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Dairy Goats Feeding Profile in Lowland Area, East Java Province, Indonesia

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Abstract
This research aims to study the profile of dairy goats feeding people in the rainy season and the dry lowland in East Java province, Indonesia.
The area selected is Kediri and Blitar districts considering a buffer zone of Kelud agro tourism, development of dairy goat breeder for 10 years increased but there is a decrease in land for agriculture. Selection of the location of each district based on stratified sampling based on the number of farmers.
Survey research methods with interview techniques and field observations on 44 dairy goat breeders taken total sampling, to obtain data on materials preparation, administration and composition of the feed, concentrate feed ingredients. Data feed intake, milk production and profits derived from measurements of the entire dairy goats belonging to 19 farmers, selected from 44 respondents with stratified sampling technic based on proximity between the locations of the breeder farm.
Rainfall in wet and dry was 1933 vs. 566 mm / 6 months. A total of 61.36 % of farmers taking forage at a distance of 2-3 km (rainy) and 25.0 % (dry) , the location of paddy land as the location where the breeders take when wet forage (50 %) and dry (27.27 %) , which is then by 45.45 % farmers *dikeringudarakan* (Hay) when wet and when dry (22.73 %) . The highest forage types used are natural grass and crops waste, while wet 44.23 % and 56.95 % at 23:55 and 37.88 % dry. The composition of the feed is highest when the wet grass and concentrate 48.24 legumes 12:47 10.88 %, while dry legumes into a 23:47 concentrate 22.68 and 25.99 %. Concentrate in the form of increased use of cassava tubers in the dry season than the wet is 12:40 compared to 22.88 and 26.45 conversely rice hull into 15.78. Intake of DM, OM and milk production in wet vs. dry season was 85.75 vs. 55.68; 71.78 vs. 49.17 g/kgBW0.75/head/day, 0:54 vs. 0.65 l/head/day. Benefit in wet vs. dry season vs. 5.732/head/day was £ 9,448.
To increase the supply of forage in the dry season should be increased use of crop waste as a source of energy and fiber as well as the provision in the form of hay or ensilage durable that can be stored. The composition of feed concentrates particularly forage ratio needs to be improved so that consumption can be obtained nutrients is met and optimal profit.
Keywords: Ettawa crossbreed, Lowland, Feeding Characteristics, profit, season

1. Introduction

Farmer commonly rearing Ettawa crossbreed goat as dairy animal in the upland area in Indonesia as secundair comodity for their earns. In the lowland area, Ettawa crossbreed as dairy goats just arise as the main commodity for farmer since 2000. The restricted of forage especially in the dry seasons is the one constrain aspect for developing this commodity in all area. Now, in many districs in Indonesia, the Ettawa Crossed Bred as dairy goat are used for not only for saving but also for increase economics and avoids poverty. Many beneficial of dairy goats, there are, the dairy goat milk can be sold for income daily, the price of dairy goats higher than cow milks, the milk can be used for avoids malnutrition especially for children, material of cosmetics and avoids of many diseases (Park and Haenlein, 2009; Belewu and Adewole, 2009). On the other hand, many related studies in the region have reported the impact of climate change on animal health and production are significantly (Kimaro and Chibinga, 2013). Climate change as the important factor and direct effect not only to forages growth as the main feed of dairy goats, but also increase heat stress, reduce feed intake and growth performance (Walter et al 2010) for animals in all seasons. Van den Bosche (2008) climate change expected to increase the risks of drought and floods, and resulting pasture shortage and water scarcity in the region.
The dairy goats in Indonesia have same various constrain as the other tropical countries like Ethiopia, where the nutritional limitation of forages and the crops residues limitation especially in dry season. Forages as the sources of energy and protein supply and the impact for the productivity of dairy was the main problem for increse the milk production (Hassen et al et al, 2010), and also from environment (Yousef, 2010).
From the field study, the avarages of dairy goats production of farmers in the lowland was lower in the dry seasons was lower than wet seasons, there were 0,56 vs. 0,64 ml/head/days. The lower production of milk due to the forages available includes crops residues, and other tree leaves for dairy goat feed were restricted in the dry seasons. There were so many kinds of forages as based feeding of dairy goats depends on the habitual and the

crops system (Hidayati et al, 2013). The climate change and landuse priority for buildings makes produce of forages as basal dairy goat feed decrease and farmer don't know how to saving gorages for their animal feed in dry seasons. Based from the result of field study, it was important to study of the profile of dairy goats feeding especially management before feeding, feed and nutrition aspecs, and benefit from each household rearing in the existing system. Data were comparing beetwen wet and dry seasons.

2. Material and Methods

2.1 Study location

The location study is the lowland region that is located at an altitude of 100-200 m above sea level, which includes the development of agro buffer area Mt Kelud . The region included in Kediri and Blitar region, which is selected based on the number of goat farmers devoted as dairy cattle, ie at least 10 farmers per region. Sampling locations in the Village Deyeng , Ringinrejo and Gembongan . Currently many farmers who develop their business as a secondary business to supplement the family income. On the other hand the low-lying areas experienced a decrease of 140 ha of agricultural land since 2010 because it is used for construction of buildings and other facilities, especially in the area of Kediri (BPS Kediri). The study area has a tropical climate with a rainy season from September till April and the dry season from April till August, with the peak of the rainy season between the months of December-January and the peak dry season from June until July. Temperature and average rainfall per year is 30 - 37oC and 1718 mm, humidity 76-86 % (Meteorology and Geophysics Agency, Office of Kediri, 2010-2011). Retrieval of data in the rainy season and dry season 2010-2011 in 2011.

The location of this study was in Kediri, Blitar Region, as area of several lowland area which farmers have dairy goats (Ettawa crossbreed) as the secundair earn. These regions were chosen based on the growing area of dairy goat's farm. The location study was the agro tourism area of Kelud Mountain. And, on the other hand, this area has decrease of crops land drastics since 2010 for about 140 ha (Statistics Institute of Kediri Region). The region lies in the 100 up to 200 m above sea level (ASL). The average of local temperature is 30 – 37 ^{O} C and humidity 76- 86 %, and the mean rainfall was 1718 mm/year (Anonim, 2010). The data were collected from 3 of 11 villages, namely Deyeng, Ringinrejo and Gembongan. The villages selected by purposive sampling which had more than 10 dairy goats' farmers. The dairy goat farmers as respondent, they were taken as total sampling.

2.2 Respondent and samples

The respondent was 44 dairy goat farmers (total sampling) for taking data of animal feeding. They were as rural farmer, and they did't join in any association. The averages of dairy goats rearing were 5 up to 8 heads. All the animals were housed of the bamboo and some of them made from combination of bamboo and wood material. For calculation of consumption, the samples were taken 19 households from 44 households (43,19%) by stratified sampling, which were based on the site of households (close to another household) and the dairy goats were milked daily.

2.3 Data collection

The farmer activity before feeding, data were collected by surveys within questionaire and observation technic. The quetionaire designed to seek information on households feeding activity to their animals, like the distances of forages location from farm, how to prepare forages before giving to animals, and what the kind of forages and concentrate for animal. It holds during 3 months in the dry and 3 months in the wet seasons. Each household were taken 3 times with intervals of 3 days based on the changes of forages location where the farmer took.

Data of forages kind in dairy goats feeding, the nutrition consumption, feed composition, and milk production were measured 3 times in each season and were recorded from 19 households involved in the survey. The animal for measurement was selected randomly from flocks of the each household.

The same way for feed composition calculating, consumption of dry matter, organic matter, crude protein and total digestible nutrient (TDN). The calculated of nutrition consumption based on the metabolic body weight.

The milk producton daily was measured in glass volume, and was taken to BJ measured in Lactodensimeter.

2.4 Chemicals analysis

Samples of feed and waste was analyses in procimate for dry matter, organic matter and crude protein (AOAC, 1990), and the calculation of nutrient concumption was adapt to formula from McDonald et al (1996). Calculate of TDN intake adapt from Ibrahim (1998) formula and OM digestiblity measurement in in vitro mehod (Tilley and Terry, 1980).

2.5 Data analysis

Data from quetionaires were tabulated and were analysis in excell programme of statistic for generate means, standard error, and percentages. The software of excell 2010 was used to analyze on characteristics of feed, nutrition and benefit with t test between wet and dry seasons (Gaspersz. 1996).

3. Results and discussion

3.1 Environment condition

Environment condition as temperature and rainfall presentation in area study showed in Table 1.

Table 1. Average of temperature (^{o}C) and rainfall (mm/season)

Variable	Wet	dry
Average temperature :		
Maximum (^{0}C)	31,2	30,02
Minimum (^{0}C)	21,4	21,17
Daily (^{0}C)	23,53	25,6
Rainfall (mm/6 months)	1933^{b}	506^{a}

Source: Meteorology and Geophysics Station in Ngadirejo, Kediri (2010-2013)
a,b superscript in the same row indicate the significant differently (P<0.05)

The maximum temperature was below 37^{0}C as the average temperature in lowland area, due to vegetation in study location still better than other location. Although since 2010 for amount 140 ha land for planting crops and forages decrease, the fertile land always available due to the mineral from Kelud mountain eruption. The rainfall in wet higher significant differently (P<0.05) than in dry season, this condition makes production of crops and forages for dairy goats feed drop, so that the nutrition from forages and crops waste couldn't meet the for dairy goat requirement. The rainfall affects the humidity too and it impact to animal physiology, especially in nutrition metabolism. Yousef (2000), comfort zona for goats is 20-30^{0}C for goat's life in dessert and 10-25^{o}C for goats life in delta. Daily temperature in location study have 23.53 and 25.60^{0}C in wet and dry seasons that was means in both seasons of study location have comfort temperature for goats. Humidity control the animal's evaporative heat loss from skin and the respiratory tract, and it will effect to milk product in dairy goats (Yousef, 2000). Goat can survive in lowland area which has higher temperature and less water than in highland due to uniqueness aspect as endurance in less frequent water in 3 days than sheep and physiological differences so that goats more tolerant for several element of mineral like Molibdenum, Copper, Iodine and Magnesium (Haenlein, 2001).

3.2 Forages preparing before feeding

Activity forages before feeding in the wet and dry seasons show in Table 2.

Table 2. Farmer activity for forages preparing before fed to animal

	Wet Season n=44		Dry Season n=44		P
	Sum of farmer	Percent	Sum of farmer	Percent	
1. Distance forages location from farm :					
a. < 0.5 km	4 ± 0.08	9.09	4 ± 0.17	9.09	= 0.03
b. 2 – 3 km	27 ± 0.31^{b}	61.36	11 ± 0.30^{a}	25.00	< 0.05
c. > 3 km	13 ± 0.38	29.55	29 ± 0.46	65.91	= 0.001
2. Kind of area					
a. Paddy land	22 ± .30^{b}	50.00	12 ± 0.30^{a}	27.27	< 0.05
b. Along road side	13 ± 0.45	29.55	23 ± 0.26	52.27	= 0.01
c. Crops land	9 ± 0.15	20.45	9 ± 0.15	20.45	= 0.04
d. Yard	-				
3. Forage preserve before feeding:					
a. Hay					
b. Chopping	20 ± 0.23^{b}	45.45	10 ± 0.30^{a}	22.73	< 0.05
c. Chopping and hay	3 ± 0.15	6.82	13 ± 0.45	29.55	= 0.011
d. Others	2 ± 0.15	4.55	4 ± 0.30	9.09	= 0.03
	19 ± 0.60	43.18	17 ± 0.15	38.64	= 0.5

Note: a,b superscript in the same row indicate the significant differently (P<0.05)

Feeding system in Ringinrejo district is cut and carry because most Ettawa crossbreed were housed close to the house of farmer and most of forage were planted in paddy land, which is far from flocks. Only 4 households have wide yard, which were close to flocks, and they always cut forages and give to animal after chopping. In the wet seasons most farmers save time more efficient due to forages production and the distances were close to farm. The opposite of this condition in the dry seasons, 29 % of household have to search forages so far outside area from their farm, because they just had yard or crops land less than 0,01 ha, and that wasn't enought for planting forages for their animals. They also had little access for bought fodder. Amount 11% of respondent take tree leaf of vegetables, legumes and other tree leaf from yard or crops land of their own in both of seasons for met the animal nutrient requirement, for reach optimum of milk production. They have to bought some crops waste like dried cassava peel, dried cassava tuber or zea mays husks for completely the animal ration.

The most of farmer preserve forages as air dried (Hay) before feeding to animal in the wet season than in the dry seasons, because the lower yield of forages in the dry seasons, so most respondents give direct the fresh all forages although most of them have known the dried forages better for decrease of helminth diseases and bloat. Only 1 household keeps foreges in chopp and air dried due to his experience of Ettawa crossbreed rearing more

than 10 years.

3.3 Characteristics of feed

The kind of forages in dairy goat feeding during in the wet and dry season in the rural farm in the lowland area shows in Table 3.

Table 3. Percentage of respondents using local forages in dairy goats ration in the different seasons

Variable	Wet N = 44	Dry N = 44
Legumes		
Without legumes	59,85±0,60	54,55±0,02
With legumes	38,64±0,39	45,45±0,02
Kind of legumes		
a.Glirisidia	16,11±0,01	22,01±0,12
c.Leucaena leucochepala	-16,86±0,04	-16,31±0,09
e.Sesbania sesban	-5,68±0,05	-7,12±0,02
Grass		
Without grass	-	18,18 ±0,0
With grass	100	81,82 ±0,0
Kind of grass		
P purpureum	40,62± 0,01	44,01± 1,31
Natural grass	44,23± 14,6[b]	23,55± 6,56[a]
Axonopus compresus	6,54± 2,01	6,20± 2,62
Setaria spacelata	8,61± 2,01	8,06± 2,62
Crops waste (CW)		
Without CW	43,05 ± 2,62[a]	62,12 ± 2,62[b]
With CW	56,95 ± 2,62[a]	37,88 ± 2,63[b]
Kind of CW		
a Zea mays straw	32,60± 17,35	22,71± 3,28
b Manihot esculenta leaf	24,35± 17,35	15,17± 3,28

Note: a, b (superskrip) in the same row indicate the significant differently (P< 0,05)

All respondent using fresh forage as Ettawa Crossbred (EC) basal feed in both seasons, and grass was the highest one than other forages due to availability of grass in entire area like in crops field, yard, along rode side and many communal land where farmer can cut everytime. In wet season, respondent used legumes and other tree leaf as basal EC feed were 17 % and 18 %. Only 2 % of respondent used crops waste. It shows that when the wet forage was sufficient for EC, especially of grass. More breeders choose to feed field grass as more available land and freely take along. It is very meaningful for farmers who do not have large land. The number of respondents stable users grass field in the second season and the user rumpu P purpureum reduced by 5% when dry. 5% of the number of respondents who have land are for P pupureum but not harvested when dry. The number of user's legume in the dry season is higher than when wet. This is due to the respondents tend to prefer grass than legumes because legumes unusual use, because it does not grow, because it does not know its usefulness. The highest prevalence of legume type used by the respondent is Gliricidae, L and S leucochepala grandiflora. All three legumes are because the most commonly available and used as feed goats. The use of legume closely with breeders Tigray, Ethiopia is in a different region with irrigation agroecologi good even though its only 4% (Assen and Aklilu, 2012). The use of wet season crops waste by 14% relative value equal to lowland farmers with a tropical climate that is approximately 17% of Tigray. Users legume especially Gliricidae and leaves of other plants and crops while the dry waste increased due to the availability of grass is reduced drastically. The user concentrates both relatively the same season 36.36% and 40.91% when dry. It shows that in the rainy season does not give farmers more for reasons of cost of concentrates and effort to utilize the abundant forage, the excess amount for livestock.

3.4 Feed composition

Feed composition average of dairy goats ration in the different seasons show in the Table 4.

The feed compositition, show in Table 4.

Table 4. Feed composition and forage: concentrate ratio (%DM Total Feed)

Variable	Wet N = 44	Dry N = 44
Feed composition (%of DM total Feed)		
Legumes	10,88 ± 1,95[a]	22,68 ± 1,88[b]
Grass	48,24 ± 3,74[b]	23,47 ± 3,87[a]
Tree leafs	17,31 ± 4,07	16,45 ± 4,18
Crops waste	11,10 ± 3,87	11,40 ± 4,37
Concentrate	12,47 ± 2,99[a]	25,99 ± 3,49[b]
Forage : Concentrate rasio	7,02 :1	2,85:1

Note: a,b superscript in the same rows indicate the significant differently (P<0,05)

Feed compostition in wet and dry seasons, it was show that grass was the mayority forages which choosen as the cheapest price of basal dairy goat feed. Grass as energy source and high of fiber, were planted in many kind area. In dry season grass production lower up to 50% from production in wet season. So for fulfill the nutrien intake farmer prever choose legumes than other forages.

Legumes in dry season were given twice than wet seasons. Legumes have lower production than grass but have stable production. Legumes have known as crude protein source, so that in dry seasons it can be substituted to concentrate, especially *G sepium* (Hidayati et al, 2013), *S grandiflora* can be substituted to Melastoma (Hang et al, 2010).

Farmers added concentrate twice than in wet seasons for energy and protein fulfill, so the milk production could be maintained. Concentrate as the potencial feed for dairy goats in dry season due to access for obtain fodder easier than in wet season.

3.5 The Using Concentrate in feeding

The using of concentrate in dairy goats feeding in the wet and dry seasons show in Table 5.

Table 5. Percentage of respondents using concentrate in dairy goats ration in the different season.

Variable	Wet N = 44	Dry N = 44
Concentrate use (%)		
Without concentrate	57,58 ± 1,31[b]	45,45 ± 2,27[a]
With concentrate	42,42 ± 1,31[a]	55,30 ± 3,47[b]
Concentrate type		
a. Concentrate mix	50,96 ± 6,50	58,86 ± 4,08
b. Cassava tuber	12,40 ± 3,71[a]	24,88 ± 4,82[b]
c. Rice hull	26,45 ± 5,90[b]	15,78 ± 6,84[a]
e. Rice brand	0 ± 0	7,91 ± 6,47
f. Manihot esculenta tuber	3,33 ± 5,77	1,33 ± 0
g. Pollard	0 ± 0	2,62 ± 0,33
h. Soybean	0 ± 0	0 ± 0
i. Soybean meal	3,52 ± 3,06	1,33 ± 0

Note: a, b (superscript) in the same rows indicate the significant differently (P< 0,05)

The use of concentrates in the dry season increased compared to its use in the rainy season, especially to meet the nutritional needs due to reduced forage production. The most used types of concentrates are concentrates so about 50-58% in the second season. Concentrated form of rice hull down due to its use in the dry season rather concentrate so full as they contain more nutrients at a price that is not too much different than 2250 Rp 1500 per kg. Use of Cassava tuber increased when dry due to the high energy content but cheaper price and especially chosen by the farmers due to limited funds. The use of cassava improvement especially cassava reject and by leveraging of dried cassava leaf leaves after harvest as result of Phengvichith and Preston's (2011) research the using of processed cassava foliage in ration can Decrease nematode parasite egg count in Laos local goats.

3.6 Nutrient intake and milk production

Nutrient intake and milk production of each animal in wet and dry seasons show in Table 6.

Table 6. Nutrient intake and milk production

Variable	Wet Season n=19	Dry Season n=19
1. Intake, Per head per day		
a. DM (g DM/KgBW$^{0.75}$) ± SEM	85,74 ± 0,78[b]	55.68 ± 0.10[a]
b. DM (%BW)	3.61 ± 0.18	2.26 ± 0.10
b. OM (g DM/KgBW$^{0.75}$) ± SEM	71.78 ± 0.84[b]	49.17 ± 0.10[a]
c. CP (g DM/KgBW$^{0.75}$) ± SEM	6.55 ± 1.60	6.60 ± 0.19
d. TDN (g DM/KgBW$^{0.75}$) ± SEM	45.09 ± 0.84	36.94 ± 0.21
2. Milk production (l/h/d)	0.65 ± 0.08[b]	0.54 ± 0.10[a]

Total DM Intake when dry only 68,27% from wet season. DM intake from body weight in wet and dry seasons were 3,6 % and 2.2 %. This condition show that the amount of forages as main feed for dairy goats still lack for fulfill the nDM requirement in dry seasons. Intake of DM and % DMI from $BW^{0.75}$in this research were the same value as the Suranindyah et al (2002) research were 85.78 and 96.40 g/kg $BW^{0.75}$ and corresponded to 3.35 and 3.74%. Compared with 2.77% of body weight). The lack of DM intake 1,4% from DM intake in wet seasons was serious condition for attention, due to the optimum milk production will be reached if the DM intake 4 % from body weight.

Milk production in wet was higher than in dry seasons, and it was significant differently, although concentrate in dry season 2.5 higher than in wet season, milk yield in dry lower 20% than in wet season. Depend on Andrarde and Schmidely (2006), concentrate level in ration effect to milk yield. Concentrate 64% in ration impact to milk, fat and protein yield 17% higher than 45% concentrate in ration.

Comparison of FCR between wet and dry seasons was 1.89 and 1.59. In dry, convertion of nutrient to milk product tendency more efficient than in wet, due to in dry season nutrient in ration i e DM, OM, CP from forages higher than in wet seasons. Crude protein and TDN from concentrate contributed to CP and TDN in ration so that intake of CP and TDN have the same value in both seasons. It showed that concentrate in dry seasons has important role for milk production of dairy goats. It would be better if along dry seasons the requirement of forage as fiber source was fulfilled, so the milk production will as high as in wet seasons. Milk production in wet season still lower than the real potential of Ettawa crosedbred goats.

3.7 Economic effect

Calculation of profits from the business of dairy goats in the dry season and the rainy listed as Table 7.

Table 7. Average of household benefit in wet and dry seasons from dairy goat farm

Variable	Wet season	Dry season
1. Output , the averages of :		
Milk production (l/h/d)	0.6474	0.5274
Price per l of milk IDR 20.000	20,000	24,000
Total output	12,947.37	12,657,37
2. Input, the averages of:		
Cost of feed, (IDR/head/day)	2,250	5,426
Cost of labour (IDR/head/day)	1,000	1,000
Cost of transportation (IDR/head/day)	250	500
Total input	6,750	9,926
3. Benefit (IDR/head/day)	9,448.37	5,732.37

The advantages of goat dairy business in the rainy season by 1.6 times compared to a profit in the dry season. The cause of this difference is mainly the cost of concentrate feed. Concentrates are added to feed 2.5 times of drought when the rainy season, due to lack of nutrients from forage close. Other expenses are the cost of transportation to find forage, during the dry forage source location farther than the rainy season so it costs 2 times as much, and the amount of forage grasses mainly obtained only half (Table 4). On the other hand the main source for the production of milk is especially high-fiber forage grasses and crop waste.

4. Conclusion

a. Handling forage before being given to cattle is low, so it needs to be improved, particularly for forage storage efforts, such as dried / hay or silage made especially during the dry
b. Crops waste as dairy goats using feed in the lowland areas is still low compared to the potential production of maize (*Zea mays*) and cassava (*Manihot esculenta* leaf). Need to explore other crop wastes mainly Soy bean straw, Ipomoea aquatica Forsk rejected and Manihot esculenta leaf.
c. Concentrate from agro industrial by-product as Manihot esculenta peel and Soy bean hull needs to be improved.
d. Composition of feeding should be considered especially when dry forage concentrate ratio so that revenue can be increased

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References

AOAC 1990. Official methods of Analysis, 15th Edition. Association of Analytica chemist Washington DC.

Andrade, P. V. D and Ph Scmidely. 2006. *Influence of percentage of concentrate in combination with rolled*

canola seeds on performance, rumen fermentation and milk fatty acid composition in dairy goats. Livestock Sci 104 (2006). Pp 77-90. http://www.smallruminantresearch.com/article/S0921-4488(11)00192-1/references

Anonim. 2013. Meteorology and Geophysics Institute of Kediri Office.

Assen E and Aklilu H. 2012. *Sheep and goat production and utilization in different agroecological zones in Tigray, Ethiopia*. LRRD 24 (1) 2012. *http://www.lrrd.org/lrrd24/1/asse24016.htm.*

Belewu, M.A and A.M Adewole. 2009. *Goat Milk : A feasible dietary based approach to improve the nutrition of orphan and vulnerable children*. Pakistan J of Nutrition 8 (10): 1711-1714. ISSN 1680-5194. http://www.pjbs.org/pjnonline/fin1466.pdf

Bereau of Statistic. 2010. Kediri region in data. Indonesia

Hang, B. P. T, V Lam, T.T Trang, T.R Preston and I Ledin. 2010. *Effect of replacing Melastoma with Sesbania grandiflora on intake, digestibility and N retention of growing goats*. LRRD 22 (2) 2010. http://www.lrrd.org/lrrd22/2/thuh22039.htm.

Gaspersz. V. 1995. *Analyses Technic in Experiment Research*. Tarsito Press. Bandung. First Ed.

Hassen, A., A Ebro, M Kurtu and A.C Treydte. 2010. *Livestock and resources utilization and management as influenced by altitude in the central highlands of Ethiopia*. LRRD 22 (12) 2010.

Haenlein, G.F.W. 2001. *Past, present and future perspectivesof small ruminant dairy research*. J dairy Sci 84:2097-2115. http://www.ncbi.nlm.nih.gov/pubmed/11573791

Hidayati, A, Hartutik, Soebarinoto. Kusmartono. 2012. *Dairy Goat Feeding Characteristic in Malang District East Java Indonesia*. Paper In Proceedings of The 1st Asia Dairy Goat Conference, Kuala Lumpur, (*Eds*: Rashedee A, M A Rajion,.J.B Liang, M.A Omar, A R Alimon and H.A Kam) 9 – 12 April, 2012, pp 205-207 http://www.fao.org/docrep/017/i2891e/i2891e01.pdf

Ibrahim, M.N.M. 1986. *Feeding Tables for Ruminants in Srilanka*. Kandy Offset. Printer Kandy.

Kimaro, E.G and O.C. Chibinga. 2013. *Potential impact of climate change on livestock production and health in East Africa*: A review. LRRD 25 (7) 2011. http://www.lrrd.org/lrrd25/7/kima25116.htm

McDonald, P., R. A. Edward, J.F.O F. Greenhalgh, and C.A Morgan. 1996. *Animal nutrition*. Longman Scientific and the Harlow UK.

Park, Y.W. 2009. *Bioactive component in goat milk in; Bioactive components in milk and dairy products.* Y.W Park Ed Wiley-Blackwell Publisher Ames. Iowa and Oxford. England. Pp 43-82.

Phengvichith V nd T.R Preston. 2011. *Effect of feeding processed cassava foliage on growth performance and nematoda parasite infestation of local goats in Laos*. LRRD 23 (1) 2011.

Suranindyah, Y and A Astuti. 2012. *The effects of feeding dried fermented cassava peel on milk production and composition of etawah crossedbred goat. World academy of sci, Engineering and technol.* Vol: 70 2012-10-21. http://waset.org/publications/3997

Tilley,J.M and R.A Terrie. 1969. *A Two Stage Technique for In-vitro Digestion of Forages. J British Grassland Society.* 18 (2): 104.47 (6) pp 903-909.

Van den Bossche P and Coetzer J A W. 2008. *Climate change and animal health in Africa* review Sci Tecnol. Of Int Epis. 2008. 27 (2). 551-562.

Walter O, Edgardo V and Patricia L. 2010. *Climate chnage and links to animal disease and animal production confoie 2010*. 179-186. From http://www.oei.int/doc/ged/d11834.PDF.

Yousef, M.K. 2000. *Stress Physiology in Livestock*. Volume I. Basic Principles. CRC Press, Inc. Boca Raton Florida.