Efficiency of Using Cassava Chip as Based Energy and Leucaena Leaf as Protein Supplement for Dairy Heifer Feed

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Abstract : This research aimed to study feeding system. Samples of the study were 20 62.50 -75.00 % Holstein Friesian dairy heifers which were divided into 4 treatments and 5 replications. Each received different treatments as follows:

Treatment 1 (TI)	para grass (control)
Treatment 1 (TII)	para grass + cassava chip
Treatment 1 (TIII)	para grass + leucaena leaf
Treatment 1 (TV)	para grass + cassava chip + leucaena leaf

Results revealed that initial weight of heifers were not significant but weight increase of T4 was the highest at the growth rate of 155.40 kg. or 0.56 kg./day, followed by T3 at 151.60 kg. or 0.54 kg./day, T2 at 148.00 kg. or 0.53 kg/day, and the lowest weight increase was T1 118.40 kg. or 0.42 kg./day. Statically, there were no significant difference among T2, T3 and T4 but there was significant different from T1 at $p<0.05$. This was because T2, T3 and T4 had increasing cassava chip and local legume as based energy and protein feed supplement but T1 did not.

In terms of Total feed consumption, T4 was the highest consumer at 8,220.80 kg. or 29.36 kg./day, followed by T3 at 8,181.60 kg. or 29.22 kg./day, T2 at 8,159.20 kg. or 29.14 kg./day and the lowest was T1 at 7,627.20 kg. or 27.24 kg./day. There was no significantly difference among T2, T3 and T4 but significantly difference with T1 at the level of $p < 0.05$. In terms of Total Feed cost consumption, T4 was the highest at 31,527.60 Baht or 112.60 Baht./day, followed by T3 at 31,371.20 Baht or 112.04 Baht./day, T2 at 31,281.60 Baht or 111.72 Baht./day and the lowest was T1 at 29,338.40 Baht or 104.78 Baht./day. There was no significantly difference among T2, T3 and T4 but high significantly difference with T1 at $p < 0.05$. Concerning the cost of feed conversion rate, it was found that T1 used the highest cost at 247.81 Baht, T2 at 211.44 Baht. T3 207.07 Baht, and T4 at 203.23 Baht. Statically, T2,T3 and T4 were not different but there was significantly difference with T1.

Keywords: Cassava chip, Leuceana leaf, Based energy, Protein supplement, Dairy heifer

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1. Introduction

At present the increasing gaps between supply and demand of protein rich (milk and meat) undated population growth, unemployment, and income efficiency among farmers in developing country particularly in Southeast Asian nations. Nutrition represents one of the most serious limitations to livestock production in the developing countries. Feed resources are inadequate in both quality and quantity particularly during dry season. (Maetha,1997) The main barriers in the dairy cattle farms are feed for dairy cattle and forage crops which are the main food for cattle. In dairy farming, feed is more dedicated to cattle than other species because the animals must be used to produce milk meat and others. The space of land for use as a forage crop has decreased steadily and the quality of the food was poor in quality deterioration as well. In addition, a highly competitive economy make a career in agriculture has been declining throughout the world. These are affecting the agricultural products especially cassava. Cassava farmers who suffered heavy losses requested for government intervention. (LDD. 2009) Therefore, many researchers tried to find a way to transform cassava to other products and also to improve the use of cassava as animal feed to reduce cassava oversupply. Cassava contains protein, fat, and starch which are the sources of energy that are easily digestible for animals as well as the microorganisms living in the rumen of cattle.(Virapol,2011)

Therefore, this research was studied by using cassava and the fresh leucaena leaves which easily find in the fields of agricultural areas for feeding heifer. The experiment aimed to find energy sources and protein supplements which available as local feedstuffs and cheaper. Farmers could implements or applies for a successful career in the dairy assets.

Objective

1.To study on effect of using cassava chip as based energy and leucaena leaves as protein supplement for feeding dairy heifer

2.To study on growth rate performance of dairy heifer fed the experimental diets

3.To be a guide line for implementation of agricultural products as a source of food energy and protein supplements for livestock and ruminant animal

4.Estimate the economic returns when use cassava and fresh leucaena leaves for fed dairy heifer

2. Materials and Methods

The experiment was conducted at Faculty of Agriculture and Natural Resourses, Rajamangala University of Technology Tawan-ok, Chonburi province during October 2011-September 2012.Twenty dairy heifers were 62.50-75.00% Holstein Friesian. Each animal was weighted bi-weekly for 280 days. The animals were grouped according to age and weight, designated into 4 treatments with 5 replications per treatment and arranged in a Completely Random Design (CRD). The dietary treatments were as follows:

Treatment 1 (TI)	para grass (control)
Treatment 1 (TII)	para grass + cassava chip
Treatment 1 (TIII)	para grass + leucaena leaf
Treatment 1 (TV)	para grass + cassava chip + leucaena leaf

For each day of the experimental period, every heifers were fully fed the fresh grass or roughage. They also fed cassava chip about 2% of body weight and fresh leucaena leaves about 1% of body weight. All heifers lived in separated confinements which had water and mineral bricks. Heifers were fed a half of feed in the morning (7.00 am) and the other half in the evening (17:00 PM). Experimental data was collected during a period of 280 days of experiment. Heifer weight gains were recorded every two weeks by weighed in the morning before feeding time until the end of the experiment and also measured the increase in the economic importance performances of the heifers as: heart girth, body length and barrel girth.

For calculate the feed intake of heifers throughout the experiment, weighing the amount of food fed to the heifers and all the rest of feed were collected every day. The methods for analysis of the nutritional value were conducted by proximate analysis (DM, CF, CP, NFE, EE Ash). The efficiency of digestion of heifers, performance changes based on the weight gain, cost of weight gain per 1 kg., costs to economic benefits, income, and other important economic traits were calculated. The data were analyzed variability in CRD experimental design and calculated the mean difference by Duncan 's New Multiple Range Test (Gomez and Gomez, 1984).

3. Results and Discussion

Table 1 Proximate chemical analysis

ITEM	DM	CP	CF	NFE	EE	Ash
Para grass	60.40	5.65	10.89	36.72	1.60	5.54
Leucaena leaf	74.55	17.05	8.91	41.15	2.46	4.98
Cassava chip	85.90	2.48	2.98	77.12	1.40	1.92

The proximate chemical composition of para grass, leucaena leaf and cassava chip are present in Table 1

Table 2 Body weight, body measurement and feed efficiency.

ITEM	Treatment			
	I	II	III	IV
Duration (day)	280	280	280	280
Number of animal	4	4	4	4
Initial body weight (kg.)	148.40	148.20	148.80	148.20
Final body weight (kg.)	266.80^{b}	282.00^{ab}	300.40^{a}	303.60^{a}
Total body weight gain (kg.)	118.40^{b}	148.00^{a}	151.60^{a}	155.40^{a}
Average daily body weight gain (kg.)	0.42^{b}	0.53^{a}	0.54^{a}	0.56^{a}
Height at wither (cm.)	67.40^{b}	74.80^{a}	76.60^{a}	78.20^{a}
Body length (cm.)	74.80^{b}	83.00^{a}	81.40^{a}	82.60^{a}
Hearth girth (cm.)	35.80^{b}	43.60^{a}	44.00^{a}	46.60^{a}
Barrel girth (cm.)	59.00^{b}	69.40^{a}	66.40^{a}	70.20^{a}
Feed conversion rate in 1 kg.	64.43^{a}	55.15^{b}	53.99^{b}	52.99^{a}

Means with different letter superscripts are significant at $p < 0.05$

The result revealed that initial weight of heifers were not significant but weight increase T4 was the highest weight increase among all four groups at the growth rate of 155.40 kg. or 0.56 kg./day later were T3 151.60 kg. or 0.54 kg./day T2 148.00 kg. or 0.53 kg/day and the lowest weight increase was T1 118.40 kg. or 0.42 kg./day respectively. Statically there were no significant different among T2, T3 and T4 but significantly different from T1 at the high significant level of $p<0.05$ because in T2, T3 and T4 increasing cassava chip and local legume as based energy and protein feed supplement but in T1 was not increasing cassava chip and local legume.

Table 3 Feed consumption

ITEM	Treatment			
	I	II	III	IV
Total para grass intake (kg.)	5852.00^{b}	6260.80^{a}	6283.20^{a}	6328.00^{a}
Average daily para grass intake (kg.)	20.90^{a}	22.36^{a}	22.40^{a}	22.60^{a}
Percent body weight of para grass intake	10.07	10.06	9.97	10.00
Total cassava chip intake (kg.)	1170.40^{b}	1226.40^{ab}	1232.00^{ab}	1243.20^{a}
Average daily cassava chip intake (kg.)	4.18^{b}	4.38^{ab}	4.40^{ab}	4.44^{a}
Percent body weight of cassava chip intake	2.01	1.97	1.95	1.96
Total leucaena leaf intake (kg.)	604.80^{a}	672.00^{a}	666.40^{a}	649.60^{ab}
Average daily leucaena leaf intake (kg.)	2.16^{b}	2.40^{b}	2.38^{a}	2.32^{ab}
Percent body weight of leucaena leaf intake	1.04	1.08	1.05	1.02
Total feed intake (kg.)	7627.2^{b}	8159.2^{a}	8181.6^{a}	8220.8^{a}
Average daily feed intake (kg.)	27.24^{b}	29.14^{a}	29.22^{a}	29.36^{a}
Percent body weight of para grass intake	13.12	13.11	13.00	12.99

Means with different letter superscripts are significant at $p < 0.05$

Total feed consumption T4 was the highest consumer at 8,220.80 kg. or 29.36 kg./day later were T3 8,181.60 kg. or 29.22 kg./day. T2 8,159.20 kg. or 29.14 kg./day and the lowest was T1 7,627.20 kg. or 27.24 kg./day. There were no significantly different among T2, T3 and T4 but significantly different with T1 at the high significant level of $p < 0.05$.

Table 4 Feed cost and feed conversion rate

ITEM	Treatment			
(Baht)	I	II	III	IV
Cost of para grass per kg.	3.00	3.00	3.00	3.00
Cost of cassava chip per kg.	8.00	8.00	8.00	8.00
Cost of leucaena leaf per kg.	4.00	4.00	4.00	4.00
Total cost of para grass	17,556.00^{b}	18,782.40^{a}	18,849.60^{a}	18,984.00^{a}
Cost of para grass per day	7.46^{b}	7.98^{a}	7.99^{a}	8.07^{a}
Total cost of cassava	9,363.20^{b}	9,811.20^{ab}	9,856.00^{ab}	9,945.20^{a}
Cost of cassava per day	1.49^{b}	1.56^{ab}	1.57^{a}	1.58^{a}
Total cost of leucaena leaf	2,429.20^{b}	2,688.00^{ab}	2,665.60^{a}	2,598.40^{a}
Cost of leucaena leaf per day	0.77^{b}	0.85^{a}	0.85^{a}	0.83^{a}
Total cost of feed	29,338.40^{b}	31,281.60^{a}	31,371.20^{a}	31,527.60^{a}
Average daily cost of feed	104.78^{a}	111.72^{a}	112.04^{a}	112.60^{a}
Cost of feed gain per 1 kg.	247.81^{a}	211.44^{a}	207.07^{a}	203.23^{b}

Means with different letter superscripts are significant at $p < 0.05$

Total Feed cost consumption T4 was the highest cost of feed consumption at 31,527.60 Baht or 112.60 Baht./day later were T3 31,371.20 Baht or 112.04 Baht./day, T2 31,281.60 Baht or 111.72 Baht./day and the lowest was T1 29,338.40 Baht or 104.78 Baht./day. There were no significantly different among T2, T3 and T4 but high significantly different from T1 at $p < 0.05$. Counting the cost of feed conversion rate, it was found that T1 used the highest cost at 247.81 Baht. respectively, T2 was at 211.44 Baht. T3 207.07 Baht. and T4 at 203.23 Baht. Statically, T2,T3 and T4 were not different. but significantly different from T1. The experiment revealed that local legume used as protein feed supplement significantly different to feed conversion rate and as same with the cost of feed conversion rate in dairy heifer.

4. Conclusion

The result revealed that initial weight of heifers were not significant but weight increase T4 was the highest weight increase among all four groups at the growth rate of 155.40 kg. or 0.56 kg./day later were T3 151.60 kg. or 0.54 kg./day T2 148.00 kg. or 0.53 kg/day and the lowest weight increase was T1 118.40 kg. or 0.42 kg./day respectively. Statically there were no significant different among T2, T3 and T4 but significantly different from T1 at the high significant level of $p<0.05$ because in T2, T3 and T4 increasing cassava chip and local legume as based energy and protein

feed supplement but in T1 was not increasing cassava chip and local legume the result showed as same with research of Virapol (2011)

Total feed consumption T4 was the highest consumer at 8,220.80 kg. or 29.36 kg./day later were T3 8,181.60 kg. or 29.22 kg./day. T2 8,159.20 kg. or 29.14 kg./day and the lowest was T1 7,627.20 kg. or 27.24 kg./day. There were no significantly different among T2, T3 and T4 but significantly different with T1 at the high significant level of $p < 0.05$. Total Feed cost consumption T4 was the highest cost of feed consumption at 31,527.60 Baht or 112.60 Baht./day later were T3 31,371.20 Baht or 112.04 Baht./day, T2 31,281.60 Baht or 111.72 Baht./day and the lowest was T1 29,338.40 Baht or 104.78 Baht./day. There were no significantly different among T2, T3 and T4 but high significantly different from T1 at $p < 0.05$. Counting the cost of feed conversion rate, it was found that T1 used the highest cost at 247.81 Baht. respectively, T2 was at 211.44 Baht. T3 207.07 Baht. and T4 at 203.23 Baht. Statically, T2,T3 and T4 were not different. but significantly different from T1. The experiment revealed that local legume used as protein feed supplement significantly different to feed conversion rate and as same with the cost of feed conversion rate in dairy heifer.

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