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The Level Of Legumes Supplementation In The Basal Diet Of Rice Straw On Intake And Digestibility Of Ongole Crossbred Cows

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Abstract: *The purpose of this study was to know the effect of different level of supplementating legumes in basal diet of rice straw (RS) on feed intake and digestibility of Ongole crossbred (PO) cows. As of 20 Ongole filial bull s (initial weight of 308.25 ± 38.36 kg, aged $I_3 - I_4$) were grouped into four treatments such as: R_0 = RS (ad-libitum), R_1 = RS + (gliricidia + leucaena 0.25% of LW (DM basis), R_2= RS + (gliricidia and leucaena 0.5% of LW), R_3 = RS + (gliricidia and leucaena 1.0 % of LW). So, in each treatment consisted of five animals as replication. Parameter measured were: intake of dry matter (DM), organic matter (OM) and crude protein (CP) and the in vivo digestbility of DM, OM and CP. Data analyzed by using completely randomized design. Results showed that supplementing legumes in basal diet of RS was influence ($P < 0.01$) DM, OM and CP intake. The treatments were also give significant different on the digestibility of DM, OM and CP. The highest DM, OM, and CP intake in metabolic liveweight was in R_3 as of 185.69 g/kg $LW^{0.75}$/d, 154.92 g/kg $LW^{0.75}$/d, and 25.03 g/kg $LW^{0.75}$/d, respectively. Meanwhile the highest of DM, OM, and CP digested were also found in $R_{3,}$ which were 144.85 g/kg $LW^{0.75}$/d, 130.50g/kg $LW0^{0.75}$/d, and 1.99 g/kg $weight^{0.75}$/d. It can be concluded that supplementing legumes at 1.0% LW in basal diet of RS gave significant effect on feed intake and digestibility of Ongole filial bull s.*

Keywords: *Legume, rice straw, feed intake, digestibility, cows*

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I. Introduction

The Ongole filial bull is a domestically-derived Indicus cattle breed in India. Ongole filial bull are highly favored by breeders because these cows are suitable to live in the tropics and can adapt to environmental conditions of less favorable areas (Nulik et al 2004). This cow has a smaller posture compared with Ongole filial bull, temperament calm, able to adjust to low-quality feed, and heat resistance.

One of the factors that determine whether the bad growth of ruminant livestock is feed Martawijaya, 2003. Feed is one of the determining factors that influence the success in a livestock business because of the feed will be fulfilled the need for basic life, production, reproduction so that the feed is defined as a supporting factor that has important role, (Haryanto, 2003). The availability of feed supporting factors for success in a ruminants business. Provision feed becomes one most serious problems faced by ranchers. Because the available land functions for cultivation of livestock are very limited because increasing number of residents and existing land used as residential areas of society, industry and buildings.

II. Materials And Methods

This research was conducted fromFebruaritoMei 2017 in Beef Cattle Research Station in Grati, Pasuruan East Java province and the material used in this study were 20Ongole filial bull sagedPI_3-PI_4years with body weight of 308,25 ± 38,36 kg and placed in individual cage. These bulls were fed with rice straw ,gliricidia and leucaena and drink water were given ad libitum."

Research Method
This study was conducted as experimental with for treatments namely:.
R0: Rice straw *ad-libitum* (control)
R1: Rice straw +gliricidia and leguminous 0.25% kg based on BK
R2: Rice straw +gliricidia and lamotoro 0.5% kg based on BK
R3: Rice straw +gliricidia and leguminous 1.0% kgbased on BK

It provides separately between rice straw and leguminosa. Treatments R1, R2, and R3 that obtain leguminous supplementation are initially approved for the treatment of R0. Drinking water is given ad-libitum.

Parameters Measured

Nutrient content of feed, administration, residual feed, and stool analyzed proximate to know BK, BO, PK Consumption of feed nutrition, weighing the amount of feed and feed residual using the calculation as follows:
Consumption of BK (kg) = (% DM feed x amount of administration) - (% BK of feed remaining x amount of feed residue)
Consumption BO (kg) = (% BO x BK granting) - (% BO x BK remainder)
Consumption PK (kg) = (% PK x BK granting) - (% PK x BK residual)
To obtain nutrient consumption of BK, BO, and PK in unit g/kg weight 0,75 / day, consumption result divided by body weight metabolis that is Weight 0,75. The digestibility of feed nutrition consists of digestibility of BK (KcBK), digestibility of BO (KcBO), PK digestibility (KcPK).
BK digestibility (KcBK) = (Consumption BK-BK Feces)/(Consumption BK)× 100%
Digestibility BO (KcBO) = (Consumption BO-BO Feces)/(Consumption BO)× 100%
Digestibility PK (KcPK) = (Consumption PK-PK Feces)/ (Consumption PK) × 100%
Consumption undigested nutrients which includes of ingested BK (KBKT), ingestion of digested BO (KBOT), the consumption of undigested PK (KPKT), by the formula: Consumption of undigested BK (g / kg weight 0.75) = Consumption of BK (g / kg BW 0.75 / day) x Dernia BK (% Consumption of undigested BO (g / kg Weight 0.75) = Consumption of BO (g / kg BW 0.75 / day x Digestibility BO (%) Consumption of undigested PK (g/kg BW 0.75) = Consumption PK (g / kg BW.75) x PK digestibility (%) The consumption of undigested nutrients is expressed for individual livestock in units of g / kg weigh T0.75 / day.
Equipment used The enclosure used is a cage with individual type of head to head livestock position equipped with feed and drinking place Analytical Scales Digital Weighing Scale capacity 15 kg x 1 gr brand ACIS Ruud weight with capacity 2700 kg. while for Berkell brand manuals with a capacity of 1000 kg of accuracy of 1 kg.

Implementation of Research

The procedures used in the implementation study were conducted using three stages of the total collection method (McDonald et al., 1988),
a) Preadaptation stage
At this stage, the cow is familiarized with feed being tried in the individual cage. This stage is done for one week with the aim that cows can adapt to feed. At the end of this stage weighing weight (Kg) to be grouped based on weight cows.

b) Adaptation and introduction

The daptation and preliminary steps are carried out for 2 weeks. This stage aims to familiarize the animals with the experimental feed that will be used during the study period. This stage the observation amount of food consumed and stage is completed if consumption is constant. At the end of the adaptation stage and the preliminary weighing weights to determine the initial weight of the data collection phase.

c) Stage of data collection

At this stage, animals are fed according to the treatment (R0, R1, R2, and R3). The data collection was done for 12 weeks by recording the feed and giving samples of feeding the rest of feed, the rest of the feed every week per tail cow and takensamples as 200 g, and recordingfeces during 24 hours conducted for 7 day.Weight the body (weight) done6 time in early adaptation, preliminary beginning, data, and end of data collection. Weighing is done before the animals are fed in the morning with the aim to know the level of nutrient feed consumption, ingestion of nutrient feed and digestive weight per day.

• **Collections samples givend**

A collection of rice straw feeds, gliricidia leaves, and leguminous leaves is done daily. Samples taken at the time of weighing feed then cut and put in the bag. Samples of feeding gifts were taken as many as 100 g then labeled and dated. After insertion into the bag, the sample is put into oven for 24 hours with 60ºC, then weighed to know the dry air weight (BK), then the feed sample is milled using a grinder to analyze the ingredients of BK, BO, and PK.

• **Collection feed and feed residue**

Feed samples were taken daily at the time of weighing. A feed sample of 100 g was taken into the bag and labeled and then dried by oven and the weight was weighed after drying. Remaining feed of each livestock for 24 hours is taken and weighed into the labeled sack and cattle number. The remaining feed for 24 hours is accommodated for 1 week. Sub sample of feed residue was taken as 200 g / feed in duplo and put into oven with temperature 60ºC for 24 hours then weighed for milling and did analysis of content of BK, BO, and PK.

• **Stool Collection**
Stool collection is done for 2 weeks, at 5week and 10week in the data collection stage. The collection of feces holding data was carried out for 24 hours for 7 days.
Stool collection is done in the following way:
1. Accommodate the falling feces taken and put into the buckets that have been provided behind the cattle treatment.
2. Stools that are accommodated for 24 hours are weighed.
3. After weighing, stool samples taken as much as 10% of total weight then put in the freezer.
4. Fecal samples during the composite collection period per tail and performed thawing.
5. After thawing, stools are taken sub sample as much as 5% of total weight.
6. The sub-samples are dried in the sun after they are fed into the 60ºC oven for 42 hours and 72 hours.
7. Feces milled for BK, BO, and PK analysis.

Data Analysis
This research was conducted using Completely Randomized Design (RAL) Steel and Yitnosumarto (1993), consisting of 4 treatments and each treatment was repeated 5 times. If show significant effect (P <0,05) continued with Real Different test.

III. Results And Discussion

Proximate analysis results of feed treatment
The chemical composition of rice straw, gliricidia, and leguminous straw material used as feed treatment during the study is presented in Table 1.

Table 1. Chemical composition of feed ration treatment during the study

Treatmen	ChemicalComposition of Feed (% BK)				
	BK	BO	PK	NDF	ADF
Rice strow	66,40	79,52	5,31	59,27	40,78
Gliricidia	35,53	92,82	19,20	44,49	34,89
Leguminous	42,90	92,27	21,91	45,94	33,45

Resource : Research Nolasco not yet publication (2010).

Based on the result of laboratory analysis in Table 1 shows that there difference chemical composition feed treatment. Based on the above treatment data that rice straw has the highest content of BK (66.40%) and low PK content (5.31%). According to Komar (1984), the rice straw consists mostly of cell walls containing BK 60-80%, PK 2-6%. The low content of straw PK PK because rice straw is composed of cell walls. The component of rice straw cell wall (79% of dry matter) contains crude fiber comprising cellulose (33%), hemicellulose (26%), lignin (7%), and silica (13%) (Jung, 1989). The high coarse fiber (SK) and low nutrients in rice straw cause low digestibility and consumption, but rice straw is a potential source of energy for ruminant livestock (Marhadi, 2009). Fiber on rice straw is bound by lignin and silica causes the rice straw to be slow to digest can be used as a single feed (Utomo, 2004). Low PK straw rice can be supplemented with forage feed which has high PK content such as leguminous feed (Gliricidiaand Leguminous) because it contains high protein. This is in accordance with the opinion of Isnainiyati, (2001) that to increase the nutritional value of rice straw has been done many of the treatments and efforts often done by small farmers is to supplement with the rest of agro-industrial agriculture or leguminous crops. The results of this study indicate that leguminous has a higher PK content (21.91%) than with gliricidia (19.20%). The content of both leguminous PK is relatively higher when compared with artificial concentrate, so it is expected to have a positive effect on livestock.

Feed Nutrient Consumption

Consumption is an essential factor that is the basis for determining livestock production. The feed used in the study was rice straw, gliricidia, and leguminous. Consumption is influenced by feed rate in the gastrointestinal tract and is also strongly influenced by digestibility rate (Kurniawati, 2002). Rumen capacity is also an important factor as a regulator of feed consumption and will affect the degradation of high-fiber raw material (Prasetya, 2002).The mean consumption of dry matter (KBK), the consumption of organic matter (KBO) and the consumption of crude protein (KPK) feed nutrient treatments R0, R1, R2, and R3 during the study are presented in Table 2.

Table 2. Mean consumption nutrient feed treatment

Variabel	Treatments			
	R_0	R_1	R_2	R_3
Consumption BK (kg/tail/day)				
Rice strow	9,77	6,43	5,63	6,67
Gliricidia	-	5,64	7,96	15,29
Leguminous	-	4,79	7,97	12,82
Total BK	$9,77^a \pm 0,38$	$10,92^{ab} \pm 0,73$	$11,56^b \pm 0,78$	$13,81^c \pm 1,45$
Total BK weight^{0,75}	$134,97^a \pm 11,21$	$148,89^a \pm 15,85$	$162,56^{ab} \pm 22,82$	$185,69^b \pm 32,00$
Consumption BO (kg/tail/day)				
Rice strow	7,61	5,01	4,39	5,19
Gliricidia	-	5,18	7,25	13,97
Leguminous	-	4,00	7,21	11,37
Total BO	$7,43^a \pm 0,48$	$8,75^{ab} \pm 0,47$	$9,48^b \pm 0,65$	$11,33^c \pm 1,11$
Total BO weight^{0,75}	$102,41^a \pm 7,28$	$119,43^{ab} \pm 12,77$	$133,32^{ab} \pm 18,61$	$154,92^b \pm 28,08$
Consumption PK (kg/tail/day)				
Rice strow	0,55	0,37	0,32	0,38
Gliricidia	-	1,17	1,65	3,17
Leguminous	-	1,13	1,87	3,00
Total PK	$0,55^a \pm 0,03$	$1,02^b \pm 0,09$	$1,26^b \pm 0,13$	$1,85^c \pm 0,30$
Total PK weight^{0,75}	$7,63^a \pm 0,73$	$13,89^{ab} \pm 2,06$	$17,67^b \pm 2,47$	$25,03^c \pm 6,05$

Information : $^{a-c}$Notations which are different in same column were highly significant different at P<0.01.

The results showed that BK consumption varied and between treatments showed a significant effect (P <0.01) on KBK, KBO, and KPK. The highest rates of PBC are in the treatment of R3 and R2 (BK kg / head / day). This suggests that leguminous supplementation in basal rice straw feed can increase total CBC. KBO and KPK is highest at R3 treatment and the lowest is R0 treatment, but based on the result of variance analysis indicates that total feed consumption in metabolic body weight for KBK (g / kg weight 0,75) has no significant effect on feed consumption but on consumption total KBO and KPK (g / kg B0.75) gave a significant effect on consumption of (Sunardi, 2002).

In Table 2 shows the total consumption of BK, BO, and PK on the treatment of R3, R2, and R1 which received leguminous feed supplementation with different proportions showed higher levels of consumption compared with treatment R0 which only received rice straw feed, therefore supplementation leguminous in rice straw basal diet can increase Ongole filial bull feed consumption.

Low levels of consumption in R0 treatment are due to rice straw containing crude fiber, very high silica and very low protein content whereas leguminosa contains low crude fiber and very high protein. This is in accordance with the opinion, Marhadi (2009), rice straw has a minimal nutrient content, low digesty power. The low consumption of feed can also be caused by several factors such as the ability of cattle to digest the feed, environmental factors such as temperature, humidity, the circumstances surrounding the cage. Van Soest (1994) states that the more feed that can be digested the faster the feed flow from the rumen to the next digestive tract. The increasing of feed intake at treatment of R3, R2, and R1 is caused by the high level of palatability low rough fiber leguminous diet and high protein content, according Utomo (1998) statement that factors affecting feed intake level on ruminant livestock are feed type, palatability , body size, physiological status and feed form and rumen capacity

4.3 Digestibility of Feed Nutrients

Digestibility is the ability of livestock in digesting feed in the digestive tract that is not excreted in the stool is completely digested or absorbed in the digestive tract. Factors affecting digestibility are the composition of feed, the physical form of feed, the physiological condition of livestock, and the amount of feed consumed (Hartadi 1997).

The results of the average BP digestibility, digestibility of BO and digestibility of PK are shown in Table 3.

Table 3. Average digestibility of feed in Ongole filial bull

Digestibility (%)	Treatment			
	R_0	R_1	R_2	R_3
BK (%)	$30{,}13^{a} \pm 1{,}00$	$33{,}42^{ab} \pm 2{,}91$	$33{,}29^{ab} \pm 2{,}18$	$45{,}07^{b} \pm 5{,}71$
BO (%)	$40{,}95^{a} \pm 3{,}69$	$40{,}26^{a} \pm 4{,}85$	$44{,}25^{a} \pm 1{,}68$	$53{,}46^{b} \pm 5{,}91$
PK (%)	$33{,}76^{a} \pm 0{,}87$	$51{,}58^{b} \pm 4{,}38$	$54{,}88^{b} \pm 4{,}76$	$67{,}64^{c} \pm 4{,}37$

Information : $^{a-c}$ Notation which are different in same column showed a highly significant different (P<0.01).

Table 5 shows the highest digestibility of BK (KcBK) in R3 treatment (45.07%) followed by treatment of R1 and R2 which is almost equal to the level of digestibility of 33.42% and 33.29% and R0 30.13. The highest digestibility of BO (KcBO) is found in the treatment of R3 with the digestibility level of 53.46%, followed by the treatment of R2 44.25% while for the treatment of R0 and R1 the digestibility level is not much different ie R0 40.95% and R1 40.26% and for the highest level of digestibility of PK (KcPK) was also found in the treatment R3 (67.64%), R2 (54.88%), R1 (51.58%), and R0 (33.76%). The value of the digestibility of feed treated R0 is lower than the treatment R3, R1, and R2 due the low digestibility of rice straw feed and the high coarse fiber. This is in accordance with Leng (1980) opinion that the characteristic of rice straw is characterized by high crude fiber content and low nitrogen, calcium and phosphorus resulting in low rice straw digestibility and decreased consumption, but still potential to be used as a source of energy. Low digestibility will cause livestock weight to be low and decreased. Djajanegara (1999) reported that there are some obstacles to the utilization of agricultural waste as feed that is generally have a low quality with high fiber content, low protein and digestibility, consequently when used as a feed basalt required the addition of feed ingredients that have good quality to meet and increase the productivity cattle (Nefadha. 2004).

The high level of digestibility in the treatment of R3, R2, and R1 is caused because livestock in this treatment get low leguminous fiber supplementation of crude fiber causing high feed digestibility. The treatment R3 showed that the digestibility level was higher than the treatment R2, and R1 because in treatment R3 obtained the level of leguminous supplementation with higher proportion. Based on the results of the research in Table 3 that the tendency higher levels of supplementation provides a fairly high indication of KcPK so that the value of KcPK high. According to Bonga, (2003) feed degradation can be used ashigh indication of low NH 3 rumen concentrations. The high degradation value will increase the NH3 concentration so that the condition can spur growth and increase the number of microbes, especially the SK digest so that the feed can be degraded more optimally so that the overall digestibility of the feed can be increased.

The digestibility will increase if the consumption of feed PK increases (McDonald, *et al.*, 1988). Based on the theory, the value of KcBK, KcBO, and KcPK in general increases with the increasing amount of supplementation so that the higher the level of giving it will be the higher level of digestibility of feed (Winugroho, 2000).

Based on the results of the analysis of variance for the digestibility presented in Table 3. shows that KcBK, KcBO, and KcPK are significantly different (P<0.01) in Ongole filial bull. Digestibility value is influenced by environment, feed composition, feed treatment and feed flow rate in rumen.

The high value of KcPK in the treatment of R3 compared with the treatment of R2, and R1,. due to the high value of the KPK because it contains more quantities. The high KPK causes rumen microbes to thrive as ruminant livestock digestion depends on rumen microbes and higher PK encourages microbial activity in the rumen so that its consumption increases and will produce high weight.

Consumption Nutrient

Data on ingestion of dried ingredients (KBKT), digestible organic ingredients (KBOT), and digestible protein (HFV) feed treatment during the study are presented in Table 4.

Table 4. Consumption of BK, BO, and PK undigested each feed treatment.

Variabel	**Treatment**			
	R0	R1	R2	R3
Consumption :				
KBKT (kg/tail/day)	$8{,}99^{a} \pm 0{,}51$	$10{,}23^{a} \pm 0{,}63$	$10{,}80^{b} \pm 0{,}71$	$10{,}76^{b} \pm 1{,}22$
(g/kg weight^{0,75})	$124{,}17^{a} \pm 10{,}47$	$139{,}44^{a} \pm 14{,}44$	$151{,}83^{a} \pm 20{,}74$	$144{,}85^{a} \pm 26{,}57$
KBOT (kg/tail/day)	$4{,}76^{a} \pm 0{,}28$	$6{,}25^{a} \pm 0{,}99$	$6{,}50^{a} \pm 0{,}47$	$9{,}71^{b} \pm 0{,}84$
(g/kg weight^{0,75})	$65{,}66^{a} \pm 5{,}05$	$85{,}02^{a} \pm 13{,}58$	$91{,}44^{a} \pm 13{,}16$	$130{,}50^{b} \pm 20{,}65$
KPKT (kg/tail/day)	$0{,}03^{a} \pm 0{,}00$	$0{,}07^{a} \pm 0{,}01$	$0{,}09^{b} \pm 0{,}01$	$0{,}15^{c} \pm 0{,}04$
(g/kg weight^{0,75})	$0{,}41^{a} \pm 0{,}04$	$0{,}93^{ab} \pm 0{,}20$	$1{,}30^{b} \pm 0{,}23$	$1{,}99^{c} \pm 0{,}63$

Information:^{a} Notations which are in same column were highly not significant at (P>0,05)

$^{a-c}$ Notations which are different in same column were highly significant different at P<0.01.

The results of analysis of nutrient consumption digested in table 4 showed that feed treatment had a significant effect on KBOT, and HCV based on consumption of nutrient g / kg weight 0,75 and did not give significant effect to KBKT (g / kg weight 0,75). The highest value of HCVF was found in treatment R2 that is 151,83 g / kg weight 0,75, followed by treatment of R3 (144,85 g / kg weight 0,75), R1 (139,44 g / kg weight 0,75), and R0 (124 , 17 g / kg weight 0.75). The highest KBOT was in R3 treatment, that is 130,50 g / kg weight 0,75, R2 (91,44 g / kg weight 0,75), R1 (85,02 g / kg weight 0,75), and R0 (65,66 g / kg weight 0,75). The highest R3 feed ions among the treatments (1.99 g / kg B0.75), followed by R2 treatment (1.30 g / kg BW, 0.75), R1 (0.93 g / kg BW, 0.75), and the lowest was treatment R0 (0.41 g / kg BW0.75). The high value of KPKT then more and more PK can be exploited by the small intestine because the more amino acids that are formed will multiply the body's animal tissue protein that causes the addition of livestock weight due to the addition of body tissue protein (Hume, 1982).

IV. Conclusions

From the results of the study can be concluded Ongole filial bull s that get rice straw basalt feed supplemented by leguminous gliricidia and leguminous 1.0% weight showed the highest levels of nutrient consumption and digestibility.

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