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Bogor Agricultural University

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP Tropical Bio-resources for Sustainable Development Role of Innovation to Enhance German Alumni in Scientific and Professional Capacities"

Editors:

Syarifah Iis Aisyah
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PROCEEDINGS OF THE INTERNATIONAL WORKSHOP TROPICAL BIO-RESOURCES FOR SUSTAINABLE DEVELOPMENT

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“Role of Innovation to Enhance German Alumni in Scientific and Professional Capacities”

13-15 August 2014
Bogor, Indonesia

Editors

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PREFACE

I am very honoured and very pleased to have this 6th SEAG International Workshop, which is organized by SEAG (South East Asia-Germany) Network-Indonesia, in collaboration with CDA (Career Development and Alumni Affairs), Bogor Agricultural University. SEAG is an Alumni-networking group, which was established in year 2000, in countries in South-East Asia.

In 1999, the Federal Ministry for Economic Cooperation and Development (BMZ) and the German Academic Exchange Service (DAAD) have been systematically supporting alumni networks of graduates from German Universities. The University of Goettingen, Kassel and Marburg have established an alumni consortium to support and maintain efficiently local and national alumni networks in Egypt-Arab-Region (GEAR), in Latin America (ReCALL), in Iran (GIAN) and in South East Asia (SEAG).

The objectives of the alumni networks are to establish an alumni database and to facilitate the exchange of scientific experiences among the alumni and their colleagues in German Universities in Germany, and finally to create and maintain local and national alumni network. In order to achieve these goals, the consortium uses many activities, such as organizing symposium, mini workshop, international workshop, school, etc.

In Indonesia, some Mini Workshops had been done several times and were taken place in many universities in different provinces. The first mini workshop had been done in Brawijaya University, Malang, East Java, in 2003 for those alumni who work in Agriculture economy. The second was executed in Soedirman University, Central Java on May 2004 for Agriculturalist, and the third SEAG mini workshop was conducted in Bogor Safari Bogor, May 2005 for Animal scientist. The fourth was in Himpunan Alumni Universitas Langi University – North Sulawesi, for the society of forester, with the theme of Developing Public Awareness through Sustainable Forest Management. The fifth was conducted in USU (North Sumatera University) for Agricultural Technology, in November 2006. The Sixth was in Bogor for horticulturist, on May 2007.

As scientists or researchers who gained education, training or part of it in Germany, we should play a role as key person in our scientific society. German members from Germany also believe that their support can only be

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ely provided if it is based on cooperation with key local players. ore development cooperation is very essentially dependent on ring and integrating such key persons. Indeed, as German alumni, we show an effort to support for economic, technological and social mation processes in our countries.

f us hold important positions in government, in the administration, essage and industry and in academia. We may act as multipliers and nators in and within our societies. We should also introduce the e specialist knowledge, provide motivation for innovation and ee cooperative capabilities in dealings with local and foreign s. That is why we explore the theme of Tropical Bio-resources for able Development: The Role of Innovation to Enhance German in Scientific and Professional Capacities, for this workshop.

ppreciation is conveyed to the organizing committee from SEAG- ia and CDA IPB for the effort to conduct this workshop. The very thank is delivered to the German Academic Exchange Service) for continues support financially and many other aspect give us ble opportunities to learn from each other, to improve individual and on competences, and to experience a lot of things across universities.

Syarifah Iis Aisyah

SEAG INDONESIA
CDA IPB

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Influence of different supplemental niacin levels on intake, digestibility and rumen fermentation of dairy cows: a meta-analysis

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Abstract Rumen microbes can synthesis niacin but at fewer amount. Niacin occasionally supplemented into dairy cows' ration to improve their production performance especially during early lactation period. The present study was aimed to assess the effect of different supplemental niacin levels on intake, digestibility and rumen fermentation of dairy cows through meta-analytical study. A database was constructed from published literatures reporting niacin supplementation on dairy cows. A total of 49 studies from 46 published articles were integrated into the database. Different niacin levels at various supplemental levels were specified, i.e. 0-24 mg; nutrient intake and rumen fermentation parameters were integrated as well. Data were analyzed by a mixed model methodology in which different studies were treated as random effects whereas niacin levels were treated as fixed effects. The significant effect was stated when $P < 0.05$. When a parameter showed $0.05 < P < 0.1$, then the effect was considered to be a tendency to be significant. The results showed that different levels of niacin supplementation did not significantly influence nutrient intake, digestibility and rumen fermentation of dairy cows ($P > 0.05$). It is concluded that supplementation of niacin has less effect in improving intake, digestibility and rumen fermentation.

Keywords meta-analysis, niacin, concentration, dairy cow

Introduction

Dairy cows require supplementation of niacin in the diet at sufficient levels because the rumen microbes can produce niacin in small amounts only. Niacin plays a role in generating energy in the Krebs cycle (ATP cycles) [1]. Energy deficiency leads to body fat mobilization of dairy cows to be used for energy and then increases beta-hydroxybutyric acid concentration; this condition stimulates ketosis, a metabolic disorder, to occur [2]. It is

that niacin supplementation can overcome the negative energy balance of dairy cows especially during early lactating period. This study aimed to know the influence of niacin supplementation levels on intake, body weight and rumen fermentation profiles of lactating dairy cows by meta-analysis method.

Materials and Methods

Case development

This study was developed from published literatures reporting addition of niacin at various levels on nutrient intake, digestibility and rumen fermentation of lactating dairy cows. Literature search was conducted using online search engines, i.e. Google scholar and Scopus to collect articles using the keywords “niacin” and “dairy cow”. Accordingly, levels of niacin supplementation were specified in the database. After collection of articles, a total of 49 studies from 46 published articles with the above-keywords were obtained; the articles were published from 1981

Statistical analysis

The data obtained were subjected to a statistical meta-analysis based on random effect methodology [3, 4]. The model used was linear model, with niacin supplementation levels as fixed effects and different studies as random effects. The following model was employed:

$$Y_{ij} = B_0 + B_1X_{ij} + s_i + b_iX_{ij} + e_{ij}$$

where Y_{ij} = dependent variable, B_0 = overall intercept across all studies (fixed effect), B_1 = linear regression coefficient of Y on X (fixed effect), X_{ij} = the continuous predictor variable (niacin supplementation level), s_i = random effect of study i , b_i = random effect of study i on the regression of Y on X in study i , and e_{ij} = the unexplained residual error. Statistical tests used were P-value and Akaike information criterion (AIC). The significance of an effect was stated when P-value <0.05. Additionally, when P-value between 0.05 to 0.1, an effect was stated as a tendency to be significant. All statistical analyses were performed with SAS Software

Results and Discussion

1. Influence of niacin supplementation on intake and digestibility of dairy cows

The effects of niacin supplementation levels on dry matter intake (DMI), dry matter digestibility (DMD), organic matter digestibility (OMD), crude protein digestibility (CPD), neutral detergent fiber digestibility (NDFD) and acid detergent fiber digestibility (ADFD) were insignificant (Table 1). In another study, supplementation of niacin at different levels increased rumen microbial population and nutrient degradation in the rumen. Niacin supplementation at 0.75 to 3.75 g/cow/d increased cattle growth by 0.7 to 0.9%; however, supplementation of niacin above 7.5 g/cow/d caused negative effects on the performance [1]. The present meta-analysis reveals that niacin supplementation does not produce consistent results. A plausible explanation is that the supplementation may effectively contribute to dairy cows only during a certain lactation period, most probably in early lactation, not the whole.

Table 1. Intake and digestibility of dairy cows on different supplemental niacin levels

Response parameter	Unit	N	Parameter estimates				Model statistics	
			Intercept	SE	Slope	SE	P-value	AIC
			Intercept	Slope				
DMI	kg/d	85	21.1	0.88	-0.013	0.014	0.340	360.8
DMD	%	14	65.3	2.07	-0.034	0.063	0.609	66.0
OMD	%	7	71.3	1.89	-0.144	0.093	0.220	32.5
CPD	%	9	53.4	11.52	-0.088	0.072	0.312	50.9
NDFD	%	20	43.6	6.69	-0.102	0.126	0.433	126.3
ADFD	%	22	42.2	4.12	-0.065	0.114	0.582	133.9

DMI, dry matter intake; DMD, dry matter digestibility; OMD, organic matter digestibility; CPD, crude protein digestibility; NDFD, neutral detergent fiber digestibility; ADFD, acid detergent fiber digestibility; N, number of data; SE, standard error; AIC, Akaike information criterion.

2. Influence of niacin supplementation on rumen fermentation of dairy cows

Results of meta-analysis showed that niacin supplementation did not affect rumen fermentation, i.e. VFA profiles and ammonia concentration (Table 2). It appears that niacin has less effect for rumen microbes, but the effect is more obvious for the host animals. Other authors reported that niacin supplementation affected the production of total VFA and acetate and propionate, but had minimal influence on butyrate production [5]. Niacin supplementation can improve rumen microbial population and, hence, such supplementation may increase fermentation of feed in the rumen especially

...e [2] and can improve the fermentation of carbohydrates, thus
...g production of total VFA [6]. It might be that different results in
...rmentation is due to the influence of the different treatment,
...ent total VFA from rumen fluid and the type of feed given to dairy

...nfluence different supplemental niacin levels on rumen
...fermentation of dairy cows

Unit	N	Parameter estimates				Model statistics	
		Intercept	SE Intercept	Slope	SE Slope	P-value	AIC
mM	23	129.3	18.31	0.610	0.544	0.283	200.0
%	16	63.7	2.16	-0.017	0.053	0.760	68.8
%	16	21.3	1.83	0.021	0.043	0.638	63.6
%	16	3.1	0.36	-0.003	0.007	0.731	18.1
%	16	11.2	0.44	-0.002	0.023	0.950	40.5
%	16	97.9	18.18	-0.324	1.056	0.766	150.6

...le fatty acid; C2, acetate; C3, propionate; C2/C3, acetate to propionate ratio;
...onia concentration; N, number of data; SE, standard error; AIC, Akaike
...riterion.

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