USING RED ONCOM (*NEUROSPORA SITOPHILA SPP*) AND BLACK ONCOM (*RHIZOPUS OLIGOSPORUS*) IN FEED FORMULATION ON PERFORMANCE AND INTESTINAL PROPERTIES OF BROILER

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ABSTRACT

The purpose of this research was to determine the dietary effect of red oncom (Neurospora sitophila spp) and black oncom (Rhizopus oligosporus) on performance and intestinal properties of broiler in different levels. The materials used for this research were 100 unsex broiler (20 days old) with Lohmann strain. Method was used in this experiment was Completely Randomize Design with 5 treatments and 4 replications. The treatment were as follows, T0: basal diet without additive, T1: basal diet + (0.25% red oncom (Neurospora sitophila spp) and 0.25% black oncom (Rhizopus oligosporus), P2: basal diet + (0.5% red oncom (Neurospora sitophila spp) and 0.5% black oncom (Rhizopus oligosporus), T3: basal diet + (0.5% red oncom (Neurospora sitophila spp) and 0.25% black oncom (Rhizopus oligosporus), and T4: basal diet + (0.75% red oncom (Neurospora sitophila spp) and 0.5% black oncom (Rhizopus oligosporus). The result showed that red oncom (Neurospora sitophila spp) and black oncom (Rhizopus oligosporus) has significantly enhanced ($p<0.05$) on intestinal properties. It can be concluded that red oncom (Neurospora sitophila spp) and black oncom (Rhizopus oligosporus) in feed gives a positive result on the broiler intestinal properties.

Keywords: *Fermentation, crypt depth, tempeh, villus height*

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INTRODUCTION

Oncom is a traditional food Indonesia from Java West (Agustiningsih, 2002). Oncom is a source of nutrition potential for society, because with the fermentation process, then the structure chemical materials that were complex, will break down into compounds simpler ones so more easily digested and utilized by body (Koni *et al.,* 2013; Hidanah and Widjaja, 2010; Babu *et al.,* 2009). Waste are derivation by product of processing that still containing a lot nutrient (Putri and Setiawati, 2008). Therefore, it is necessary to use that red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) as broiler feed. The advantage of using red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) is a high starch content (Amalie, 2019).

Currently there are two types of oncom, namely red and black oncom. Second difference the type of oncom lies in the type the microbial. Oncom red is produced by *N. sitophila* microbes that have strains red. While black oncom is produced by *R. oligosporus* microbes that have black strain (Mahfudz, 2006; Zaman, 2013). Red or black oncom is determined by color pigments produced by microbes that are used in the fermentation process. Microbes' oncom can secrete lipase and enzymes proteases that are active during the fermentation process and plays an important role in decomposition of starch into sugar (Adli *et al.,* 2018).

However, animal feed sourced from waste has a low nutritional value that is high in crude fiber, low nutritional energy and crude protein being a limiting factor in its use. Previous studies explain the increase in crude fiber content in feed which accelerates the flow of diets in the digestive tract to be fast (Adli and Sjofjan, 2018). Provision of agricultural waste is not negative on growth, feed consumption and Feed Convertion Ratio (Adli *et al.,* 2019).

MATERIAL AND METHODS

A total of 100 (male and females) one-day-old Lohmann broiler were randomly allocated to 5 dietary treatments and 4 replicates. The cage that is used using a stage cage consists of 20 flocks. Each flock cage is filled with 5 Lohmann broiler aged 20 days, the cage is equipped with a place to drink and feed. The food and drinking water used in the study was administered *ad-libitum*. Red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) is obtained from Tasikmalaya, Regency, and West Java Indonesia which through several processes include counting the oncom, drying, and grinding it into flour.

Experimental design

The method used in this study was a field experiment with a completely randomized design (CRD) with 5 treatments and 4 replications and each of them consisted of 5 broilers. The treatments given are T0: base formulated feed without oncom, T1: base formulated feed + (0.25% red oncom (*Neurospora sitophila spp*) and 0.25% black oncom (*Rhizopus oligosporus*), T2: basal diet + (0.5% red oncom (*Neurospora sitophila spp*) and 0.5% black oncom (*Rhizopus oligosporus*), T3: basal diet + (0.5% red oncom (*Neurospora sitophila spp*) and 0.25% black oncom (*Rhizopus oligosporus*), and T4: basal diet + (0.75% red oncom (*Neurospora sitophila spp*) and 0.5% black oncom (*Rhizopus oligosporus*). The formulation of feedstuff consisted: maize, dehulled soya bean meal, L-lysine, DL-Methionine, Di calcium Phosphate, Premix mineral, vitamin mineral, choline, limestone, soyoil, and oncom. Feed was reformulation using software.

Data analysis

Data were subjected using SAS Academic online, if there is differences among treatments ($p < 0.05$) were continued using Duncan multiple range test (Albright *et al.,* 2011)

Table 1. Ingredient and nutrient composition of the diet

Feed nutrient	Starter (1-21 days)	Finisher (22-35days)
Maize	57.11	69.66
Dehulled soybean meal	36.53	26.65
L-Lysine	0.1	0.1
DL-methionine	0.55	0.55
Dicalcium phosphate	1.67	1.55
Limestone	1.13	1.02
Salt	0.3	0.3
Soy oil	2.81	0.06
Vitamin premix*	0.05	0.05
Mineral premix**	0.05	0.05
Choline	0.1	0.1
	100	100
Dry matter (%)	87.00	87.00
ME (Kcal/kg)	3050	3150
Ash (%)	9.00	9.00
Crude protein (%)	22.00	18.00
Fat (%)	6.00	6.00
Crude fibre (%)	3.00	2.50

T0: base formulated feed without oncom,

T1: basal diet + (0.25% red oncom (*Neurospora sitophila spp*) and 0.25% black oncom (*Rhizopus oligosporus*),

T2: basal diet + (0.5% red oncom (*Neurospora sitophila spp*) and 0.5% black oncom (*Rhizopus oligosporus*),

T3: basal diet + (0.5% red oncom (*Neurospora sitophila spp*) and 0.25% black oncom (*Rhizopus oligosporus*), and T4: basal diet + (0.75% red oncom (*Neurospora sitophila spp*) and 0.5% black oncom (*Rhizopus oligosporus*).

Performance measurement

The broiler performance were calculated every week on weight gain. Feed gain ratio were calculated amount feed consumption a certain period. Each week are calculated on body weight gain at 0, 7,14,21,35 days. (Sjofjan *et al.*, 2019).

Intestinal measurement

Intestinal measurement were sample taken from intestinal approximately 12 cm of duodenum, jejunum, and ileum. Moreover, Hematoxylin eosin staining are conducted to recorded the sample result.

RESULTS AND DISCUSSION

Data on comparation red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) in feed showed in Table 2. Giving Red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) meal doesn't improved ($p > 0.05$) on FI, FCR, and BWG. Sjofjan et al (2020) explained that the body weight of poultry to be determined would be determined by the consumption of feed with a balanced energy and protein content. The description proves the fermentation product with carotenogenic mold Neurospores have good nutritional value and can be utilized as a well-marked source of poultry nutrition with the same productivity as the treatment control or increase, so it can be used as alternative feed ingredients to replace some conventional feed.

Result of crypth depth are reflected from amount feed inside (Widiyawati et al 2020). Statistical analysis of the meat quality presented in table 3. Shows that red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) in feed on the intestinal properties in villus height and

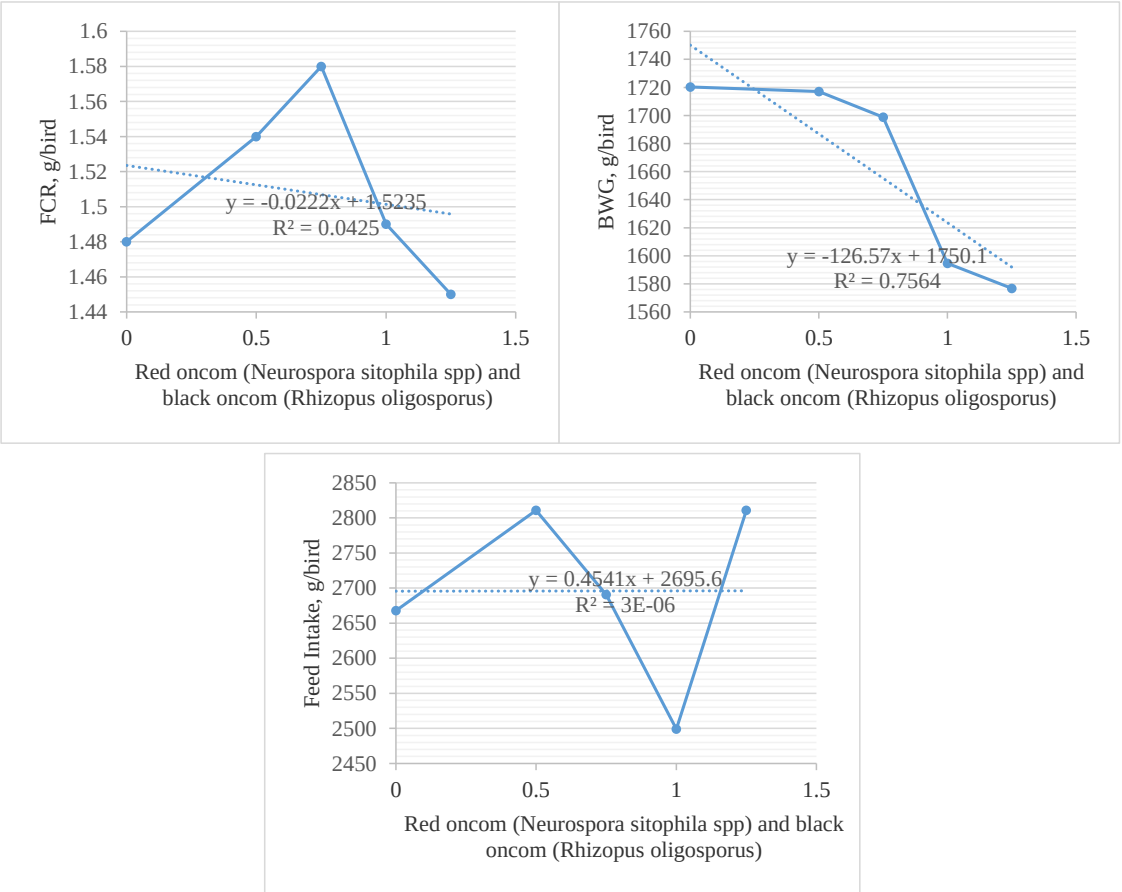
crypt depth (p< 0.05) on broiler. Villus height in jejunum tissue increase is a positive indicator of intestinal health and increased of absortive area.

The level addition of a probiotic to broiler increased the villus height leading to increased intestinal surface area and therefore to an increased digestion and absorption of nutrients in the basal diet. Thus, the increasing of villus height theorically from decreased intestinal cell turnover and gene expression (Sujono, 2001). According to Sjofjan et al (2020) factors that affect heart weight are broiler body weight, age, broiler activity and gender. A shallow crypth is positive factors for development of an immunal status and efficient for small intestine. With a lower renewal rate, the cells in the intestinal become mature and allowing more efficient digestive enzyme production and absorption (Kasiman, 2019). A variety of indigenous fermented foods exist today; however, oncom has been one of the most widely accepted mold-modified fermented products.

Table 2. Effect of red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) in feed on the performance

Item	T0	T1	T2	T3	T4	SEM	*p* value
FI, g/bird	2668	2810.8	2690.80	2499	2810.80	42.10	1.26
FCR	1.48	1.54	1.58	1.49	1.45	0.37	0.03
BWG, g/bird	1720.33	1717	1698.86	1594.64	1576.78	21.33	0.34

[a-b] Means within row followed by different superscript differ at p<0.05, BWG (body weight gain), FI (feed intake), FCR (feed conversion ratio), BWG (body weight gain)



Ingredients (Mahfudz, 2006).

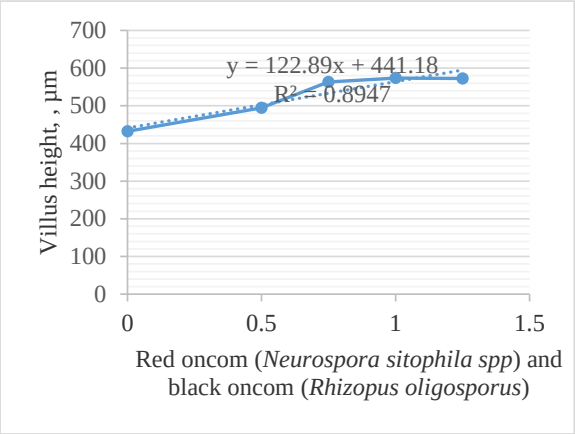
Figure 2. Effect of Effect of red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) on FCR and BWG

Table 3. Effect of red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) in feed on the intestinal properties

Item	P0	P1	P2	P3	P4	SEM	*p* value
Villus height, µm	432.25^{c}	494.25^{bc}	563.50^{ab}	573.25^{a}	572.5^{a}	5.14	0.25
Crypth depth µm	133.75^{bc}	158.75^{a}	152.50^{ab}	153.50^{ab}	157.75^{a}	2.82	0.73
VH/CD	5.57	7.06	6.35	6.06	5.23	0.63	0.24

$^{a-b}$ Means within row followed by different superscript differ at $p<0.05$

Oncom is a local resources feed produced by fermentation process, with good of protein and nutritious are good (Vital *et al.*, 2018). It also has a high content of carbohydrates, calories, and a good sourceof fibers, being an excellent product for energy intake, and if inserted in a balanced diet, it may act as intestinal regulator (Kasiman, 2019). Continuous scientific research is necessary to identify beneficial components, their mechanisms of action, function, nutritional aspects (Vital *et al.*, 2018). Oncom can be produced by using local or native beans, giving alternative to specific feed (Mahfudz, 2006; Zaman, 2013).



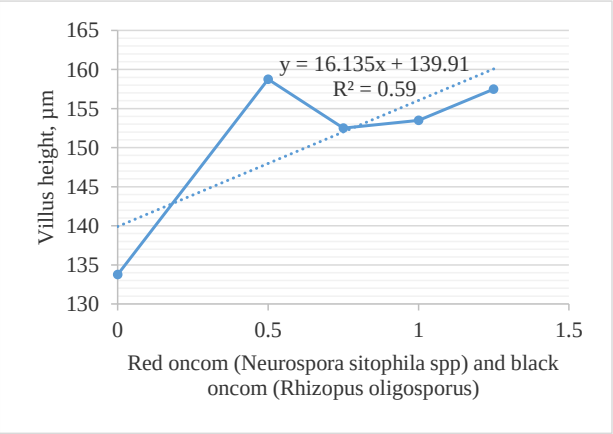


Figure 4. Effect of red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) on Villus height, µm

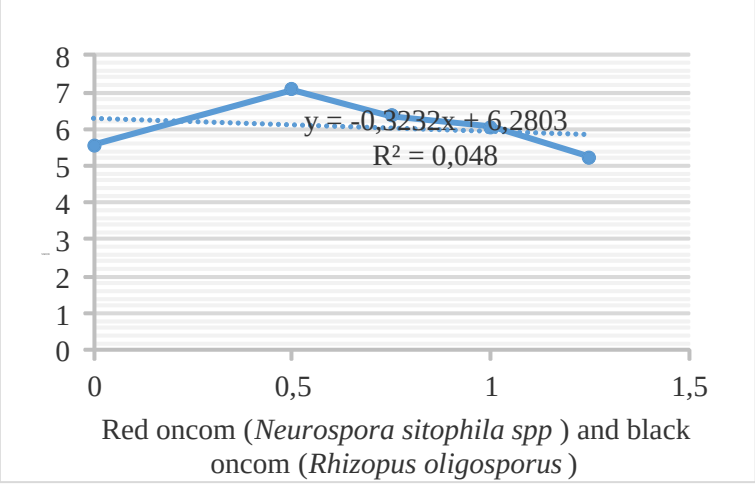


Figure 5. Effect of red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) on Villus height, µm

CONCLUSION

It can be concluded that red oncom (*Neurospora sitophila spp*) and black oncom (*Rhizopus oligosporus*) in feed gives a positive result on the broiler intestinal properties.

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