vera* extract/gallon of water

4 = 15ml. Acid cheese whey/gallon of water

5 = 25ml. Acid cheese whey/gallon of water

General Management Practices

All experimental quails were raised in a plastic screen-floored cage. Feeding the birds with the *Trichanthera*-based diets was regularly undertaken; drinking program was strictly followed with daily cleaning and renewal of water in each treatment. Lighting and ventilation were provided, and dung removal was done daily so as not to discomfort the experimental animals. Usual management practices for quails production were followed (Capitan, 2003).

Data-gathering and Analysis

The following are the parameters as the bases of gathering the data in this study: average initial weight; average final weight; average weight gain; average feed consumption; feed conversion ratio; water consumption; point of lay; laying percentage; egg weight; egg width; egg length; egg size/shape index (S.I. = W/L x 100, a formula used by Carter, 1975); shell thickness; surface area (SA = 4.5118 x L.289 x B.3164 x (EW).4882, Carter, 1975 as cited by Rasali et al., 1993); breaking strength (BS = 50.86 x (EW).915 Ar, et al.,1979, as cited by Arad and Marder, 1882); yolk color using improvised Roche Yolk Color Fan (RYCF); total cholesterol content by colorimetric procedure (Perez & Cañesares, 2009); and financial profitability.

For growth responses and laying performance, data collection were made every week except for point of lay and economic viability which need to be taken at the start of laying and end of laying stage or end of the study period respectively. Egg production percentage and egg qualities evaluation were taken for three (3) months of lay.

Observations for growth performance, egg production, and egg qualities were subjected to Analysis of Variance (ANOVA) for factorial experiment in a Randomized Complete Block Design (RCBD). Treatment means were compared based on Tukey's Honestly Significant Difference Test (HSD). While profitability or Net benefit of the project were computed using Net Present value (NPV), Internal Rate of Return (IRR) and Benefit-Cost Ration (BCR).

III. RESULTS AND DISCUSSION

Growth Performance of Quails

Table 3 presents the growth performance of the quails with 0%, 15% and 25% *T. gigantea* leaf meal in their diets and different levels of *Aloe vera* extract and *acid cheese whey* supplementation in their drinking water. The result showed significantly higher final weights, gain weights and feed consumption of the quails fed with 15% *T. gigantea* leaf meal than those in the control irrespective of supplementation in their drinking water. No significant difference was shown between birds with 15% *T. gigantea* and the control group in their feed conversion ratio, but significantly different among treatments regarding water consumption.

As indicated, *T. gigantea* leaf meal inclusion in the feed of quail can optimally be given at 15% level since it significantly increases final and gain weights, feed consumption, water consumption and improve egg production. The 25% *T. gigantea* fed birds were the less efficient among the experimental birds. The findings indicates that 15% levels of *T. gigantea* in the diet is the optimum level for the quails, conforming the study of Bitancor, (2008) that acceptable weight gain in her study on quail was shown between 10-20% levels of *T. gigantea* leaf meal than those without *T. gigantea* and those with 30-40% *T. gigantea* in their diet. *Aloe vera* and acid cheese whey supplements seemed to have no significant effect on the growth of the birds.

Result on feed consumption conformed with the findings of Jaya et al. (2007) on his

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study of pigs fed 10% *T. gigantea* leaf meal in the ration, and Tabler (2008) claiming that, if animals are fed low energy diet, they will tend to eat more of that diet than if fed a higher energy diet.

Table 3. Growth Performance of Quail Fed with *T. gigantea* Leaf Meal and *Aloe vera* and Cheese Whey Supplementation

Factors	Initial Weight	Final Weight	Gain in Weight	Feed Consumption	Feed Conversion Ratio	Water Consumption
Factor T (Levels of *T. gigantea* leaf meal)						
T0 (0% T. gigantea)	21.85	102.80^{b}	80.95^{b}	365.55^{b}	4.53^{b}	36.45^{c}
T1 (15% T. gigantea)	21.60	108.70^{a}	86.95^{a}	401.25^{a}	4.63^{b}	42.85^{b}
T2 (25% T. gigantea)	21.70	99.20^{b}	77.50^{b}	409.45^{a}	5.31^{a}	45.51^{a}
Factor 1-5 (Levels of *Aloe vera* and cheese whey*)*						
1 (0ml *Aloe vera* & cheese whey)	21.17	100.75	79.58	389.33	4.92^{a}	41.75
2 (15ml *Aloe vera*)	22.58	103.08	80.50	394.75	4.93^{a}	41.98
3 (25ml *Aloe vera*)	22.25	103.33	80.67	389.25	4.85^{ab}	41.30
4 (15ml cheese whey)	21.08	103.50	82.42	396.50	4.83^{ab}	41.88
5 (25ml cheese whey)	21.33	107.17	85.83	390.58	4.58^{b}	41.10

Table 4. Production Performance of Quail as Affected by Experimental Diets and Supplementation

Factors	Point of Lay (d)	Egg Weight (g)	Egg Production (1st month)	Egg Production (2nd month)	Egg Production (3rd month)
Factor T (Levels of *T. gigantea* leaf meal)					
T0 (0% T. gigantea)	56.60^{b}	9.27^{b}	43.65^{a}	51.30^{a}	57.40
T1 (15% T. gigantea)	59.95^{a}	9.41^{ab}	44.16^{a}	50.05^{a}	59.25
T2 (25% T. gigantea)	60.90^{a}	9.58^{a}	36.82^{b}	43.66^{b}	55.89
Factor 1-5 (Levels of *Aloe vera* and *cheese whey)*					
1 (0ml *Aloe vera* & cheese whey)	58.08	9.38	42.11	49.50	56.36
2 (15ml *Aloe vera*)	59.83	9.46	42.57	47.53	57.53
3 (25ml *Aloe vera*)	59.08	9.40	41.33	47.61	55.86
4 (15ml cheese whey)	59.33	9.40	40.45	48.53	58.31
5 (25ml cheese whey)	59.42	9.45	41.25	48.52	59.51

Laying Performance of Quails

The laying performance of quail fed with levels of *T. gigantea* leaf meal and *Aloe vera* extract and *acid cheese whey* supplementation in terms of point of lay, egg weight and egg production are shown in Table 4. The result showed that mean point of lay of birds without *T. gigantea* leaf meal in the diet was significantly shorter than those quails with 15-25% *T. gigantea* leaf meal in their diets. The point of lay of birds in this study revealed that birds fed without *T. gigantea* leaf meal in their diets laid eggs earlier (56.6 days) than those fed with *T. gigantea* leaf meal which took 59-61 days before they start to lay eggs. The result indicated that birds fed with diet containing 25% *T. gigantea* had significantly higher egg weight than the quails without *T. gigantea* in their diets. Data further showed that birds with 15% *T. gigantea* had significantly higher egg production percentage

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than the birds with 25% *T. gigantea* leaf meal in the diet. Quails fed with 15% *T. gigantea* and those without *T. gigantea* did not vary significantly on egg production. The result also revealed no significant difference in egg production among treatment birds on the third month of lay. Levels of supplements of both *aloe* extract and cheese whey did not affect the point of lay, egg weights and egg production of the quails. No interaction effects were observed on egg weight among treatment combinations which range from 9.22 to 9.69 grams a little higher than 9.03 grams as cited by Capitan (2003).

There was a delay of sexual maturity or point of lay for the *T. gigantea* fed birds which correlated to the reduced body weights due to the less digestibility of the feed as the level of *T. gigantea* was increased. Egg production for 1st and 2nd month and egg weights were significantly affected by the levels of *T. gigantea* inclusion in the feed. The result implies that the sexual maturity of the birds was adversely affected by the experimental diets. The 0% T. gigantea leaf meal for the experimental diets conforms with the study of Dozier and Bramwell (2002), revealed 6-7 weeks or 42-56 days normal point of lay for the quail fed with low fiber content.

Egg Qualities Produced by the Quails

Table 5 shows the results on egg length, egg width, Shape Index, shell thickness, surface area, breaking strength, yolk color, and total cholesterol content of the quail eggs. The result indicated an overall positive effect on egg qualities except for egg width of those birds with *T. gigantea* leaf meal in their diets. Specifically, the result of the study revealed that birds fed with 15 and 25% *T. gigantea* leaf meal have significantly longer eggs than those with 0% or without *T. gigantea* leaf meal in the diet, no significant effects are shown with the three levels of *T. gigantea* leaf meal on the width of eggs. The result also indicated significantly higher shape index and surface area of eggs for the quails fed 15% *T. gigantea* leaf meal than the birds without *T. gigantea* in their feeds. This result can be associated with the effect of the factor on egg length and egg width which were higher for those birds fed with *T. gigantea* leaf meal. Egg shell of the quail fed with 15-25% *T. gigantea* leaf meal in the diet is significantly thicker than the birds not given *T. gigantea* leaf meal. The breaking strength of the quail eggs in this study ranges from 395-402 grams for those quails fed with 15-25% *T. gigantea* leaf meal which was significantly higher than 390 grams for those birds without *T. gigantea* leaf meal.

Color is one of the important factors that influence the acceptability of a food product. The panelists observed significant differences in the yolk color of the quail eggs. Birds with 15-25% *T. gigantea* in the diets have yolk color values of 10.64-11.46 classified as dark yellow to light orange yolks. For cholesterol content of the quail eggs, birds fed 15-25% *T. gigantea* leaf meal have significantly lower cholesterol content than those birds without *T. gigantea* in their diet. Except for egg length, other egg qualities parameters were not affected by *Aloe vera* and acid cheese whey supplementation to the quail. Egg weight, egg length, shape index, shell thickness, surface area, breaking strength were significantly affected by the levels of *T. gigantea* inclusion in the feed and aloe vera extracts and cheese whey supplementation. Such effect can be attributed to the increase of calcium deposition in the shell gland due to the calcium content of the *T. gigantean* leaves (Rosales and Galindo, 1987 and Rosales et al., 1992; Leterme, et al., 2005 as cited by Bitancor, 2008). The shell thickness of the quails fed 15 and 25% *T. gigantea* were numerically higher than 0.33 mm reported by Stadelman (1997). The surface area of the quail eggs in this study ranged from 23.93-25.39 cm^2, higher than the surface area of 21-23 cm^2 revealed by Stadelman (1997). And the breaking strength result suggests that the capacity of the egg that needs to be broken or cracked requires a force or weight of 388.11-406.31 grams which can be associated with the increased thickness of egg shell.

Another vital result in the present study were the effects on yolk color and reduction of the total cholesterol content of the eggs produced by the quails fed with *T. gigantea* leaf meal. The study of Nguyen et al. (1996) on laying quails found better yolk color of eggs with *T. gigantea* leaf meal in the diet. Such color effect might be due to the carotene content of the *T. gigantea* leaves as claimed by Rosales and Galido (1987) and Rosales et al. (1992). The reduction of cholesterol content of eggs of the birds fed with *T. gigantea* may be associated to the nutritional factors contained in the leaves such as fiber, Rosales et al., (1996); Mc Naughton (1978); Talwinder et al. (1992); Naber (1990) as cited by Ponte et al., (2008) and saponins (Langub and Acabal, 2010), which are essential in nutrient metabolism, bile acid synthesis and

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reabsorption to facilitate the maintenance of a healthy cholesterol level, Elkins and Rogles (1990) and Gauther (2005).

Table 5. Egg Qualities of Quail as Affected by the Experimental Diet

Factors	EL	EWd	ES (SI)	ST	SA	BS	YC	CC
Factor T (Levels of *T. gigantean* leaf meal)								
T0 (0% T. gigantea)	3.06[b]	2.36	75.61[b]	.321[b]	24.40[b]	390.02[b]	8.37[c]	1477.05[a]
T1 (15% T. gigantea)	3.12[a]	2.39	78.07[a]	.340[a]	24.54[ab]	395.45[ab]	10.64[b]	804.37[b]
T2 (25% T. gigantea)	3.12[a]	2.46	77.52[ab]	.357[a]	24.99[a]	402.12[a]	11.46[a]	666.98[b]
Factor 1-5 (Levels of *Aloe vera* and *cheese whey)*								
1 (0ml Aloe vera & cheese whey)	3.06[b]	2.41	76.30	.341	24.79	394.26	9.8	943.55
2 (15ml Aloe vera)	3.16[a]	2.35	76.88	.345	24.44	397.28	10.02	815.15
3 (25ml Aloe vera)	3.10[ab]	2.42	78.11	.338	24.69	395.32	10.01	991.95
4 (15ml cheese whey)	3.07[b]	2.39	77.81	.343	24.54	395.22	10.35	1136.63
5 (25ml cheese whey)	3.13[ab]	2.38	76.23	.330	24.74	397.24	10.61	1026.73

Means in a column followed by a common letter are not significantly different, based on Tukey's HSD Test at p<0.01. Legend: EL = egg length; EWd = egg width; ES = egg shape; ST = shell thickness; SA = surface area; BS = breaking strength; YC = yolk color; CC = cholesterol content

Table 6. Cost and Return Analysis of Quail during the Four-month Study Period

Treatments	Total Operating Costs[1]	Egg Produced[2]	Sales of Eggs[3]	Net Income[4]	Return on Investment[5]
T0-1 (0% *T. g.* & 0ml *AV & ACW*)	84.00	48.22	96.44	12.44	14.1
T0-2 (0% *T. g.* & 15ml *Aloe vera*)	84.00	47.89	95.78	11.78	14.2
T0-3 (0% *T. g.* & 25ml *Aloe vera*)	84.09	44.78	89.56	5.47	6.50
T0-4 (0% *T. g.* & 15ml cheese *whey*)	84.01	45.22	90.44	6.43	7.65
T0-5 (0% *T. g.* & 25ml cheese whey)	84.04	44.78	89.56	5.52	6.57
T1-1 (15% *T. g.* & 0ml *AV & ACW*)	82.58	44.34	88.68	6.10	7.39
T1-2 (15% *T. g.* & 15ml *Aloe vera*)	82.79	45.38	90.76	7.97	9.63
T1-3 (15% *T. g.* & 25ml *Aloe vera*)	82.70	43.00	86.18	6.16	7.55
T1-4 (15% *T. g.* & 15ml cheese whey)	83.13	47.38	94.76	11.63	13.9
T1-5 (15% *T. g.* & 25ml cheese whey)	82.72	48.38	96.76	14.04	16.7
T2-1 (25% *T. g.* & 0ml *AV & ACW*)	81.60	43.88	87.76	3.48	4.21
T2-2 (25% *T. g.* & 15ml *Aloe vera*)	81.75	38.33	76.66	-5.09	6.23
T2-3 (25% *T. g.* & 25ml *Aloe vera*)	81.40	41.47	82.94	1.54	1.89
T2-4 (25% *T. g.* &15ml cheese whey)	81.52	40.60	81.20	-0.32	-0.39
T2-5 (25% *T. g.* & 25ml cheese whey)	81.51	38.80	77.60	-3.91	-4.80

Financial Profitability

Among the dietary treatments evaluated, birds fed with 5% *T. gigantea* leaf meal has the highest net income and return on investment (Table 6). It can be observed that birds fed without *T. gigantea* and with 15% *T. gigantea* are the ones that showed positive earnings. However, the 0% *T. gigantea* fed birds with 15 ml. *Aloe vera* and the birds fed 15% *T. gigantea* with 15-25ml cheese whey are the most profitable considering its return on investment reached beyond 10%. Birds fed with 25% *Trichanthera gigantea* regardless

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Table 7. Economic Analysis of Egg Production of Quail for Five Years if Fed with Levels of *T. gigantea* and Supplementation

Treatment Combinations	Year 1		Year 2		Year 3		Year 4		Year 5		Total
	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	
T0-1 (0% T. g. & 0ml A.V/ACW)	60,057.17	40,689.34	60,057.17	44,758.27	60,057.17	49,234.10	60,057.17	54,157.51	60,057.17	59,573.26	
Net Benefit	**19,367.83**		**15,298.90**		**10,823.07**		**5,899.66**		**483.91**		**51,873.36**
T1-5 (15% T. g. & 25ml ACW)	62,156.28	40,114.21	62,156.28	44,125.63	62,156.28	48,538.19	62,156.28	53,392.01	62,156.28	58,731.21	
Net Benefit	**22,042.07**		**18030.65**		**13618.09**		**8764.27**		**3425.07**		**65,880.13**
T2-3 (25% T. g. & 25ml A.V)	56,296.74	39,581.63	56,296.74	43,539.79	56,296.74	47,893.77	56,296.74	52,683.15	56,296.74	57,951.46	
Net Benefit	**16,715.12**		**12756.96**		**8402.98**		**3613.60**		**-1654.71**		**39,833.94**

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of supplementation appeared to have negative and the lowest earnings among treatments.

Table 7 shows the consequence of the three projects if continued for fi5ve years with an assumption of 10% increase in total costs annually, while maintaining its total benefits within five years. It is expected that birds fed 15% *T. gigantea* with the supplementation of 25 ml *cheese whey* can be profitable within five years duration without change of benefits while increasing total costs by 10% every year.

As to the economic/financial viability of raising quail based on experimental diets, birds fed 25% *T. gigantea* leaf meal showed a negative net income and return on investment for the three months period than those birds with 15% and without *T. gigantea* leaf meal in the diet. The most viable level of *T. gigantea* inclusion was at 15% due to the higher and positive net income and return on investment data. The projected financial analysis made for one-year operation of the project as reflected on the computed project worth measures, the 15% *T. gigantea* leaf meal in the diet and 25mL supplementation of *Aloe* extract or cheese whey has indicated acceptability of the project based on Net benefit values every year. The viability of the project is more justified by the result of the project worth measures which indicated worthwhile Net Benefit values (computed using NPV, IRR and BCR) for the birds with 15% *T. gigantea* leaf meal and with 25 ml cheese whey supplementation as well as those birds without *T. gigantea* leaf meal and without supplementation. It appeared that birds with 15% *T. gigantea* leaf meal and without *T. gigantea* are the two projects said to be economically profitable since both obtained a desirable and positive worth measures. While birds fed 25% *T. gigantea* and 25 ml *Aloe vera* supplement is no longer economical due to its negative Net Benefit values.

IV. CONCLUSION

Based on the result of the study growth performance, egg production and egg qualities of quails were affected with different percentage levels of *Trichanthera gigantea* leaf meal (TGLM) in terms of final and gain weights, feed consumption, feed conversion, water consumption, point of lay, percent egg production, return of investment, project viability, egg weight, egg length, egg shape, shell thickness, surface area, breaking strength, yolk color and cholesterol content. The 15% TGLM and 25 ml. ACW is the treatment combinations considered the optimum level that can provide an increase in the growth, egg production and egg qualities of quails.

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