FACULTY
OF ANIMAL SCIENCE
Universitas Brawijaya

BOOK OF ABSTRACTS

ICESAI

THE 2nd INTERNATIONAL CONFERENCE ON ENVIRONMENTALLY SUSTAINABLE ANIMAL INDUSTRY (The 2nd ICESAI 2021)

Malang, October 12, 2021

"Innovation, Challenges and Opportunities in Environmentally Sustainable Animal Industry"

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Room 4

Topic Moderator Co-Host	: Feed Resources, Sustainable Production and Animal Nutrition : Asri Nurul Huda, M.Sc. : Hafid
13.00 – 13.20	**Invited Speaker: Prof. Anuraga Jayanegara (IPB University, Indonesia)** [KI-106] The role of tannin on silage proteolysis
13.30 – 13.32	[ABS-10] Effect of feed supplement on nutrient digestibility, methane production and growth performance of Bali cattle *Ramaiyuliz, Yurma Metri*
13.32 – 13.44	[ABS-65] The potential of frozen rumen fluid for ruminant feed evaluation using in vitro gas production technique *Meiyndra Sonya Pramita, Hendrawan Soetanto*
13.44 – 13.56	[ABS-18] Effect of lactic acid bacteria addition on in vitro nutrient utilization of rice straw and oil palm frond silages processed with fiber cracking technology *D. Muthia, M. A. F. Harahap, A. Dwisyahputra, F. R. Santi, Nahrowi, A. Jayanegara*
13.56 – 14.08	[ABS-39] Effect of energy and protein level in complete feed used elephant grass (Pennisetum pupureum, schum.) and maize stover silage (Zea mays. L) on nutrient content, total digestible nutrient and in vitro degradation *Hartutik, Marjuki, Asri Nurul Huda, Poespitasari Hazanah Ndaru, Roi Katul Jannah*
14.08 – 14.20	[ABS-41] Effect of tannin and myristic acid addition in complete feed on rumen liquid VFA profile in vitro *Siti Chuzaemi, Mashudi, Poespitasari Hazanah Ndaru, Asri Nurul Huda, Iftitah Nuzulia Qur'aty*
14.20 – 14.30	Break
14.30 – 14.42	[ABS-42] Volatile fatty acids concentration and efficiency of microbial protein synthesis of concentrate cassava peel diet with different levels protein sources *Arya D. Saputra, Kusmartono, Mashudi, Poespitasari Hazanah Ndaru*
14.42 – 14.54	[ABS-43] Effect of using different preservatives in cassava peel silage on degradability, concentration VFA, and microbial protein synthesis by in vitro method *Aprilia Dwi Kartika, Kusmartono, Mashudi, Poespitasari Hazanah Ndaru*
14.54 – 15.06	[ABS-44] Effect of soybean (Glicine max, Merrill) seed epidermis in complete diet on protein content and in vitro gas production test parameters *Marjuki, A. N. Huda, R. Damayanti, Hartutik*
15.06 – 15.18	[ABS-76] In-vitro nutrient degradability of complete feed containing myristic acid and tannins addition *Poespitasari Hazanah Ndaru, Siti Chuzaemi, Mashudi, Asri Nurul Huda, Muhimmatu Mufidah*
15.18 – 15.30	[ABS-78] The study of fermentation of mixed rumen contents and jackfruit peel using aspergillus oryzae on in vitro gas production and digestibility *Mashudi, Wahyuni Nurmawati, Siti Chuzaemi*
15.30 – 16.00	Break

[ABS-10]

Effect of feed supplement on nutrient digestibility, methane production and growth performance of Bali cattle

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Abstract

The objectives of this study were to evaluate the effect of feed supplements on the *in vivo* methane production, Dry Matter Intake (DMI), Organic Matter Intake (OMI), Average Daily Gain (ADG), and nitrogen retention of Bali beef cattle. The feed supplements consist of a mixture of brown sugar, bran, tapioca, soybean meal, urea, salt, ultra mineral, and gambier (*Uncaria gambir* Roxb) leaf residue with 29.36% crude protein content and 1.17% tannin. Feed supplements were added (10% and 15%) to the forage and concentrate rations (70:30 DM). The results showed that although the DMI was not significant, its digestibility ($P<0.01$) increased from 72.61 to 77.45 g/$BW^{0.75}$. The digestibility of organic matter, crude fiber, NDF, ADF, cellulose hemicellulose, and total digestible nutrients were non-significant. The feed supplement significantly suppressed the production of methane gas from 1.85 to 1.74 KJ/g DM. The efficient use of ration energy reflected in the highest ADG of 742 g/day obtained at the feed supplement level of 15%.

Keywords: feed supplement, digestibility, tannin, gambier, energy
Topic: Feed Resources, Sustainable Production and Animal Nutrition

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CERTIFICATE

This certified

Ramaiyulis

as

Oral Presenter

in the 2nd International Conference on Environmentally Sustainable Animal Industry (The 2nd ICESAI 2021)
"Innovation, Challenges and Opportunities in Environmentally Sustainable Animal Industry"
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Effect of Feed Supplements on Nutrient Digestibility, Methane Production and Growth Performance of Bali Cattle

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INTRODUCTION

The average daily gain nationally was only 0.33 kg/day, the potentially of 0.8-0.9 kg/day (Soedjana *et al*., 2012)

what are the problems ??

The rations rely maore on the provision of grass or accompanied by the provision of concentrates from local materials that are widely available in the farmer's environment, such as bran, sago, cassava, and coconut dregs.aaa

The grass given is of low quality with a protein content of less than 7 g/kg (Souza et al., 2010)

The protein content in the concentrate does not meet the standard SNI 3148-2:2017 for beef cattle.

What is the alternative solution ??

We need a supplement to mix with concentrate to complete the nutritional content in order to increase feed efficiency.

Feed supplements based on local raw materials brown sugar, bran, tapioca, soybean meal, urea, salt, ultra minerals and gambier (*Uncaria gambir* RoxB) leaf residue with 29.36% crude protein and 1.17% tannin were reported to be able to increase the rate of microbial biomass production in the rumen (Ramaiyulis et al., 2019).

Rumen Microbes function in the digestion of feed nutritions but also produce methane gas (CH4) emissions in the rumen fermentation, which is inversely proportional to animal productivity (Hristov et al., 2018).

This study aims to determine the effect of adding supplementary feed (Ramaiyulis et al., 2019) on apparent nutrition total tract digestibility, enteric methane production, and Bali cattle performance.

MATERIALS AND METHODS

2.1 Livestock and Treatment diets

The study used 12 male Bali cattle (Bos sondaicus) aged 18 months with body weight ranging from 234-241 kg

Table 1. Nutritional content of treatment diets

Item	Forage	Concentrate	Supplement
Treatment diets, %DM			
Control	100	0	0
FC	75	25	0
FCS	75	22,5	2,5
FCS2	75	20	5,0
Nutritional contents, %DM			
Dry Matter	22,27	88,44	96,41
Organic Matter	90,33	92,27	87,82
Crude Protein	5,41	13,37	23,31
Neutral Detergent Fiber	58,66	40,16	27,16
Acid Detergent Fiber	37,85	21,64	13,56
Condensed Tannin	-	-	1.17

2.2 Data collection

Dry Matter Intake, Cattle were adapted to the cage environment and treatment rations for 3 days, preliminary period 9 days, and data collecting for 6 days.

Apparent Total Tract Digestibility, Data were collected for 6 days by weighing the total consumption and feces of each animal. Feces samples 5% (wet basis) of the total daily feces output were collected and placed in dry aluminum containers that were pre-weighed, sealed, and stored at -20 °C.

Methane gas production is predicted to follow (Jentsch et al., 2007):

$$y = 1.62(DCP) - 0.38(DF) + 3.78(DCF) + 1.49(DN\text{-}fe) + 1142$$

DCP = digestible crude protein (g); DF = digestible fat (g); DCF = digestible crude fiber (g); DN-fe = digestible N-freeextract (g).

Bodyweight of cattle measurement using digital cattle scales (Sonic A12-E), body weight gain was calculated from the difference between initial body weight and final body weight with a duration of 28 days.

2.3 Chemical Analysis

Samples of feed and feces that had been collected every 24 hours for 6 days were analyzed in the laboratory by proximate analysis (AOAC, 2005), while the fiber fraction content followed the method (Van Soest et al., 1991).

2.4 Data Analysis

The resulting data were tabulated and statistically processed using The Statistical Package for the Social Sciences (SPSS, Chicago, USA) by one-way ANOVA. The effects were considered significant at $P < 0.05$ and continued with Duncan's test to determine the mean difference between treatments.

RESULTS AND DISCUSSION

Tabel 2. Dry matter intake, apparent digestibility and methane production measured in Bali beef cattle

Parameters	Control	FC	FCS	FCS2	SEM	P-value
Dry Matter Intake (%BW)						
Forage	2.30	2.04	2.01	1.96	0.01	0.06
Conncentrate	0	0.60	0.60	0.49	0.09	-
Supplement	0	0	0.06	0.12	0.01	-
Total	2.16^{b}	2.64^{a}	2.67^{a}	2.56^{a}	0.07	0.02
Apparent digestibility (%)						
Dry Matter	73.74	71.47	71.59	73.02	0.51	0.06
Organic Matter	77.13	75.12	75.01	76.35	0.45	0.05
Crude Protein	35.97^{b}	56.30^{a}	55.53^{a}	57.31^{a}	3.00	0.01
Crude Fiber	77.36	76.28	68.89	78.29	2.03	0.05
NDF	66.97	66.59	67.08	67.09	2.83	0.36
ADF	67.55	60.94	60.17	64.38	1.84	0.05
Selulosa	73.13	69.37	67.20	68.09	1.82	0.08
Total digestible nutrients (TDN)						
TDN, %	67.89^{b}	72.77^{a}	72.02^{a}	74.35^{a}	0.01	0.04
TDN, g/kg BW	15.45^{b}	19.18^{a}	19.19^{a}	19.06^{a}	0.56	0.01
Methane production						
Methane, MJ/hr	10.06^{a}	10.4^{a}	9.79^{a}	8.41^{b}	0.15	0.006
Methane, MJ/kg TDN	2.68^{a}	2.15^{b}	2.10^{c}	1.79^{d}	0.01	<0.01

Table 3. Performance of growing Bali beef cattle fed the treatment diets

Parameters	Control	FC	FCS	FCS2	SEM	P-value
Initial weight, kg	248	248	244	245	5.19	0,87
Final weight 28 d, kg	259	261	261	266	5,72	0,65
Dry Matter Intake, kg/d	5.25^{b}	6.42^{a}	6.56^{a}	6.31^{a}	0,19	0,02
Average Daily Gain, kg/d	$0,37^{c}$	$0,47^{b}$	$0,59^{b}$	$0,75^{a}$	0,04	0,01
Feed:gain	$14,8^{a}$	$13,7^{ab}$	$11,3^{b}$	$8,46^{c}$	0,98	0,02

The addition of concentrate significantly increased the total dry matter intake, but did not change with the mixing of the supplements

Apparent digestibility of the total tract did not change significantly with the addition of concentrates and supplements, except for the increase in digestibility of crude protein.

Increasing Total digestible nutrients are proportion to the increase of total dry matter intake

The diets Significantly mitigated methane (CH4) gas emissions successively by adding concentrate, mixing 2.5% supplement and 5% supplementation.

The diet RSC2 produced the highest average daily gain (0.75 kg/day) which is the optimal growth of Bali cattle.
This ration is quite efficient, where every 8.46 kg of feed consumed will produce an additional 1 kg of body weight of the Bali Cattle.

CONCLUSIONS

The addition of concentrates and supplements in Bali cattle diets can increase total digestible nutrients, reduce methane gas emissions so as to increase average daily gain.

Optimal production of Bali cattle (0.75 kg/day) can be obtained with a ration of 75% Forage + 20% concentrate + 5% supplement