PROCEEDING

ICOLIB

International Conference on Life Sciences and Biotechnology

EXPLORATION AND CONSERVATION OF BIODIVERSITY

The ICOLIB 2015 focuses on life sciences and biotechnology aspects to explore and conserve biodiversity by bringing together investigators from different fields such as health and medicine, agriculture, food technology and security, new and renewable energy, conservation and management including exploration of biodiversity

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International Conference on Life Sciences and Biotechnology (ICOLIB)

Exploration and Conservation of Biodiversity

Editors

Kahar Muzakhar
Purwatiningsih
Eva Tyas Utami
Siswoyo
Fuad Bahrul Ulum
Rendy Setiawan
Syafiq Ubaidillah
Anis Barokah
Zakiyatul Khoiriyah
Arminatul jannah

Preface from the Editor

The explosive development of the sciences and its expansion into other disciplines such as the Life Sciences field is yielding groundbreaking discoveries from novel genes and bio-products to cutting-edge nanotechnology, resulting in a transformed science landscape with profound global applications in understanding life, eradicating diseases, securing a more equitable food and water supply distribution as well as creating novel bio-industries and products.

Based on these phenomena above, the ICOLIB 2015 with theme "**Exploration and Conservation of Biodiversity**", provide an interdisciplinary platform of life sciences for researchers, academics, students, professionals, industries, and policy makers. This meeting also proposed to among scientists and professionals to stay at the leading edge of recent advances in life sciences and sustainability, act as a catalyst for further research, improve international collaboration while bridging the scientific and technological differences among scientists, and foster global health security.In order to disseminate to community more broadest, the articles were published as a proceeding.

The conference was organized by the Department of Biology, Faculty of mathematic and natural sciences, The University of Jember collaboration with the Flensburg University of Applied Sciences, Deutscher Akademischer Austauch Dienst (DAAD), Indonesian-German Network for Teaching, Training and Research Collaboration (IGN-TTRC), University of Kassel and IndoBIC (Indonesian Biotechnology Information Centre) The Southeast Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP). The conference participants from 5 countries and of which 9 lectures within the field health and medicine, agriculture, food technology and security, new and renewable energy, conservation and management including exploration of biodiversity. Presentation divided into plenary, oral and poster session. More than 150 researchers including students participated on this meeting.

On behalf of the organizing committee, i would like to thank all invited speakers and presenters for participating in the ICOLIB 2015 for giving valuable contribution to this conference. Also, acknowledgements are address to Rector University of Jember, Flensburg University of Applied Sciences, DAAD, Indonesian-German Network for Teaching, IGN-TTRC, University of Kassel and IndoBIC-SEAMO BIOTROP as well as all sponsors for the efforts. Finally, i would like to express deep appreciation to the member of the organizing committee for the good teamwork and the great effort to bring success to the conference.

Jember, September 2015

Kahar Muzakhar
Committee

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POSTER SESSION

Keynote Speakers

THE USING WOOF IS COMPOSED of FERMENTED-ECENG GONDOK (*Eichchornia crassipes*), TAHU DREGS and DRIED-KANGKUNG (*Ipomoea aquatica*) as THE RUMINANT LIVESTOCK WOOF FORMULATION

Isnawati[1], Herlina Fitrihidajati[2], Gatot Suparno[3]

[1,2,3]Departemen of Biology, Faculty of Mathematics and Natural Sciences, The State University of Surabaya
isnawati67@gmail.com

Abstract

There are two major aims of the research. First, aimed is to find the best woof formulation to get the best sheep growth. Second, this research want to create the woof formulation that increase protein percentage in the sheep meat. The type of this research is experimental design with the three treatment. There are three kinds of woof formulation. Woof formulation I is composed (30% tahu dregs, 35% fermented-eceng gondok and 35% dried-kangkung) , woof formulation II is contained (35% tahu dregs, 30% fermented-eceng gondok, and 35% dried-kangkung), woof formulation III is compiled (35% tahu dregs, 35% fermented-eceng gondok, and 30% dried-kangkung). The woofs is given for three group of the sheep, each group have nine members. The sheep is given the woof for ten days. Then, the sheep body weight is measured. In addition, the sheep meat protein percentage is measured too. The conclusion of the research is the woof formulation III is the best media to increase the sheep body weight (0,71Kg/ten days) and the sheep meat protein percentage increase 1%/ten days.

Keywords: Fermented-eceng gondok, tahu dregs, dried-kangkung, woof formulation

Introduction

Eceng Gondok (*Eichchornia crassipes*) can grow so quickly in the water and disturb and damage the water environment [1]. Because of that, some efforts should be made to handle it to protect the negative effect of water environment disturbing. One kind of the solution is utilizing the plant as animal feed so that weeds waters become something of economic value. This is possible item because of high nutrient content in the Eceng Gondok. The plant contain dry matter of about 7%; 11.2% crude protein; 18.3% crude fiber; BETN 57%; crude fat 0.9%; 12.6% ash; Ca 1.4%; and P of 0.3% [46].

Recently a lot of research is done on the using of Eceng Gondok for animal feed. First, the research related to the using Eceng Gondok for the ducks feed and the duck is given the feed produced the high levels protein eggs. Eceng Gondok is also good fish feed especially Nila (*Oreochromis niloticus*), as well as feed ruminant animals such as goats because of high protein and carbohydrate content in thes plant- fermented [12]. According to the [13] biomass of
goat that is given the feed of Eceng Gondok-fermented increased high. The protein content of the goat meat 1% higher than that is given with conventional feed [40].

The fermentation process is very important to be applied to the plant in order to the plant can be used as the feed that have a higher nutritional value and better of level digesting. Some studies fermentation in Eceng Gondok was done. [46] reported that the best long fermentation of the plant with Aspergillus niger is 6 weeks, with PK levels of 18.84% and 15.73% SK levels. In this case the Aspergillus niger is a probiotic. The addition of probiotics increase the acceleration of the fermentation process. Probiotics are living microorganisms that can improve the health and physiological benefits when consumed [49].

Several studies related to the using of probiotics was done. The research conducted by [20] has succeeded in developing a probiotic that can be used to decompose the materials is derived from plants quickly. The other researchers was successfully to conducted the research related to rice straw, corn straw and soybean hay fermentation and implemented in ruminants [20]. The using of mixture of various types probiotics such as of sellulolitik, proteolytic and lipolytic microorganisms produced high quality feed for the cattle from the raw materials of corn straw , from the raw materials of rice straw [17] and from the raw materials of soybean straw [35]. The using of a probiotic mixture of different types of microbes more advantageous than the using of a single microbial as tha fermentation agents. In addition the using of EM (Effective Microorganism) as the probiotics can also speed up the process of organic material decomposition of [11]. Therefore, in this study will be used the ragi tempe (one kind of the yeast) as the fermentation agents of Eceng Gondok

fermentation process. The yeast is a mixture of various microorganisms.

The fermentation process will be improve digestibility, increase nutrient absorption, improve rumen microflora balance, increase endurance, and eliminate or decrease pathogenic microorganisms [7]. In the fermentation process, the protein will turn into peptides, amino acids, ammonia, the fats will turn into volatile fatty acids, and carbon dioxide [48].

There are several important points that must be had the probiotic bacteria that is normally present in the digestive tract. The bacteria must have a shorter regeneration time, produce substances to block the growth of pathogenic microorganisms and strong enough to withstand the packaging process (manufacturing) and distribution so that it can be moved into the intestine in a state live [30].

As a support to obtain these properties, in the fermentation process is added molasses, according opinion of [33] which states that molasses is a major waste of sugar refining industry. Molasses has a crude protein content (PK) 3.1%, crude fiber (SK) 0.6%, extract materials without nitrogen (BETN) 83.5%, crude fat (LK) 0.9%, and ash 11.9 % so as to improve the fermentation nutrients. Based on the nutritional content, there are two kinds of molasses: (1) Cane-molasses, molasses has a sucrose content of 25-40% and 12-25% reducing sugar with a total sugar content 50-60% or more. Levels of crude protein (CP) approximately 3% and ash content of about 8-10%, which is largely made up of potassium, calcium, chloride, and sulfate salts; (2) Beet-molasses¬ a laxative feed which is normally given to cattle in small quantities of about 0.5% [33].

According to [15] more and more types fresh feed of plants is given to the cows will be better, because the element of nutrients (carbohydrates, proteins, fats, vitamins, and minerals) will be more complete. Based on this study it was not good to apply the Eceng Gondok as the singly animal feed. In this research the plant was mixed with the other water plant namely Kangkung (Ipomoea aquatica). The Kale contain some kinds of substances such as vitamin A, vitamin B1, vitamin C, protein, calcium, phosphorus, iron, with a protein content of 3% and energy 29 kcal. Increasing the protein content to the feed is done by adding ampas tahu (solid waste in the tahu production process) to the feed. Ampas tahu has a high nutritional content such as protein and carbohydrates to 17% to 67% in addition to the substance of these nutrients, ampas tahu also have other nutrient content is 3.79% fat, water and ash 51.63% 1 , 21%, it is possible pulp to be added into animal feed.

This study has been carried out by the manipulation of feed formulation levels of Eceng Gondok-fermented, dried kale and ampas tahu. Fermentation techniques were applied following the best results of previous studies [12] so that the research will produce the best formula of ruminant feed that contain three ingredients as mentioned above. Furthermore, the feed formula is implemented to three groups of goat. Each group have nine members of goat. After ten days the biomass of goat and the protein level in it's meat is measured.

Method

This study was an experimental study. Manipulation variables in this study was the percentage component of ruminant feed formula. There are three formulas, namely the formula I that contain (ampas tahu/ pulp 30%, 35% Eceng Gondok-fermented, dried kale 35%), the formula II (ampas tahu/pulp 35%, 30% Eceng Gondok-fermented, water spinach Rendeng 35%) and formula III / III ration (pulp 35%, 35% fermented water hyacinth, dried kale 30%). The response variable in the research is biomass of goats and the level protein in the goat meat. Controle variabel of this research is the age and condition of Eceng Gondok and kale, types of probiotics, , goats gibas weighing 20-25 kg, and the probiotic inoculum as much as 0.15 grams for each treatment and conditions of ampas tahu. Then, the feed is applied to three group of goat (each group have nine members of goat) for 10 days, then the goat's weight and protein content is measured. The data is analyzed with qualitative and quantitative descriptive analysis to obtain the findings or conclusions.

Result

The results that have been achieved in this research include place identification to get the plant, their extraction process, the process of Eceng Gondok fermentation, analysis the nutritional content of fermented feed, kale processing into rending/dried kale, collecting pulp/ampas tahu, formulation of feed, application the feed to goat and measuring the goat weight and meat protein level of goat dafter 10 days application. The detailed description of each product are as follows.

Getting the Eceng Gondok from the river is based on an abundance of the plant. The place is Kali(river) Rungkut. This river is the border between Surabaya and Sidoarjo. The Eceng Gondok in these waters is very abundant, can even cover almost the entire surface of the river and potentially harmful aquatic organisms in that place.

Intake of the Eceng Gondok is done by cutting the stems and leaves. Eceng Gondok is taken a number of ± 1000 Kg. After that, the stems and leaves of Eceng Gondok is chopped in a

composting Nursery, in Bratang. The fermentation process carried out in the Laboratory of Mycology, Department of biology, Faculty MIPA, Unesa.

After the chopping process, Eceng Gondok is boiled until cook. Furthermore is dried up in the sun until rather dry. The plant then put in plastic basket that is lined with banana leaves and fermented with yeast of tempe. To accelerate the fermentation process, the molasses is added on the material. The material is fermented for 10 days, and then is analyzed the nutritional content of feed.

The feed then is analyzed protein content by the proximate analysis. The proximate analyzes performed in the Laboratory of Animal Feed, Faculty of Veterinary Medicine, University of Airlangga.

Table 1. The Proximate Analysis Results of Fermentation Feed during 5 days at various concentrations Ragi of Tempe

NO	KODE SAMPEL	HASIL ANALISIS (%)							
		Bahan Kering	Abu	Protein Kasar	Lemak Kasar	Serat Kasar	Ca	KH	ME (Kcal/kg
1	V0.L5	32.4970	8.1681	4.6958	2.4114	10.9431		17.2217	587.23
	V1.L5	23.8642	6.2166	4.5914	2.2253	6.2500		10.8309	496.66
	V2.L5	25.9936	5.7981	5.1146	2.7824	6.4569		12.2985	601.07
	V3.L5	28.8609	6.4102	4.8301	2.4662	7.3903		15.1544	641.78
	V4.L5	25.6951	5.8889	4.8843	2.2343	6.8651		12.6876	554.22

Table 5. The Proximate Analysis Results of Fermentation Feed during 10 days at various concentrations Ragi of Tempe

NO	KODE SAMPEL	HASIL ANALISIS (%)							
		Bahan Kering	Abu	Protein Kasar	Lemak Kasar	Serat Kasar	BETN	ME (Kcal/kg	KH
1	V0L10	40.0630	9.4630	3.6525	1.7091	16.6299	8.6085	601.23	25.2384
2	V1L5.K	75.6872	17.5757	10.2941	5.8537	15.4093	26.5544	1778.08	41.9637
3	V1L10	42.4818	10.8233	6.9862	2.2918	12.7431	9.6374	782.82	22.3805
4	V2L10	40.4395	10.7599	7.1514	2.6139	10.0352	9.8791	813.92	19.9143
5	V3L10	42.6386	10.3097	6.6413	1.5904	13.0414	11.0558	773.74	24.0972
6	V4L10	44.0817	11.5536	6.9251	1.4271	12.3775	11.7984	797.17	24.1759

Rendeng is ready to be used as a feed component to be made in this study.

The ampas tahu is used as a mixture of feed formula in this study is the solid waste from the tahu factory. The waste collected by buy it. The ampas tahu is dried until the water does not drip. The ampas tahu that had not drip the water is ready to be mixed into the feed formula.

In this study, there are three kinds of feed formula that contain of three materials as mention above as follows.

- Formula I (ampas tahu/pulp 30%, 35% Eceng Gondok-fermented, dried kale 35%),
- Formula II (ampas tahu/pulp 35%, 30% Eceng Gondok-fermented, dried kale 35%)
- Formula III (ampas tahu/pulp 35%, 35% Eceng Gondok-fermented, dried kale 30%)

The feed formulas then is applied as feed for goats for 10 days as an independent feed without any mixture or the addition of another feed. Each feed formula is given for nine goats with 2 times application daily at 09.00 and 17.00. The goat is maintained in Tegalrejo, Bareng, Jombang.

Calculation of weight gain of sheep is done by reducing the weight of sheep after treatment with lamb weight prior to treatment.

Table 3. Weight Gain of the goat which is given feed formula I, II and III for 10 days

Treatment	Re-peat	The prior goat weight (kg)	The last goat weight (kg)	The adding goat weight (kg)	The average adding goat weight (kg)
Feed formula I	1	24,5	25,17	0,67	0,67
	2	22	22,68	0,68	
	3	23,5	24,18	0,68	
	4	22	22,67	0,67	
	5	24	24,68	0,68	
	6	22	22,66	0,66	
	7	24	24,68	0,68	
	8	23	23,67	0,67	
	9	23,5	24,18	0,68	
Feed formula II	1	23	23,67	0,67	0,67
	2	23	23,67	0,67	
	3	22	22,66	0,66	
	4	24,5	25,18	0,68	
	5	22,5	23,16	0,66	
	6	24,5	25,17	0,67	
	7	23	23,67	0,67	
	8	24	24,67	0,67	
	9	23,5	24,16	0,66	
Feed formula III	1	24	24,7	0,7	0,71
	2	22,5	23,19	0,69	
	3	24	24,69	0,69	
	4	22	22,68	0,68	
	5	23,5	24,19	0,69	
	6	22	22,67	0,67	
	7	25	25,9	0,9	
	8	22,5	23,16	0,66	
	9	24,5	25,18	0,68	

After aplication of the feed formulas the goats are slaughtered to get their meat and then is analyzed the nutritional content of the meat. The nutritional value of goat meat are shown in Table 4 below.

Table 4 The nutritional value of goat meat

No.	Sam-pel Code	Nutritional value (%)							
		Dried materials	ash	Crude protein	Crude fat	Crude cellulose	Ca	BETN	ME (Kcal/Kg)

1	Ran-sum 1	22,9249	1,141 5	17,0198	2,2518	1,8735	3,0041	0,6383	757,33
2	Ran-sum 2	30,6002	0,966 5	18,2870	2,3878	1,7605	2,6529	7,1984	1050,39
3	Ran-sum 3	28,402	1,062 9	18,8037	2,2833	1,2584	2,3251	4,9935	977,78

Discussion

Ruminants abdomen consists of four parts, namely the rumen, reticulum, omasum, and abomasum with the size of which varies according to age and natural food. Feed rumen capacity to accommodate as much as 80%, 5% reticulum, omasum 7-8%, and abomasum 7-8%. This division can be seen from the shape muscle spincter during contraction. When considered from the food storage capacity can be known that the major ingestion of food occurred in the rumen.Rumen media containing a liquid that is a result of changes in foodstuffs that have been mixed with water from food, drinks and water from the water contained in saliva. Saliva contains a large amount of sodium bicarbonate which is very important to maintain the proper pH and serve as a buffer against volatile fatty acids is produced by bacterial fermentation. Saliva is also important to keep the amount of water in rumen fluid [45]. The process of digestion in the stomach depends on rumen temperature 37-39 ^{0}C and pH 6.0 to 6.7 and in the anaerobic state is the best condition for fermentation and the end of the fermentation process will be absorbed continuously by the reticulo rumen [47]. In the rumen there are a large number of microorganisms, which are primarily anaerobic who do a symbiotic mutualism with the host animal. The rumen microorganisms play an important role in digesting food enzymatically to produce simple organic substances are readily absorbed in the digestive system further. Rumen microorganisms secrete extracellular enzymes to enzymatically digest food.

In the digestive system of cattle ruminasia there is a process called cud (rumination). Food that has been chewed by an animal in his mouth, then is swallowed to enter into the rumen. In the rumen occurs destruction of the cell walls of forage, then the nutrients locked inside the walls of cellulose can be overhauled by enzymes produced by microorganisms. The first reform process is certainly not perfect, it will spew ruminant animals back food contained in the rumen back into the mouth. The animal will repeat to chew food for a few moments. Furthermore swallowed back and get into the rumen to digest enzymatically. This continued three to four times, so when we look at ruminant animals have characteristics always perform continuous mastication.

Goat is one kind of ruminant digestion fermentative do. Fermentative digestion is done with the help of rumen microorganisms. On ingestion fermented foods will be overhauled by rumen microorganisms into other compounds of different chemical properties as an intermediate substance. Microorganisms are involved in the digestive process this has cellulolytic and proteolytic properties. At ruminants, digestion in the rumen fermentation occurs and in the reticulum. Fermentation produces protein peptides, amino acids, ammonia, volatile fatty acids, and carbon dioxide [48].

Based on the food digestion process then will be greatly assisted if the food consumed by animals exist in the form of "partially digested" therefore The Eceng Gondok is used as one component of the feed formula should be fermented in advance to assist in the digestion of food is to mechanical or chemical, kale should be made rending to be more subtle (mechanical aids digestion of food) and ampas tahu as a third component, add the protein content in feed formula and bring a distinctive aroma that stimulates appetite goats.

Provision of various types of feed formulas were created role in this study have an impact on weight gain or animal biomass trials. Based on Table 3 on weight gain of goats, feed formula III gives the best average weight gain than that for formula I and II. Weight gain of goats with feed formula III is 0.71 kg within 10 days or 2.13 kg per month. While weight gain of goats that is given feed formula I and II 0.67 per 10 days or 2,01 kg per month. When compared to weight gain with conventional feed goats (1.5 Kg per month) are actually three types of rations were formulated in this study is better than conventional feed, but the feed ration III is the highest weight gain results.

Feed formula III consists of components ampas tahu/pulp 35%, 35% Eceng Gondok-fermented, dried kale 30% while the feed formula I contain ampas tahu/ pulp 30%, Eceng Gondok-fermented 35%, 35% dried kale. Feed formula II consists of ampas tahu/pulp 35%, 30% Eceng Gondok-fermented, dried kale 35%. When considered in the feed formula III the pulp out high and high Eceng Gondok-fermented strongly supports the quality of feed. The ampas tahu contains protein, Eceng Gondok-fermented also highly nutritious and livestock are also high appetite with weight gain

goat thus also the highest. The dried kale high percentage less supportive of growth in weight because it has not become fodder "partially digested" so that undernutrition can be taken to the maximum.

Actually, all three types of feed formulas are made in this research have high nutritional value and can trigger weight gain better than conventional feed. High nutritional value of feed can definitely trigger weight gain faster. Mc Donald et al. (2002) states that the growth of livestock is controlled by the consumption of nutrients, especially energy consumption.

Weight gain, due to the dry ingredients in the feed requirements have been met, and also due to the results of protein and carbohydrate fermentation product which is higher than conventional feed so that the resulting growth is also better. This is consistent with the statement of Soepranianondo (2005), that if the process of metabolism in ruminant good, then the fermentation product in the form of amino acids, ammonia-N and volatile fatty acids in the rumen will be high. As we know that for the growth of livestock amino acid required for the formation of the protein network while volatile fatty acids are used as a source of energy that the rest will be used as a fat or energy reserves.

Boediono (1997) said that the increase in the rate of weight gain can be obtained by increasing the amount of feed composition, as is well known that the feed containing nutrients in sufficient quantities allowing livestock to grow. Therefore, the overall goat feed formulas in this study grew faster than those fed conventional goat.

Based on Table 4 above it can be seen that the protein content of goat meat that is given three kinds feed formula is made in this research is higher (feed I = 17.0198%, ration II = 18.2870, ration III = 18.8037) when compared with the levels of protein goat meat with the conventional feed(16.6%) [7]. In addition to increased protein content, the feed formulas is developed in this study also produce goat meat is low fat content. According [7] the fat of meat goat generally contain up to 9.2%, while based on the results of the analysis of goat meat with feed formula I is 2.2518% fat content, the fat content of goat meat with feed formula II amounted to 2.3878% and ration III produce goat meat with fat content 2.2833%. Based on the results of the analysis of the data obtained can be stated that the feed formulas were developed in this study has the potential to produce goat meat with the low fat and high protein.

Composition and nutritional value of feed is very influential on the physical and physiological condition of the goat. According [38], nutrient content of feed affects the quality of goat meat and goat hormonal conditions. Furthermore, the physiological processes that occur will affect the quality of meat especially level of protein and fat.

Conclusion

Feed formulas were developed in this study resulted in weight gain of goats is larger (2:07 kg per month) than that of goats with a conventional feed (1.5 kg per month). Feed formula III is the best formula to trigger weight gain goat (2.13 kg per month) is compared with feed formulas I and II (2:01 kg per month). While the protein content of goat meat with feed formulas are developed in this study increase of about 1% when is compared to the goat meat with the feed convensional feed.The level of fat in the goat meat with the feed formula are developed in this study experienced a decline of about 7%.

Suggestion

Feed formulas that have been developed in this study need to be implemented on other ruminants other than goats. Research on the manufacture of feed formulas based on the waste to produce meat low in fat and high protein remains open to do.

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