CORRELATION BETWEEN SEX AND ADDITIVE ON BLOOD BIOCHEMISTRY OF BROILER

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ABSTRACT

The correlation between sex and additive on blood biochemistry, and gut morphometric of broiler was investigated. First experiment were day-old-chicks of Ross 308 placed among control and experimental. The first experiment were used 56 Ross 308 broiler with aged 35 days including 28 males and 28 females as control, and 28 males and 28 females supplemented with or without probiotics. The second experiment were used non-linear models of Gompertz models to predict between sex and probiotic effect on the growth performance. The data analyses were uses two-way of variance between probiotic and sex (male-female). At the end experiment (35 aged d) thus probiotic and sex were significant difference ($p > 0.05$) on live weight (g), glucose (mg/dL), and villus height (µm). Data were statistically analyses using of SAS University version 4.0 red hat (64-bit). To sum up, the interaction between group × sex was significant for body weight (g), villus height (µm) and trends reduce amount of glucose (mg/dL) of broiler and non-linear models were effective to comparison between in vivo and predicted models.

Keywords: *Broiler, female, linear regression, probiotic, sex.*

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INTRODUCTION

At the quarter fourth of 2021 the price of the broiler were increasing in Indonesia. The consumption are mirroring from key consumption in Indonesia that broiler are fulfilled as a cheap protein. With regard of this condition all sector including feed sector ought to be aware of this condition (Adli *et al.,* 2018). Consequently, the price of feed are increasing of each time. For example feed mill were always increasing start at 100,- / kg IDR. On each raw material of the feed are consisted feed additive. One additive is called probiotic. Probiotic is amount of microorganism that stimulated and do technologies engineering to support in feed. Since early of 2018 our government also following European Union to banned used of antibiotic growth promoters in feed 2018 (Adli and Sjofjan, 2020a;b;c).

Probiotic are hopefully given significant effect to growth performance of broiler. Nowadays, our researchers are do the small research when separated the sex between male and female in research. Surprisingly findings, Adli *et al.,* (2019) if we separated the male and female sex in the research would be detailed in results. In 2022, our industries were faced into smart farming technology but the research are low when doing this research. Gompertz is one of base algorithm that can help to compared between in-vivo test (Masoudi and Azarfar, 2017). The Gompertz were statistical linear models which are used to define animal body of animal were used to finding broiler body weight. Therefore, were to find interaction influence between of sex and correlation between sex and additive on blood biochemistry, and gut morphometric of broiler.

MATERIAL AND METHODS

A total of 112 (Ross308) broiler with BW of 37.23± 5.33 gram set for fifth week of in vivo study. The broiler (male and females) were separated gender. The pens designed a randomized completed design. All broiler were keeping in an environmentally controlled with fan intermittent and heater.

The housing relatively temperature and humidity among 29°C and 64%, respectively. The rice hull-littered floor pens with height of 3.3 (1.7 x 1.7) m2 per pen. The lighting program was set at 23 L and 1 D).

Experimental design

Experimental design began with two treatments and four replicates as control and experimental while, sex act as an male and female. The probiotics are divided into four types (table 2).

The formulation of feedstuff consisted: maize, dehulled soya bean meal, L-lysine, DL-Methionine, Di calcium Phosphate, Premix mineral, vitamin mineral, choline, limestone, soy oil. Feed was reformulation using software.

Data analysis

The data collected and test using software SAS and differences among treatment and interaction were continuing with turkey test ($p < 0.05$).

Probiotic content analyses and blood measurement

The profile of probiotic (table 1) of the Probiotic enhanced liquid acidifier and Probiotic enhanced mannan rich fractions were used quantitative agar technique method (petri dish method). About (ranging from 10^{-3} to 10^{-5}) and then streak onto MacConkey agar plates (Difco Laboratories, Detroit, MI, USA) for the enumeration of *Streptococcus thermopiles. Lactobacillus, bacillus spp, bacillus subtilis,* and *Lactococcus sp* (Medium 222; DSMZ, Braunschweig, Germany). The *Saccharomyces cerevisiae* yeast using chloramphenicol medium. Finalizes, plate was incubated for 24 hours at 37°C (Gao *et al.,* 2017). at the end of period the blood samples were collected from vein of wing and put into EDTA. Immediately centrifuged at 3000 rpm.

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Table 1. Raw feed and feed formulation during time of experimental

Feed nutrient	Starter (1-21 days)	Finisher (22-35days)
Maize	56.22	68.76
Imported soya bean	36.21	26.65
Betaine	0.54	0.55
Sodium bicarbonate	1.67	1.55
Broken limestone	1.13	1.02
Salt	0.3	0.3
Palm oleate	2.81	0.06
Custom vitamin mix	0.05	0.05
Custom mineral mix	0.05	0.05
	100	100
Dry matter (%)	91.05	86.22
ME (Kcal/kg)	3050	3150
Ash (%)	9.00	9.00
Crude protein (%)	21.00	18.00
Fat (%)	6.00	6.00
Crude fibre (%)	3.00	2.50

Table 2. Microbial profile of probiotics

Determination target	Cell count (cfu/ml)	
	Probiotic enhanced liquid acidifier	Probiotic enhanced mannan rich fractions
Lactobacillus spp	1.0×10^{8}	3.2×10^{10}
Bacillus spp	2.6×10^{5}	8.1×10^{6}
Lactococcus spp	2.5×10^{9}	2.3×10^{7}
Bacillus subtilis	6.5×10^{11}	2.1×10^{9}
S. cerevisiae	5.5×10^{10}	1.0×10^{8}

RESULTS AND DISCUSSION

According to the Table 3 shows that the GOT and GPT result control males broiler were 214 U/L (0.85%; GOT vs. 0.9% GPT) lower than females from the same group, whereas experimental males broiler blood biochemistry result 184 U/L (0.85%; GOT vs. 0%; GPT) more than experimental females. In both groups, glutamic oxaloacetic transaminase; glutamic pyruvic transaminase; triglyceride; total cholesterol; glucose did not significant ($p < 0.05$) greater numerically trends in females than in males. However, the group × sex interaction was not significant ($p < 0.05$) for among parameter. The Glucose result were significant difference ($p > 0.05$) showed in the table the positive trends result between control and experimental numerically with result in average (215.25 vs 200 mg/dL).

The result of triglyceride and total cholesterol were not significant ($p < 0.05$) result numerically but help to reduce the number. According to Abbas et al., (2018) stated different levels of treatment probiotics on some serum biochemistry showed serum glucose concentration and serum total protein concentration was greater significance ($p <0.05$) with increasing levels of probiotic supplementation in feed. Serum urea concentration and Serum creatinine concentration were not significantly

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different (p > 0.05). Blood serum glucose and serum total protein concentrations tended to be higher (p < 0.05) in the protexin supplemented treatments. Additional reports from Adli and Sjofjan (2020) stated the probiotics can't help increasing the amount of TCHOL, BUN, GLC due the consistencies of probiotic secreted the acid. Based on the experimental used the natural resources to increase the nutritive value of the feed e.g. *Lactobacillus, Bifid bacterium, Bacillus sp., Streptococcus, yeast, and Saccharomyces cerevi*ciae and metabolite as basic to produce the probiotic. The total bacteria that can providing the immunity balance are 3.2 x 10^{10} CFU/g, in otherwise *Lactobacillus* are probiotics that can survive in the acid condition, intestinal due to function of *Lactobacillus* to covered the mucosa and produce the pathogen anti-microbes (Wang *et al.*, 2018).

Table 3. Selected blood biochemistry of broiler in 35-day-old

Group	Sex (n=56)	GOT (U/L)	GPT (U/L)	TCHOL (mg/dL)	TGL (mg/dL)	GLC (mg/dL)
Control	Male	214	2.25^{a}	154.00	86.25	215.25^{b}
	Female	251.25^{b}	2.50	148.00	170.25	247.25^{ab}
	Avg	232.62	2.37	151.00	128.25	231.25^{ab*}
Experimental	Male	184	1.75^{ab}	138.75	93.00	200.00^{b}
	Female	214.25^{b}	1.75	129.75	198.25	229.75^{b}
	Avg	199.12	1.75	134.25	145.62	249.75^{b*}
Pooled SE		23.57	0.61	11.15	41.67	0.64
Group		0.212	0.444	0.22	0.123	0.23
Sex		0.34	0.233	0.33	0.234	0.111
Group x sex		0.221	0.111	0.22	0.212	<0.001

GOT: glutamic oxaloacetic transaminase; GPT: glutamic pyruvic transaminase; TGL: triglyceride; TCHOL: total cholesterol; GLC: glucose

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

Table 4. Gut morphometric of broiler in 35-day-old

Group	Sex (n=56)	Villus height (µm)	Crypt depth (µm)	VH/CD Ratio
Control	Male	537.50^{b}	117.00	4.75
	Female	686.75^{a}	113.00	5.86
	Avg	612.12	115.00	5.30
Experimental	Male	753.50^{a}	107.25	7.02
	Female	646.75^{ab}	99.50	6.50
	Avg	700.12^{a*}	103.37	6.76
Pooled SE		67.44	41.70	1.60
Group		0.222	0.445	0.866
Sex		0.123	0.233	0.912
Group x sex		0.331	0.123	0.638

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

According to the Table 4 shows that result of the gut morphometric of the control male's broiler were 537.50 µm (0.78%) lower than females from the same group, whereas experimental male's broiler weighed 700.12 µm (1.16%) more than experimental females and give significant difference (p > 0.05). The group × sex interactions for villus height, crypt depth, and VH/CD ratio were no significant difference (p < 0.05) (Table 6). The data listed in Table 6 showed that the use of two kind probiotic did not have a significant effect (p < 0.05) on crypt depth and VH/CD ratio. In both groups, crypt depth and VH/CD ratio were did not significant ($p < 0.05$) greater numerically trends in males than in females. However, the group × sex interaction was not significant for the above parameter. In the experiment, the gut morphometric were average increase rather than crypth depth and VH/CD ratio. The genes may correlation with the sex in this experimental. In addition, the brush border were potential reason increased the gut morphometric area of broiler since it separated between sex and probiotic. Compared with Porter et al., (2010) no interaction between sexes for growth performance. At the end the result of this experimental of Goo et al., (2019) also similar both male were heavier than female's body weight ($p < 0.05$).

CONCLUSION

To sum up, the interaction between group × sex was significant for body weight (g) broiler and non-linear models were effective to comparison between in vivo and predicted models.

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