



ABSTRACT BOOK



The 4th International Conference
on Agriculture and Life Sciences
(ICALS)

RETOUCHING STRATEGY FOR EXPLORING POTENCY OF INDUSTRIAL CROPS FOR HEALTH IN ADAPTING TO THE NEW NORMAL ERA

FACULTY OF AGRICULTURE
UNIVERSITY OF JEMBER

POST GRADUATE PROGRAM
UNIVERSITY OF JEMBER

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Date : October 6th-8th, 2020

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Post Graduate Study Program: Tropic
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“Retouching Strategy for Exploring Potency of Industrial Crops for Health in Adapting to the New Normal Era”

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	9	Mohammad Affan Fajar Falah	Physical quality changes of dehydrated strawberry affected by different packaging in tropical environment
<p style="text-align: center;">B4</p> <p>Moderator: Tri Ratmazari, S.Si, M.Si</p> <p>Time: 15.00 - 17.00</p> <p>Presentation: 10'</p> <p>Discussion: 5'</p>	1	Lailatul Isnaini, STP	Effect of Waxing And Packaging Method on The Quality of Pontianak Siam Orange
	2	Ahmad Nafi, STP., MP	Characteristics of TVP (Texturized Vegetable Protein) From Hyacinth Bean MOLEF (Modified Legume Flour)
	3	Dr. Ramayulis, S.Pt, M.P	Rumen Undegraded Dietary Protein And TCA Soluble Protein With Gambier Leave Residue Supplementation As A Source of Tannins In Cattle Feed Supplement
	4	Dr. Asap Nurhikmat	Effects of Canning Process on Sensory Properties Indonesia Traditional Foods
	5	Dr. Ir. I Ketut Budaraga, MSi	Study of escherichia coli and salmonella sp meatball trader in bandar creating market Padang City
	6	Ayutha Wijandiyah, S.TP, M.Gizi	Portrait Of Housewives Knowledge of <i>Moringa oleifera</i> Nutrition As A Plant Based Diet In West Kotawaringin Regency
	7	Rani Sugiarni	Optimization Formula For Addition Of Pala Fruit Flour (<i>Myristica fragrans</i>) And Elephant Ginger Flour (<i>Zingiber officinale</i>) on The Making Of Cookies Using Response Surface Method
	8	Ika Fitri	The Effect Of Lime Of Dolomite And NPK Fertilizers On The Response Of Growth, Yield And Protein Content Of Black Soybean (<i>Glycine soja</i> (L.) Merr) In Acid Soil
	TOTAL PARTICIPANTS ROOM B: 35		



**Rumen Undegraded Dietary Protein and TCA Soluble Protein with Gambier
Leave Residue Supplementation as a Source of Tannins in Cattle Feed
Supplement**

Ramsiyulis

Agricultural Polytechnic of Poyakumbuh, Campus Tarjung Pati, Lima Puluh Kota, Sumatera
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Abstract

This study aims to obtain the optimal level of gambier leave residue (GLR) in cattle feed supplement based on the evaluation of rumen microbial degradation. Cattle feed supplement was prepared with isoprotein 29.53% and isoenergy 75.01% with supplementing GLR at level 0; 2.5; 5.0 and 7.5%. Rumen microbial degradation was evaluated in vitro method using cattle rumen fluid in 4 observation times of 0, 3, 6, 12, 24, and 48 hours of incubation. The results showed that the degradation of dry matter and organic matter decreased ($P < 0.05$) at the GLR level of 5.0 and 7.5% at 6, 24, and 48 hours of incubation. Crude protein degradation was highest at 3 hours of incubation and decreased significantly ($P < 0.05$) at all observation times. Rumen undegraded dietary protein and TCA soluble protein increased ($P < 0.05$) with the addition of GLR and the highest at 48 hours incubation. Regression analysis showed that the optimal GLR level in cattle feed supplement is 4.93%.

Keywords: Gambier leave residue, rumen degradation, rumen microbial, cattle feed supplement



CERTIFICATE OF PARTICIPATION

No: 3980/UN25/TU/2020

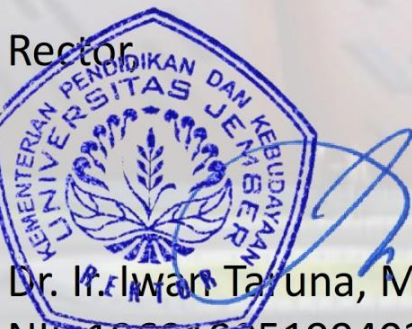
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Dr. Ramaiyulis, S.Pt., M.P

has attended as oral presenter following paper entitled:

Rumen undegraded dietary protein and TCA soluble protein with gambier leave residue supplementation as a source of tannins in cattle feed supplement

at the 4th International Conference on Agriculture and Life Sciences "Retouching Strategy for Exploring Potency of Industrial Crops for Health in Adapting to The New Normal Era" held at University of Jember, East Java, Indonesia October 6-7, 2020



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Rumen un-degraded dietary protein and TCA soluble protein with gambier leave residue supplementation as a source of tannins in cattle feed supplement

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Abstract. This study aims to obtain high rumen undegraded dietary protein and TCA soluble protein in a rations combination of forage, concentrates, and supplements. Gambier leaf residue (GLR) supplementation in cattle feed supplement contains 29.53% crude protein and 75.01% TDN energy. There were 4 treatment rations, forage (F), F + concentrate (FC), F + supplement (FS), and FCS, where the tannin concentration of 0.117% was found in the FS and FCS rations. Rumen microbial degradation and microbial protein synthesis were evaluated in vitro method using cattle rumen fluid. The results showed that GLR supplementation as a source of condensed tannins significantly reduced the rate of protein degradation in the rumen from 1.17 to 0.99% per hour. This effect has implications for the increase in rumen undegraded dietary protein (RUDP) and Peptide-N as rumen fermentation products. Rations containing supplements (FS and FCS significantly produced higher microbial biomass and microbial protein. TCA soluble N was superior in the FCS combination ration which produced the highest amount of protein for intestine sourced from RUDP and microbial protein.

1. Introduction

Beef cattle farming in Indonesia has rapid development in recent years, in line with the government's program to achieve self-sufficiency in beef and buffalo by 2022. Cattle farming in Indonesia 82.73% are small business farmers that difficulties with low livestock productivity with daily weight gain less than 0.5 kg/day due to the low quality of the ration. The rations usually consist of forage and concentrate such as bran, sago pith, cassava, and coconut pulp.

Gambir (*Uncaria gambir*, RoxB) belongs to the Rubiaceae family, which is a specific shrub from West Sumatra in Indonesia. Gambier plant processing produces gambier products as a superior export product from West Sumatra. The main components of gambier are Tannat catechu acid (20-50%), catechin (7-33%), and pyrocatechol (20-30%) [1]. Gambier processing leaves gambier leaf residue (GLR) that has not been utilized, in terms of containing 9.98% tannins of the catechin type which is classified as condensed tannins.

The role of tannins in ruminant nutrition has been widely reported that tannin can bind to a protein in the rumen so that it is protected from rumen microbial degradation which causes a decrease in the biological value of protein [2,3]. The application of tannins in rations can increase the daily weight gain of beef cattle [4]. This study evaluated the protective power of tannins against protein through supplementation of the GLR and to obtain high protein fermentation products. The hypothesis is that



the supplementation of GLR as a source of tannins can protect protein thereby increasing RUDP and TCA-soluble protein as total protein available to the small intestine.

2. Material and Methods

2.1 Ration

Treatment rations refer to rations provided by the small business farmers, 2 types of rations are commonly found, namely 100% grass and a mixture of grass and concentrate (60: 40%). Both types of rations are supplemented with the GLR which have been formulated in the cattle feed supplement with a relatively equal tannin content of 0.117% (dry basis). The rations content and nutritional analysis are shown in Table 1.

Table 1. Ration composition

Item	F	FC	FS	FCS
Ration ingredient, %DM				
Roughage	100	60	90	60
Concentrate	0	40	0	30
Supplement	0	0	9.50	9.50
Gambier leaf residue	-	-	0.50	0.50
Nutrient composition, %DM				
Organic matter	90.33	91.58	89.89	91.02
Crude protein	5.41	6.24	7.24	7.99
Neutral Detergen Fiber (NDF)	56.47	49.82	55.51	47.55
Tannin	-	-	0.117	0.117

F = forage; FC = F + concentrate; FS = F + supplement; FCS = F + C + S; DM = dry matter

2.2 In vitro analysis

In vitro rumen analysis followed the Krishnamoorthy procedure [5]. The treatment ration was mashed with a 1 mm sieve and then weighed 2.5 grams and then put it in 250 ml Erlenmeyer tubes. Then add 250 ml of a mixture containing buffer solution (9.8 g NaHCO₃, 4.62 g Na₂HPO₄, 0.57 g KCl, and 0.12 g MgSO₄/ liter) and rumen fluid with a ratio of 4:1 (v/v). To create an anaerobic condition in the rumen, CO₂ gas is sprayed for 5 seconds to the Erlenmeyer then is closed with a rubber which is given a nipple. The incubation was carried out for 48 hours at 39 °C using a shaker water bath (Precision, USA). Fermentation was stopped at the end of the incubation time by immersing Erlenmeyer in cold water 3-5 °C for 5 minutes.

All contents of Erlenmeyer were separated by centrifuge at 3,000 rpm for 5 minutes. The filtrate was used for NH₃-N analysis using the Conway micro diffusion method [6] and the residue was washed 3 times with 0.85% NaCl solution, then dried at 60 °C. Protein content was measured by the Kjeldahl method [6] and the difference between the sample protein and the residual protein was protein degraded. Microbial biomass was measured following the Griswold method [7] by centrifuging the filtrate at 15,000 rpm for 30 minutes at 4 °C and the biomass obtained was analyzed for protein by the biuret method using a 540 nm UV spectrophotometer with bovine serum albumin (BSA) as standard. TCA-Soluble protein was measured by the ICARDA method [8] using trichloroacetic acid (Brand Darmstadt, Germany).

2.3 Statistic

Data obtained from laboratory analysis were tabulated and analyzed using SPSS 22 software (IBM, USA) with the F test comparing the mean value on one-way ANOVA. The difference in the mean value is significant if the P-value is <0.05 then a further test is carried out with the turkey test.

3. Results and Discussion

Table 2. Protein degradation, microbial protein, and protein to the intestine of ration by rumen in vitro

Parameter	F	FC	FS	FCS	SEM	P-value
Protein Degradation						
Degradation rate, %/ hr	0.82 ^b	1.17 ^a	1.12 ^a	0.99 ^b	0.03	0.003
Degraded, %	38.34 ^c	55.01 ^a	52.38 ^a	46.31 ^b	1.64	0.003
Ruminal NH ₃ -N, mg/dl	2.34 ^b	2.94 ^b	4.51 ^a	4.57 ^a	0.17	0.002
Rumen Microbial Protein						
Protozoa, cellx10 ⁴	9.485 ^b	18.970 ^a	9.462 ^b	19.874 ^a	3.26	0.047
Microbial Biomassa, mg/dl	120 ^b	114 ^b	189 ^a	169 ^a	9.12	0.004
MPSE, mg MP/ g BOT	8.37 ^c	6.84 ^c	13.51 ^a	10.60 ^b	0.65	0.003
Nett Protein to Intestine						
Peptide N, mg/dl	9.63 ^c	26.17 ^a	15.00 ^b	24.54 ^a	1.33	0.002
RUDP, mg/ml	31.67 ^a	24.17 ^b	37.03 ^a	34.19 ^a	1.22	0.003
Microbial protein, mg/dl	63.45 ^b	92.40 ^a	103.35 ^a	92.62 ^a	4.92	0.006
TCA-soluble N, mg/dl	74.80 ^c	151.89 ^b	121.98 ^b	181.93 ^a	1.19	0.002

Superscript = significant (P<0.05); SEM = standard error of means; F = forage; FC = F + concentrate; FS = F + supplement; FCS = F + C + S; DM = dry matter; DOM = digestible organic matter; MPSE = Microbial protein syntesis efficiency; RUDP = Rumen undegraded dietary protein

3.1 Protein degradation

Tannins in the rumen form a tannin-protein complex that is resistant to microbial proteolysis enzymes [9]. The tannin content of the FS and FCS rations was found to be effective in inhibiting protein degradation in the combined ration of forages, concentrates, and supplements (FCS). The rate of protein degradation by microbes in the rumen was significantly higher in the FC and FS rations compared to F and FCS which had implications for the amount of degraded protein. Degradation of crude protein into peptides and amino acids which are then deaminated to ammonia, the high rate of protein degradation in FC and FS does not cause high ammonia in the rumen but high ammonia in FS and FCS is related to the urea content in the supplement on FS and FCS rations.

3.2 Rumen microbial protein

The supply of soluble carbohydrates in concentrate (FC and FCS) has been a higher protozoan population in the rumen. Supplementation of GLR containing tannins in FS and FCS rations (0.117% tannin content) was not able to suppress the protozoa population in the rumen. Microbial biomass is bacterial biomass in rumen fluid, significantly higher in rations with the addition of a supplement both on forages (FS) and concentrate (FCS), but the efficiency of microbial protein synthesis was significantly the highest in the FS ration. Other researchers reported the microbial biomass in the rumen fluid of cattle normally ranges from 118 to 148 mg/dl [10]. In connection with the lower NH₃-N concentrations in the F and FC rations, it resulted in lower efficiency of microbial protein synthesis in both rations.

3.3 Nett Protein to Intestine

The role of tannins in protecting proteins from microbial degradation in the rumen is indicated by the high peptide N found in the FCS ration, this is also seen in the high RUDP, and both going to be available to the intestine. The lowest microbial protein was found in rations of 100% forage (F) and significantly increased when added with concentrates and or supplements. The final results of both RUDP and microbial protein with bound to TCA-soluble protein as a total protein that enters the small intestine were found to be the most superior in rations with a combination of forage, concentrate, and

supplement (FCS). The tannin-protein complex can be broken down again due to changes in pH in the abomasum and intestine [11] so that it can be digested and absorbed by ruminants.

4. Conclusion

supplementation of gambier leaf residue as a source of condensed tannins in the ration at a concentration of 0.117% can reduce the rate of protein degradation by microbes in the rumen. The addition of supplements can increase the microbial biomass and supply of microbial protein along with RUDP available to the intestines of ruminants. TCA soluble N derived from RUDP and microbial protein as total protein available in the intestine was found to be the highest in rations with a combination of forages, concentrates, and supplements

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