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Research Paper

Effect Of Dietary Biosupplement Fermented Earthworm Microbes Consortium Inoculant On The Carcass Production And Cholesterol Blood Profile Of Baliness Duck

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***ABSTRACT*:-** A research has been carried out to evaluating potency of dietary biosupplement fermented earthworm microbes consortium inoculant on the carcass production and cholesterol blood profile of baliness duck. Completely Randomized Design consisted of six treatments and four replicates were employed. The first treatment was ration based on waste and weed crop without supplemented (RS_0), while the other treatments were RS_0 supplemented by biosupplement fermented without earthworm inoculant (RSB0), biosupplement fermented inoculant of 0,1% earthworm ($RSBc_1$), biosupplement fermented inoculant of 0,2% earthworm ($RSBc_2$), biosupplement fermented inoculant of 0,3% earthworm ($RSBc_3$), and biosupplement fermented inoculant of 0,4% earthworm ($RSBc_4$). The result showed that fed dietary of biosupplement fermented eartworm microbes consortium inoculant ($RSBc_1$, $RSBc_2$, $RSBc_3$ and $RSBc_4$) increasing ($P<0,05$) slaughter weight (1457,5 -1493,8 g/duck), carcass weight (848,40 – 914,52 g/duck), carcass percentage (58,21 – 61,47%), physical composition of carcass and carcass meat percentage compare with RS_0. Fed ration supplemented biosuplemen SB_0 (RSB_0) also increase ($P<0,05$) slaughter weight and carcass weight baliness ducks compare with RS_0 were 4,03% and 12,28% respectively. While for the chemical and cholesterol blood profile all treatments has not significant different ($P>0,05$), except for the concentration of LDL blood fed $RSBc_3$ and $RSBc_4$ decreased ($P<0,05$) concentration of LDL blood was 27.73 to 28.38 mg/dl Vs 29.70 to 41,33 mg/dl. It was concluded that dietary biosupplement fermented earthworm microbes consortium inoculant can increased carcass production and decreased concentration of LDL blood baliness duck.

Keywords:- *Baliness Duck, Biosupplement, Earthworm Microbes Consortium Inoculant, Carcass Production, Cholesterol Blood*

I. INTRODUCTION

Optimization of baliness duck farms that have been developed with an integrated farming system by utilizing waste and weed crops as feed is important to be done in the national meat source diversification efforts. Utilization of waste and weed crops to feed the ducks on the one hand will reduce production costs. On the other hand the origin of the waste feed material has various drawbacks related to the poor quality of available nutrient content, especially due to high crude fiber content (Mudita *et al*., 2104; 2015; Partama *et al*., 2014). So it is absolutely necessary feed technology applications. Inoculant production of biosupplements through the utilization of microbial consortium earthworm is one potential strategy developed.

Utilization of earthworms as a source of a consortium of microbial inoculant in the production of bio-supplements believed to produce high quality products considering the content of various nutrients and growth promoters and various microbial symbionts on earthworms. Some research suggests that the use of bio-supplement/supplements contain beneficial microbes "probiotic" can improve gastrointestinal health, productivity and lowering cholesterol levels of poultry meat (Sheng-Qiu *et al.*, 2013; Sutarpa *et al.*, 2011; Zhou *et al.*, 2010). Result of Li *et al*. (2011) show that supplementation of probiotic (*Bacillus subtilis*) in diet can increase ($P<0,05$) egg laying rate (88,1±0,9% Vs 84,77 ±0,6%), decrease ($P<0,05$) triglyceride and total cholesterol egg, and triglyceride, total cholesterol, uric acid and ammonia serum of blood in shaoxing ducks. However, the use of earthworms as information microbial consortium bioinokulan feed supplements has not been obtained. So this research is very important to be developed in an effort to optimize the utilization of various waste and weed crops in the optimization of business development traditional bali duck livestock.

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II. MATERIALS AND METHODS

Earthworm Microbes Consortium Inoculant

The earthworm microbes consortium inoculant were produced by inoculating earthworm earthworms that have been crushed (according to treatment) in anaerobic medium inoculant (Table 1) and then incubated T 39^{o}C for 7 days. Production of inoculant done in under aseptic and anaerobic conditions (gas powered CO_2). Nutrient contents and microbial population of inoculant presented at Table 2 and 3

Type of inoculant are produced, namely:

BC1 = Inoculants produced from 1 gram earthworms (earthworms physiological solution of 10%) in 1 liter of medium inoculant

BC2 = Inoculants produced from 2 gram earthworms (earthworms physiological solution of 20%) in 1 liter of medium inoculant

BC3 = Inoculants produced from 3 gram earthworms (earthworms physiological solution of 30%) in 1 liter of medium inoculant

BC4 = Inoculants produced from 4 gram earthworms (earthworms physiological solution of 40%) in 1 liter of medium inoculant

Tabel 1 Composition of Inoculant Medium (on 1 liter)

No	Material	Composition
1	Thioglicollate Medium (g)	**2**
2	Sugarcane (ml)	**50**
3	Urea (g)	**1**
4	Tannic Acid (g)	**0,5**
5	CMC (g)	**0,5**
6	Soybean Flour (g)	**1**
7	Corn Flour (g)	**1**
8	Apu Leaves (g)	**0,5**
9	Water Hyacinth Flour (g)	**0,5**
10	Tapioca Flour (g)	**0,5**
11	Mineral-vitamin "Pignox" (g)	**1**
12	**Water**	**Volum up to 1 liter**

Table 2. Nutrients Content of Earthworm Microbial Consortium Inoculant

Inoculant	Nutrients Content				
	P	**Ca**	**Zn**	**S**	**Soluble Protein**
	mg/l	mg/l	mg/l	mg/l	%
BC 1	132.21a[2]	1275.00a	7.29a	227.33a	4.03a
BC 2	149.95ab	1281.25a	7.51a	232.67a	4.34a
BC 3	151.29b	1242.50a	7.76a	232.67a	4.39a
BC 4	132.47ab	1155.83a	7.57a	236.00a	4.17a
SEM[3]	4,60	96,97	0,22	6,30	0,14

Tabel 3. Microbial Populations and pH of Earthworm Microbial Consortium Inoculant

Inoculant	Microbial Population					pH
	Totally bacteria	**Cellulolytic Bacteria**	**Amylolytic Bacteria**	**Proteolytic Bacteria**	**Totally Fungi**	
	x10^{9} colony/ml	x10^{8} colony/ml	x10^{8} colony/ml	x10^{8} colony/ml	x10^{4} colony/ml	
BC 1	7.77a	1.18a	6.60a	4.03a	2.92a	3,81a
BC 2	8.85a	1.35a	6.87a	4.67a	2.99a	3,64a
BC 3	8.88a	1.73a	7.37a	4.83a	3.23a	3,53a
BC 4	9.40a	1.76a	6.73a	4.97a	3.52a	3,64a
SEM	0,66	0,17	0,92	1,29	0,61	00,09

Biosupplement

In this study produced 5 supplements consisting of 4 probiotic biosupplement namely SB_1, SB_2, SB_3, and SB_4 (supplement produced by a fermentation process using 4 inoculant microbial consortium) and basal supplement/SB_0 (biosupplement fermented without earthworm microbe consortium inoculant as a supplement control). Supplements made in the form of pellets using a pelleting machine.

Fifth supplement products manufactured using basal supplements prepared by utilizing various crop wastes and other agro-industrial wastes before first sterilized with UV light for 24 hours in a laminar air flow. The composition of the basal supplement shown in Table 4.

Table 4. Composition of The Basal Supplement

No	Material Supplement	Composition (% DM)
1	Yellow Corn	28
2	Rice Bran	20
3	Coconut Meal	10
4	Soybean	10
5	Tapioca Flour	5
6	Tofu Dregs	5
7	Sugarcane	5
8	Coconut Oil	2
9	Leaves of *Gliricidia sepium*	4,5
10	Water Hyacinth	5
11	Apu Leaves	5
12	Salt	0,4
13	Mineral-vitamin "Pignox"	0,1
	Total	**100**

Production of biosupplemen was done by the fermentation method. The fermentation process is done by every 1 kg (DM) products supplement fermented using a inoculant solution containing 50 ml of inoculant (according to treatment), 50 ml of sugarcane and 900 ml of water. Then mixed until homogeneous and immediately put in a plastic container lid tightly and filled to the brim. Then incubated anaerobically for 1 week. Furthermore biosupplement oven-dried at a temperature of 39 - 42 ° C until the moisture content of 20-25% of products (usually for ± 3 days). Once completed, the biosupplement ready to be used for further research activities. The nutrients content and population microbial presented at Table 5 and 6.

Table 5. Nutrients Content of Biosupplement

Variable	Biosupplement					SEM[3]
	SB_0	SBc_1	SBc_2	SBc_3	SBc_4	
Dry Matter/DM (% *fresh basis*)	77,90a[2]	84,93b	85,53b	87,27c	88,75d	0,29
Organic Matter/OM (%)	88.22a	90,08b	90,12b	90,91c	90,94c	0,13
Crude Fibre/CF (%)	12,30c	9,51b	8,47ab	7,46a	7,14a	0,42
Crude Protein/CP (%)	15,75a	18,44b	19,56b	19,64b	19,91b	0,33
Extract Ether (%)	7,40a	7,77a	7.51a	7.77a	7.26a	0,14
Calsium/Ca (%)	0.88a	0.84a	0.84a	0.84a	0.85a	0,02
Phosphor/P (%)	0,75a	0,75a	0,77a	0,77a	0,82a	0,04

Table 6. Microbial Population of Biosupplement

Variable	Biosupplement					SEM[3]
	SB_0	SBc_1	SBc_2	SBc_3	SBc_4	
Totally Bacteria (x 10^7 cell/ml)	0,10a	4,44b	5,08b	5,18b	5,28b	0,32
Cellulolytic Bacteria (x10^6 cell/ml)	0,08a	0,91b	1,11bc	1,31c	1,26c	0,06
Xylanolytic Bacteria (x10^6 cell/ml)	0,09a	3,72b	5,22b	5,83b	4,97b	0,73
Amylolytic Bacteria (x 10^5 cell/ml)	0,51a	6,53b	6,78b	6,83b	6.81b	0,22

Ration Based on Waste and Weed Crop

The basal diet used in this study is based rations waste and weed crops. The basal diet prepared following the usual feed provided by a traditional farmer with the composition of the constituent materials are presented in Table 7.

Table 7. Composition of the constituent materials and Nutrient of basal ration

No	Material	Composition (% DM)
1	Yellow Corn	30
2	Coconut Meal	15
3	Rice Bran	30
4	Soybean	10
5	Umbi Ketela Pohon	8
6	Water Hyacinth	2,5
7	Apu Leaves	2,5
8	Salt	1
9	Mineral B-12	1
Total		**100**
Nutrients Content		
1. Dry Matter (% fresh basis)		74,02
2. Organic Matter (%)		87,3980
3. Crude Fibre (%)		12,7540
4. Crude Protein (%)		14,5209
5. Extract Ether (%)		6,7556
6. Calsium (%)		0,3225
7. Phosphore (%)		0,7069

Supplementation ration done by mixing homogeneously 95% (DM) basal diet with 5% (DM) supplements (as per treatment). Further research ration is ready to be used as animal feed. Rationing is done ad libitum and feed consumption level is calculated every day from the early morning (08:00 pm) until the following morning (08.00 pm). Rationing is done by placing the ration in a container of plastic that is placed in front of the cage ducks on any treatment unit.

III. EXPERIMENTAL DESIGN

The research was conducted by completely randomized design/CRD with six treatment and 4 replicated, where each replication consisted of five male ducks bali age of 2 weeks.

The treatments were as follows:

R0 = Fed ration based on waste and weed crop without Supplementation
RSB_0 = Fed ration based on waste and weed crop supplemented 5% SB_0
RSB_{C1} = Fed ration based on waste and weed crop supplemented 5% SB_{C1}
RSB_{C2} = Fed ration based on waste and weed crop supplemented 5% SB_{C2}
RSB_{C3} = Fed ration based on waste and weed crop supplemented 5% SB_{C3}
RSB_{C4} = Fed ration based on waste and weed crop supplemented 5% SB_{C4}

Variables Observations

The parameters observed in this study consists of:

1. Production carcass, consisting of slaughter weight, production and carcass percentage, carcass Physical Composition (production and the percentage of meat, bones and subcutaneous fat including the skin)
2. Chemical and cholesterol blood profile consists of blood glucose, blood uric acid, total cholesterol, triglycerides, HDL and LDL blood

Data Analysis.

Data were analyzed by analysis of variance / Anova, if there are significant differences ($P \leq 0,05$), followed by the analysis of Duncans multiple range test (Sastrosupadi, 2000).

IV. RESULTS AND DISCUSSION

Production and Carcass Quality

The results showed that applications of supplementation technology using probiotic biosupplement produced by earthworms microbes consortium inoculants ($RSBc_1$, $RSBc_2$, $RSBc_3$ and $RSBc_4$) increasing ($P<0,05$) slaughter weight, carcass weight, carcass percentage, physical composition of carcass and carcass meat percentage (Table 4). That table shows fed ration by supplementing biosuplemen ($RSBc_1$, $RSBc_2$, $RSBc_3$ and $RSBc_4$) capable of producing slaughter weight (1457.5 - 1493.8 g/duck), carcass weight (848.40 -914.52 g/duck), carcass percentage (58.21 - 61.47%), and the percentage of carcass meat (39.29 to 40.21%) were significantly higher ($P<0.05$) than fed ration R_0 and/or RSB_0.

Table 8. Produktion and Carcass Quality of Baliness Duck

Variables	Treatments						SEM
	RS_0	**RSB_0**	**$RSBc_1$**	**$RSBc_2$**	**$RSBc_3$**	**$RSBc_4$**	
Sloughter Weight (g/duc)	1302,5a	1355,0ab	1457.5bc	1493,8c	1482,5c	1488,1c	28,11
Carcass Weight (g/duck)	634,68a	712,62b	848,40c	914,52c	911,20c	893,91c	17,26
Carcass Percentage (%)	48,81a	52,59a	58,21b	61,20b	61,47b	60,36b	0,96
Composition of physical carcass							
– Meat Carcass(g)	221,49a	260,98a	333,57b	366,31b	358,40b	365,69b	9,15
– Bone Carcass (g)	271,96a	286,30ab	322,44bc	344,09c	341,25c	340,05c	8,45
– Fat and skin carcass (g)	140,19a	165,69ab	192,32bc	204,79c	207,77c	207,72c	6.97
Carcass Meat Percentage (%)							
– Meat Carcass(%)	34,92a	36,62a	39,29b	39,93b	40,11b	40,21b	0,53
– Bone Carcass (%)	42,86b	40,15ab	38,07a	37,34a	37,31a	38,47a	0,78
– Fat and skin carcass (%)	22,13a	23,23a	22,64a	22,73a	22,49a	23,23a	0,83

Notes:

1) *Experimental Treatments:*
   - R_0 = Fed ration based on waste and weed crop without Supplementation
   - RSB_0 = Fed ration based on waste and weed crop supplemented 5% SB_0
   - RSB_{C1} = Fed ration based on waste and weed crop supplemented 5% SB_{C1}
   - RSB_{C2} = Fed ration based on waste and weed crop supplemented 5% SB_{C2}
   - RSB_{C3} = Fed ration based on waste and weed crop supplemented 5% SB_{C3}
   - RSB_{C4} = Fed ration based on waste and weed crop supplemented 5% SB_{C4}
2) The same letter in the same column, not significant different ($P> 0.05$)
3) *SEM = Standard Error of The Treatment Means*

The high level of the production and physical quality of carcass produced as a result of administration fed ration supplemented of probiotics biosupplement are response from improving the quality of rations due applications of supplementation and fermentation technology by inoculant of earthworms. microbial consortium. These results indicate the importance of processing technology applications, especially in the provision of low quality feed such as rations based on waste and weed crops.

Results of this research has also shown that earthworms are a source of high quality nutrients (Table 2) and synergistic microbial consortium (Table 3) and capable of effective role in optimizing the utilization of fiber-rich feed materials into high-quality biosuplement (Table 5 and 6). Fed of high-quality biosupplement with manufactured utilizing high-quality inoculants will definitely be able to produce a healthy body and the digestive tract of animal/duck are getting better, feed intake, feed digestibility and nutrient metabolism in the body so that the higher production quality and carcass be high (Table 8). The results also supported by Sheng-Qiu *et al.,* (2013), Zhou *et al.,* (2010) and Li *et al* (2011) that indicates the utilization of probiotic biosuplemen can increase productivity and production as well as the quality of the resulting carcass.

Cholesterol and Blood Chemistry Profile of Baliness Ducks

The results showed that the blood chemistry profile and cholesterol (except LDL) all treatments resulted in no significant concentrations. Blood glucose levels of research animals (baliness ducks) ranged 1,53,75 - 180.25 mg/dl, uric acid levels 3.15 - 6.10 mg/dL in total cholesterol 181.25 - 237.25 mg/dl, triglycerides 41.75 - 56.50 mg/dl, HDL 134.03 - 143.63 mg/dl (Table 9).

Table 9. Cholesterol and Blood Chemistry Profile of Baliness Ducks

Variables	Treatments						SEM
	RS0	RSB0	RSB1	RSB2	RSB3	RSB4	
Blood Glucose (mg/dl)	153,75a	162,75a	168.75a	180,25a	175,5a	169,5a	6,39
Blood Uric Acid (mg/dl)	6.1a	4.68a	4.08a	4,05a	3,25a	3,15a	114
Totally cholesterol. (mg/dl)	237.25a	217.75a	198,00a	196,00a	193,00a	181,25a	15,02
Trigliyceride Blood (mg/dl)	53.5a	56.5a	51,50a	50,25a	50,50a	41,75a	6,33
Blood HDL (mg/dl)	138.55a	138.23a	141,6a	142,05a	143,63a	134,03a	15,02
Blood LDL (mg/dl)	41.33b	40,42b	37,89ab	29,7ab	28,38a	27,73a	2,46

Notes:

1) *Experimental Treatments:*
   - R0 = Fed ration based on waste and weed crop without Supplementation
   - RSB_0 = Fed ration based on waste and weed crop supplemented 5% SB_0
   - RSB_{C1} = Fed ration based on waste and weed crop supplemented 5% SB_{C1}
   - RSB_{C2} = Fed ration based on waste and weed crop supplemented 5% SB_{C2}
   - RSB_{C3} = Fed ration based on waste and weed crop supplemented 5% SB_{C3}
   - RSB_{C4} = Fed ration based on waste and weed crop supplemented 5% SB_{C4}
2) The same letter in the same column, not significant different (P> 0.05)
3) *SEM = Standard Error of The Treatment Means*

Blood chemistry profile produces relatively the same (except LDL) shows the level of health and metabolism in the body of animals is relatively good, reflecting the distribution of nutrients in the body rernak can take place properly. While the presence of high levels of LDL in the treatment R0 and RSB0 show on treatment without supplementation technology applications and/or using a fermentation process bioinokulan indicate persistently high bad cholesterol components ducks given such treatment. The results also clearly shows that supplementation with the application of technology products fermented microbial inoculants consortium earthworm is capable of significantly lowering blood cholesterol levels, especially LDL ducks treatment. This indicates the quality of the meat produced will be better and healthier.

V. CONCLUSION

Supplementation of biosupplement fermented earthworm microbes consortium inoculant on ration based on waste and weed crop can increased carcass production and decreased concentration of LDL blood of baliness duck.

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