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Potentiality of Offering Waste Product as an Alternative for Animal Feed

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ABSTRACT

The study was conducted at Denpasar in January 2018. The objective of it was to know potentiality of offering waste products as an alternative for animal feed. The method used in this study was qualitative method. Data obtained were analyzed descriptively. Environment pollution is a big threat in the future for Bali as famous tourist destination in central of Indonesia due to its custom and culture. There is no secondary of it in the world. Waste product of Hindu ritual is originally from holly places where they pray. They are most consists of organic rubbish (coconut and palm leaves, fruits, bamboos, flowers, rice, clothes, etc.). Because of income per capita of Balinese is rise up year to year, so that their rituals (offerings) that offer to the God are getting better too in quantity and quality. It consequence is the waste products accumulation are getting more and more and environment pollution occurs. To reduce environment pollutions of that ritual, it needs a perfect effort to process it to be an animal feed which available from year to year, cheep and no competitive with human needs. The process can be done biologically process, chemically and physically (through fermentation, ammonization, chop, etc.) for making silage. The best biological process (fermentation) in enzyme cellulotic system that is produced by Trichoderma reesei QM-9414. While ammonization (chemical) use urea, because it is easier than others.

KEY WORDS: *offering waste products, fermentation, ammonization, silage*

INTRODUCTION

Bali is one of the most famous tourism destination in Indonesia even in the world due to its custom and culture. Generally, the Bali society sure that tourism gives good economic contribution to residential development. According to Erawan (1994) and Bendesa (2008) that tourism affected significantly to Bali economic growth. But, Picard (2006) reported that environment pollution particularly rubbish becomes a big challenge to Bali in the future.

The low management attention to the rubbish can be seen from society care to it after conducted religious ritual (Hindu). It tends to increase dump rubbish after the Bali society finish to perform religious ceremony. This can be seen at the end of religious ceremony activity, where rubbish dump is left at a certain places. These can make bad image of the Bali Island. Most of it waste product consists of some organic rubbish i.e. foliage, fruits, bamboos, flowers, stuffs/clothes, rice, etc. At the past the rest of all ceremony is dump rubbish can be decomposed with the help of micro organism. At that time, areas at around holy places for praying are still broad to accommodate the rubbish. But, now it condition is much difference. Mostly of the areas around them have high economic values. They are become real estate, trading places or garden. Because of income per capita of the Bali society is increase, the

ceremony is done increasingly too. This caused rubbish accumulation is getting more and more, therefore it needs more work to reduce polluted environment by organizing it becomes an alternative feed animal which available all the time, cheap and no competition with human needs.

Feed is one of many factors affect to animal productivity. Feed in low of quantity and quality point of view could causes low animal productivity. It's due to lot of feed ingredients alternative is not clear yet in their quantity and quality. So that, it needs to be conducted some efforts to look for an alternative feed animal which is potential, cheap, easy to find out and no competition with human being.

Now day, existence of animal feed is getting limited. This is due to demand of row material of animal feed is rise up and getting less and less of forage area development as results of utilization of land for food and housing. Therefore, it needs to look for potential new resources to use it for alternative feed animal and to replace part or all forage and also to reduce dependent on utilization of concentrate ordinary used.

Those resources should be available in a certain place with large amount, so that no need much cost to find out them. Unfortunately, waste product of a ritual of Hindu in Bali is bulky and contains high crude fiber. Those need to be treated to increase it nutrition value and digestibility, then they could become a potential feed animal. There are some technic can be performed i.e. biological (fermentation) and chemical (ammonization) processes. Both, fermentation and ammonization are used to make silage.

How potential utilization of the waste product as an alternative for animal feed? To know the potential utilization of it as an alternative for animal feed is the objective of this study

MATERIAL AND METHODES

The study was conducted at Denpasar in January 2018. Materials use were offering waste product, molasses, urea, water, *Trichoderma virideae* (*T.v.*), plastic bag. The method used in this study was qualitative method.

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THE STUDY OBJECTIVE

The objective of the study was to know potentiality of offering waste products as an alternative for animal feed.

DATA ANALIZED

Data obtained were analyzed descriptively.

RESULTS AND DISCUSSION

The waste product of offering, daily Hindu ritual, in Bali is very potential as animal feed alternative if it is processed perfectly. Bali's population in the year of 2010 were 2.751.828 people, with 688.281 families, and areas for about 5.636.66 square km. In tradition of Hindu religion, there are 108 times ceremony in a year (within 420 days of Balinese calendar) for examples: routine ceremonies are daily ceremony ("*mesaiban"*), every six months (260 days

according to Balinese Calendar) ceremony including "*Galungan"* and "*Kuningan"*, "*Saraswati", "Pagerwesi",* Temples Ceremonies ("*Piodalan di Pura, Merajan", etc*), once in a year ceremony is called Silent Day ("*Nyepi"*); while none routine one are tooth failing ("*potong gigi"*), wedding ("*perkawinan"*), etc.

In average that each Balinese home in Bali use 34 small offering called "*canangs"* in a routine ceremony (daily offering). Each of it consists of 8.5 g flowers (Sukarsa, 2005). Furthermore, he also reported that for each daily offering needs young coconut leaf and palm leaf for 15 g. If in average per year in Bali there are 108 times pray, it means that 21.482,65 ton of flowers and 37.966,27 ton young coconut leaf are needed. From the daily offering point of view, it tend to pollute environment if not be managed perfectly. So that, to counter that problem it is need some efforts or strategies to overcome it to avoid air pollution or even environment. One of them is fermentation or ammonization technic to make it ready use for animal feed.

As mentioned above that Bali is very popular as world tourism destination, it must be kept green. Phenomenon of polluted environment shown that it's a contra productive. As a center of economic Bali growth including hotel location, restaurant and various international trading and business facilities available in it clearly. These must be performed internationally all the time. Unfortunately, facts shown that polluted environment at the area already developed become golden three angle for economic growth of Bali is very punctual. Bali society as supporters of local tradition already known broadly has high value concept that place harmony as priority to nature and appreciate to beauty and spiritual value that contribute much good image to Bali.

The more accumulation of rubbish phenomenon after religious ceremony activities was done it becomes interesting to look for solution because it's related to Bali's society culture (worship). Every body who watch it may proud of it in order to run their religion. Local Government should has a certain program in order to counter accumulation of rubbish waste product of offering and avoid contra productive of society belief in perform ceremony. Hindu philosophy said that the rest of ceremony are fruits, cakes, rice, etc. called "*prasadam"* has holy power because of blessing of the God. Offering actually has two functions i.e. as symbol of nature and human being. After offerings were offered to the God, they can be eaten who ever want them (Putrawan, 2009). In this case, rubbish or waste products phenomenon should be not losing others. Whatever their form they must be treated accordingly to be some things useful for human being or others, atleast for animal feed.

The waste product of Hindu ritual in Denpasar (Bali) is originally came from Hindu religion ceremony in Bali. In general, it's made of young coconut leaf. Composition of the young coconut leaf is similar to palm oil's. Young coconut leaf contains lot of lignin, so it needs to be treated to increase its digestibility. Jafar and Hassan (1990) said that lignin, cellulose and hemicellulose contents affect digestibility of feed, and there is strong correlation between lignin and dry matter digestibility. Lignin and cellulose are often form lignocellulose compound in plant cell membrane, and those cells are strong bind each other (Sutardi, 1980). Feed fiber digestibility is not only determined by lignin content, but also by strong bind of lignin compound with other carbohydrate group (Djajanegara, 1986). According to Lubis (1963) that high concentration of crude fiber could disturb digestibility of others and decrease their level. High concentration of fiber would decrease total digestible nitrogen (TDN) value of feed (Stevenson, 1959).

Generally, horticulture by product has some characters as follows: 1) nutritional values is low particularly protein and its digestibility; 2) balky; 3) high humidity causes difficulties in it storage and costly; 4) often some components of feed are poisons where animal did not like them; 5) beside that they potential in pollution and their performance is less interesting (Davendra, 1980). Other limitations are: 1) it cell membrane is coated by silica crystals (Van Soest, 1982) and 2) lignification and cellulose structure processes formed in crystal and not in amorphous any more (Jackson, 1977). To counter those matters they need some things to do accordingly, so lignocellulose becomes better quality for animal ruminant feed.

There are some process can be conducted to increase potential digestibility of dry matter (Preston and Leng, 1987). According to Hungate (1966), to increase quantity of part of animal feed that can be digested on low quality of feed, this can be conducted through physical ways (chopping, grinding, crushing) and biological treatments (fungi and bacteria fermentations). Furthermore, chemical treatments (colloid and acid) are suggested by Pigden and Bender, 1978) and urea ammonization by Walker and Kohler (1978).

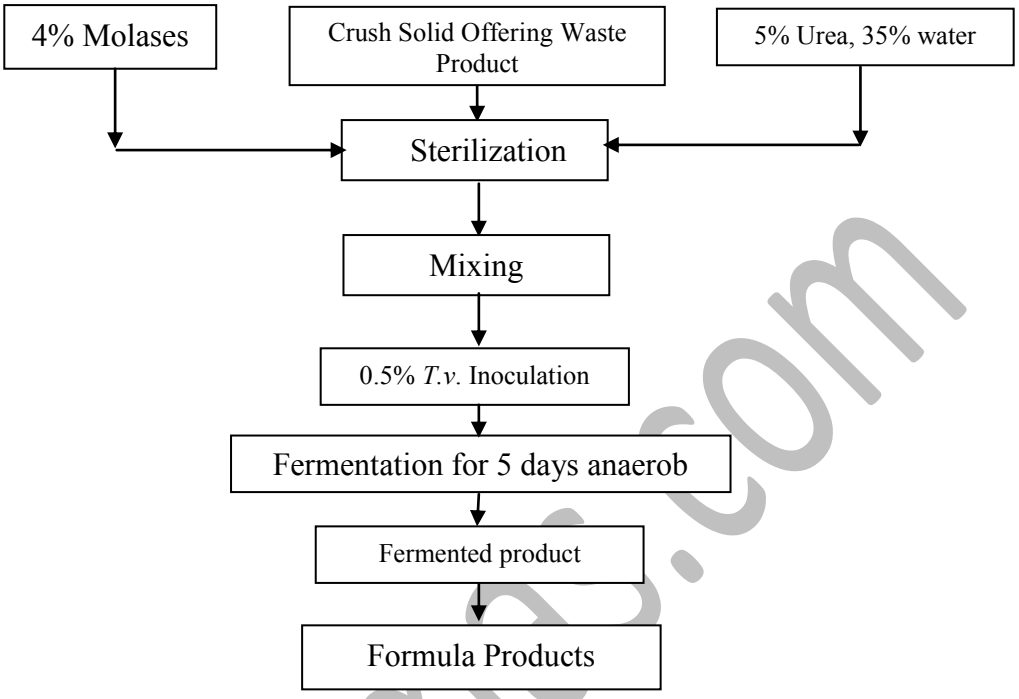
The word of fermentation is originally come from Latin word, "*fervere*". It means boiled (result of yeast works in fruit essence or seeds affairs). Those affairs actually are due to bubbles of carbon dioxide gas as the result of anaerobic carbohydrate catabolism. But, now understanding of fermentation is different indeed from biochemistry point of view, it's related to energy release on carbohydrate organically.

Biological fermentation is chemical change process on substrate as the work of microorganism enzyme results certain product. It works depend on kind of substrate, microorganism and environment affects growth and metabolism of microorganism. Treated substrate bio fermentation, generally has higher nutritive value compare to it originally matter. This is due to the presentation of catabolic character and anabolic of microorganism, therefore they capable to breakdown complexity of components to be simple compound and easier to digest. Fermentation process would pieces chemical network structure of cell wall and separation of lignocellulose binding. Feed fermented would increase its nutrient digestibility.

Phanerochaete chrysosporium fungi of *Basidiomycetes* class is a destructor of lignin to form *meselia* group and reproduces unisexual via spore. The fungi has strong ability to breakdown lignin by produces peroxidase extracellular enzyme in the form of peroxidase lignin (LiP) and peroxidase manganese (MnP). In fermentation process by using original culture its sterility must be look after seriously to obtain optimum results. Flow Chart 1 as follows showed the fermentation of original culture on substrate of offering waste product.

Trichoderma sp is micro organism of fungi class that capable to produce various kind of enzymes involve in catabolic of polymer carbohydrate be in animal feed matter is originally from coconut leaf. The enzymes produces are *endo-Beta-glucanase* and *ekso-Beta-glucanase* in a lot amount relatively, and *Beta glucosidase* in small amount relatively. Those enzymes are the main component in cellulolytic enzyme system that capable to hydrolyzed cellulose crystal (invitro) completely. The best strain of *Trichoderma sp* produces cellulose enzyme is *Trichoderma reesel* QM-9414. That enzyme is biological catalyst in metabolism process to increase velocity of reaction and efficiency generally. Enzyme that use on feed is product of micro organism fermentation (fungi and bacteria including Beta-glucanase and endoprotease

of Bacillus acidophilus), while that originally from fungi is pectinase of *Aspergilus niger*, cellulose of *Trichoderma ressei* or *T. virideae* (*T.v.*).



Flow Chart 1. Fermentation process of the offering waste product by *T. virideae* culture

Coconut leaf, row material of offering is directly can be fed to big ruminant animals particularly cattle and buffalo. It's also can be processed early i.e. silage or ammonization. This can decreases pollution impact of environment and can increases animal feed stock. Silage fed to the animal is very profitable because more safety and increases better nutritive value and preserves waste product. Other profits of ammonization with urea is easy to do it and increases feed quality.

Compare to other i.e. chemical process (NaOH), ammonization has some profits for example: 1) technically it's very simple and no dangerous, 2) cheaper and easy to do it compare to NaOH, 3) effective to wipe out *aflatoxin* in rice straw. 4) increase crude protein content, 5) no cause pollution in the earth.

Ammonization with urea was confirmed has good affect to feed. Furthermore, ammonization process is also give benefit on increases feed digestibility. After it catabolized into NH3 and CO2 then NH3 with water molecule to go through hydrolysis to be $NH4^+$ and OH. In normal situation (pH = 7), NH3 is more as NH^+. So that, ammonization will similar to alkali treatment. OH group can break hydrogen binding between carbon number 2 of glucose molecule one with oxygen carbon number 6 of another glucose molecule that is in cellulose bind, lignocellulose and lignohemicellulose. It was known that two final bind of alkali is very unstable. It can be ended with alkali treatment. So that, feed will easier to be digested by rumen microbial. Furthermore, it will stretch out lignin deposit in cell wall and among cell

spaces. It means that ammonization is also decreases nutrition concentration that difficult or can't be digested by animal, thus it digestibility is also increases.

According to Banerjee (1978) that urea it self can't replace protein even it can supplies amino nitrogen, but other part of protein molecule must be obtained from other resources. Carbon and hydrogen of protein molecules can be obtained from carbohydrate that easy to be fermented. Utilization of high concentration of urea in animal feed needs some criterion to obtain optimal usefulness. According to Neumann and Snapp (1969) those criterions are:

1. Enough energy content.
2. Enough Ca and P concentration.
3. Enough microelement.
4. High vitamin A concentration.
5. Enough sulfur as limited factor to synthesis amino acids methionine and cysteine by microbial rumen.
6. Salt available to increase palatability.
7. Homogenous mixed urea in animal feed.

Nearly all structure of coconut tree is sesame to oil palm, so coconut tree is also can be made silage. All of petiole and leaflets coconut tree are chop for about 2 cm in length, then they are preserved as silage. It can be fed to ruminant animal as well as oil palm. Three factors that determine successful of silage process are: a) be or not be there of lactic acid bacteria and big or small it population over there, b) physical and chemical characteristic of green forages are used, c) environment condition.

To obtain good quality of silage, it needs to form acid in short time with stimulates of bacteria growth with additional of matter rich of carbohydrate and energy resources for bacteria. Availability of matter that contains high carbohydrate for example is tuberous plant powder would stimulate fermentation process and lactic acid developed quickly. Tuberous plant powder contains protein, crude fiber and low fat, but its Beta-N is high enough. This showed that tuberous plant powder could be used as energy resources.

CONCLUSION AND SUGGESTION

By product of Hindu rituals must be pay attention seriously because it tends to pollute environment. It needs certain process i.e. fermentation and ammonization to make it becomes animal feed alternative.

In the future, it needs experiment about using of ritual Hindu by product as animal feed. In this case chemical composition and nutrition content of the by product can be updated with using fungi, bacteria and yeast.

REFERENCES

i. Banerjee, G.C. 1978. Animal Nutrition. Oxford & IBM Pub. Co Calcuta.

ii. Devendra, C. 1978. Utilization of Feeding Stuffs from the Oil Palm. Interaction: Feeding Stuffs for Livestock in South East Asia. Malaysia Society of Animal Production. Serdang Selangor, Malaysia.

iii. Djajanegara, A.B. , Sudaryanto, Winugroho, dan A.R. Axarto. 1999. Potensi Produk Kebun Kelapa Sawit untuk Pengembangan Usaha Ternak Ruminansia. Laporan APBN 1998/1999. Balai Penelitian Ternak, Puslitbang Peternakan. Bogor.

iv. Erawan, I N. 1994. Pariwisata dan Pembangunan Ekonomi (Bali Sebagai Kasus). Denpasar: Penerbit Upada Sastra.

v. Hungata, R. E. 1966. The Rumen and Its Microbes. Academic Press. New York.

vi. Jafar, M.D. and A.O. Hassan 1990. Optimum Steaming Condition of PPF for Feed Utilization. Processing and Utilization of Oil Palm By-Products for Ruminant. Mardi -Tarc Collaborative Study. Malaysia.

vii. Jackson, M,G. 1977. The Alcali Treatment of Straw. Anim. Feed Sci. and Tech. 2: 105–130.

viii. Picard, M. 2006. Bali Pariwisata Budaya dan Budaya Pariwisata (terj. Jean Coutean dan Warih Wisatsana). Jakarta. KPG (Kepustakaan Populer Gramedia), Forum Jakarta-Paris.

ix. Pigden, W. J. and F. Bender. 1978. Utilization of Lignocellulosic by Ruminant. World. Anim. Rev. 12: 30-33.

x. Preston, T.R. and R.A. Leng. 1978. MatchingRuminant Production System with Available Resources in the Tropic and Sub-Tropic. International Colour Production. Stanthorpe, Queensland, Australia.

xi. Putrawan, N. 2009. Menyikapi Limbah Sampah Upacara and Ritual Hindu. Majalah Radytya, edisi Juli 2009.

xii. Stevenson, F. 1959. Humus Chemistry. Willey, New York.

xiii. Sukarsa, I M. 2005. Pengaruh Pendapatan Keluarga dan Pemahaman Agama Terhadap Pengeluaran Konsumsi Ritual Masyarakat Hindu di Bali Ditinjau dari Berbagai Dimensi Waktu. Disertasi. Universitas Airlangga. Tidak diterbitkan.

xiv. Sutardi. 1980. Landasan Ilmu Nutrisi I. Departemen Ilmu Makanan Ternak, Fakultas Peternakan, Institut Pertanian Bogor.

xv. Van Soest, P. J. 1982. Nutritional Ecology of The Ruminant. Comstock Publishing Assc. Cornell University Press, USA.

xvi. Walker, H.G. and G.O. Kohler. 1978. Treated and Untreated Cellulosic Waste and Animal Feeds. Recents Work Interaction the United States of Amarica.