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The Effect of White Button Mushroom (*Agaricus bisporus*) Crude Extract on Broiler Meat Physical Quality and Relative Organ Weight

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Abstract**—** *This research was to exemine the effect of agaricus bisporus crude extract on broiler meat physical quality and relative organ weight. The extraction process was perform using microwave-assisted extraction. This research were used 200 day-old boiler chicks which allocated into five dietary treatments. The treatments were A0 (control group), A0$^+$ (Zinc Bacitracin Group), A1 (A. bisporus 0,4% inclusion), A2 (A. bisporus 0,8% inclusion), A3 (A. bisporus 1,2% inclusion) with four replication using ten chicks each. Tabulated data were then analyze using one way ANOVA, then significant differences (P<0,05) tested using Duncan's Multiple Range Test. The result showed the treatment did not show significant differences (P>0,05) between treatments on broiler meat physical quality and relative weight organ. It can be concluded that A. bisporus crude extract may replace zinc bacitracin in broiler diets.*

Keywords**—** *Broiler, Extract, Meat quality, Mushroom, Organ weight.*

I. INTRODUCTION

The increasing of broiler meat demand by local market depand on human population. High demand of broiler meat may induce to broiler farmer to improve their farm. Once effort that usually used by local farmer was addition AGP (Antibiotics Growth Promoter) into broiler diets which is AGP may influence on human health. Antibiotics can be used preventively, therapeutically, or as performance enhancers, promoting positive effects on animal production. During the past several decades, Subtherapeutic dosages of antibiotics have been used extensively as growth promoters in poultry feeds. Antibiotic growth promoters were supposed to increase growth rate as a result of improved gut health, resulting in better nutrient n better nutrient utilization and improved feed conversion (Butaye *et al.*, 2003). However, issues such as loss of antbiotics efficiency along time and risk of residues in food of animal product, with the possible development of bacterial resistance in humans, have concerned consumers creating a great problem for poultry production.

The alternative to replace AGP was back to nature with utilize mushroom as feed additives (Khan *et al.*, 2018). *Agaricus bisporus* contain many phenolic compound such as phenol, flavonoids, sterols, tocopherol, vitamin, micro minerals, carbohydrates, and amino acids (Muszyńska *et al.* 2017). Meanwhile to improve *A. bisporus* utilization in broiler diets need extraction technology to increase *A. bisporus* crude extract activity in broiler diets. Conventional extraction may spend more extraction time, and solvent. The alternative to solve these problem was using microwave-assisted extraction technology that spend less extraction time and solvent usage (Purwanto *et al.*, 2010). Kozarski *et al.* (2011) reported that two kinds of *Agaricus bisporus* hot water extract showed glucan content 63,8% with α-glucan 5,6% and β-glucan 58,2%. Glucose was monomer from glucan which act as prebiotics to stimulate gut microbiota. Meanwhile A. bisporus methanolic extract showed higher phenolic content than hexane and ethyl acetate solvent (Öztürk *et al.*, 2011).

Previous study with A. bisporus inclusion into broiler diets did not showed significant differences between A. bisporus dietary treatment and Flavophospholipol group on final body weight gain, abdimonal fat pad, liver percentage, thigh weight, and breast weight (Kavyani *et al.*, 2012). Meanwhile in another study Kavyani et al. (2014) reported that significant increase goblet cells in 5 g/kg *A. bisporus* inclusion. Which 30 g/kg *A. bisporus* inclusion also reduce *E. coli* bacteria on ileum. Giannenas *et al.* (2010) reported that 0,1% dried *A. bisporus* increase duodenum and ileum villus height. Many beneficial effect of *A. bisporus* as antimicrobial, antiviral, anticancer, and therapeutic food. In present study we investigate the effect of *A. bisporus* crude extract on physical quality of broiler meat and relative organ weight.

II. MATERIALS AND METHODS

200 day-old chicks were allocated into 5 dietary treatments. The treatments were A0 (control group), A0$^+$ (Zinc Bacitracin Group), A1 (*A. bisporus* 0,4% inclusion), A2 (*A. bisporus* 0,8% inclusion), A3 (*A. bisporus* 1,2% inclusion) with four replication using ten chicks each and equipped feeder and drinker. The feed and water were given add libitum then reared for 35 days. The broiler chicks were purcashed from PT. Multi Breeder Adirama Tbk. Basal diets used in this research were BR1 (for starter phase 0-21 days) and BR2 (for finisher phase 22-35 days). The nutritional value of BR1 and BR2 were shown in Table 1.

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TABLE 1. Nutritional value of basal feed

Nutritional value	BR1	BR2
Dry matter (%)	86,58	86,49
Crude Protein (%)	23,09	20,93
Crude Fiber (%)	3,55	5,25
Ether Extract (%)	6,07	5,25
Ash (%)	6,14	4,92

* Based on Animal Feed and Technology Laboratory, Animal Science Faculty, Brawjaya University

Agaricus bisporus crude extract were perform using microwave-assisted extraction adopted from Purwanto *et al.* (2010) with some modification. The *A. bisporus* crude extract were in liquid form so we sprayed *A. bisporus* crude extract into basal diets, which easily to mix between basal diets and *A. bisporus* crude extract. Variable measured were broiler meat physical quality such as carcass weight, water holding capacity (WHC), cooking loss, and relative organ weight such as liver weight, heart weight, gizzard weight, and spleen weight. Data were collected and tabulated using *MS. Excel* 2010 then analyze using one way ANOVA, significant differences ($P<0,05$) were then followed using Duncan's Multiple Range Test (DMRT).

III. RESULTS

Based on analysis of variance showed that the treatments did not give significant differences on relative organ weight and carcass physical quality of broiler chicks. The effect of A. bisporus crude extract on broiler meat physical quality and relative organ weight. Liver weight in the range of 1,79-2,07 %. Liver weight percentage was in normal range, it can be predicted that A. bisporus crude extract did not show negative effect on liver, which there are normal colour on liver organ. Liver was subjected to produce red blood cells, fat, protein, and syntesis of fibrinogen, detoxification of toxic molecule and keep glycogen, and fat soluble vitamin (Widodo, 2010). Zinc bacitracin group showed higher percentage of liver weight, it may affected liver to filter the blood and increase relative liver weight.

TABLE 2. Effect of treatments on broiler meat physical quality and relative organ weight

Variable	Treatments				
	A0	A0$^+$	A1	A2	A3
Liver (%)	1,88 ± 0,13	2,07 ± 0,07	1,81 ± 0,22	1,79 ± 0,13	1,80 ± 0,15
Heart (%)	0,41 ± 0,07	0,44 ± 0,05	0,37 ± 0,04	0,43 ± 0,06	0,43 ± 0,04
Gizzard (%)	1,37 ± 0,19	1,31 ± 0,11	1,66 ± 0,21	1,41 ± 0,18	1,34 ± 0,11
Spleen (%)	0,11 ± 0,01	0,13 ± 0,01	0,11 ± 0,01	0,11 ± 0,01	0,11 ± 0,01
Carcass weight (g/chicks)	1578,0 ± 48,8	1597,5 ± 53,3	1579,6 ± 12,6	1591,0 ± 70,8	1517,5 ± 71,2
WHC (%)	41,0 ± 4,64	44,4 ± 2,99	31,8 ± 8,94	34,4 ± 5,21	41,1 ± 6,98
Cooking loss (%)	32,8 ± 4,11	30,5 ± 1,00	33,4 ± 6,37	36,9 ± 1,31	32,8 ± 4,11

* Data were shown as mean ± standard deviation

Heart percentage also did not show effect, which heart percentage in normal range with 0,37 – 0,44%, in this organ possible to distribute blood into lungs that transport oxygen. The highest heart percentage was 0,44%. Many factor can induce heart percentage including animals activity, ages, genetics, environment, that indicate higher heart percentage could help oxygen supply for metabolism Suyanto *et al.* (2013). Then the colour of heart also in normal range and there are no signal for disease increment. Gizzard used for mechanical digestion or reduce particle size of feed by poultry, size and strength of gizzard affected by feed density, feed form, and environment of broiler. Highest heart percentage shown in treatment A1 was 1,66% and the lowest was shown in zinc bacitracin group. While the heart percentage also in normal range and there are no signal from disease increment. Swito *et al.* (2015) reported that gizzard percentage of broiler in the range from 1,89 – 2,34%. Gizzard percentage count from weighing the gizzard then compared with live body weight. Gizzard percentage also influenced from dietary fiber value, higher fiber value could induce on increasing gizzard percentage (Aqsa et al., 2016). Spleen was subjected to blood storage, the other function of spleen was to destroy old red blood cells and to produce uric acid and limfosite conformation and has correlated on antibody system in poultry. Table 2 showed that spleen percentage was in normal range in 0,11 – 0,13% live weight basis. Meanwhile, broiler spleen in the range from 0,10 until 0,18% from live weight (Swito *et. al.*, 2015; Sulistyoningsih, 2015). The higher spleen percentage in zinc bacitracin group 0,13%. It can be concluded that A. bisporus crude extract did not show negative effect on relative organ weight.

The treatments did not show significant differences on carcass weight, once lead higher carcass weight was showed in zinc bacitracin group and A2, zinc bacitracin group shown 1597,5 g/chicks and A2 group shown 1591,0 g/chicks. Which carcass weight could correlated with broiler live weight, higher live weight could improve carcass weight. Yuanita *et al.* (2009) stated that carcass weight had correlation with live weight and body weight gain. Factor may induced in carcass weight were broiler sex, ages, genetics, and environment (Anggitasari *et al.*, 2016). Then the higher broiler meat WHC showed in zinc bacitracin group (44,4%) than the other treatments. The treatments did not show significant differences on broiler meat WHC. It may fat and protein content contained in broiler meat still in low percentage. Daud *et al.* (2007) stated that broiler in growth phase need nutrient absorbtion into the body from feed. WHC reduction caused by lactic acid content that accumulated from broken myofibril protein, then followed by broiler meat water holding capacity. Table 2 showed recovery WHC from 0,4% to 1,2% *A. bisporus* crude extract inclusion. Zinc bacitracin group also showed better cooking loss (30,5%). Cooking loss in this reserch categorize in normal average which Prayitno et. al. (2010) stated that broiler meat cooking loss 6 and 7 weeks in

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the range from 24,9% until 34,5%, and commonly cooking loss vary 15% to 40%. This caused the effect off feeding from feed fat content. The used feed given in this study contain same fat content, then affected on broiler meat cooking loss. Feeding with relative same composition did not provide a significant differences between treatments. Nutrient losses among cooking could impact on cooking loss percentage (Prayitno *et al.*, 2010).

IV. CONCLUSION

Agaricus bisporus crude extract inclusion on broiler diets showed non toxicity effect which relative organ weight did not show differences percentage and in normal range. Meanwhile *Agaricus bisporus* crude extract inclusion showed relative carcass weight, WHC, and cooking loss in same result, which *A. bisporus* crude extract may changes AGP in broiler diets.

REFERENCES

[1] Khan, S.H., N. Mukhtar, and J. Iqbal. "Role of Mushroom as Dietary Supplement on Performance of Poultry". *Journal Of Dietary Supplements*. 2018.

[2] Muszyńska, B., K. Kała, J. Rojowski, A. Grzywacz, and W.I. Opoka. "Composition and Biological Properties of Agaricus bisporus Fruiting Bodies – A Review". *Pol. J. Food Nutr. Sci*. 67(3): 173-181. 2017.

[3] Purwanto, H., I. Hartati, dan L. Kurniasari. "Pengembangan *Microwave Assisted Extractor* (MAE) Pada Produksi Minyak Jahe Dengan Kadar Zingiberene Tinggi". Momentum. Vol. 6 No. 2: 9-16. 2010.

[4] Butaye, P., L. A. Devriese, and F. Haesebrouck. "Antimicrobial growth promoter used in animal feed: effects of less well known antibiotics on gram-positive bacteria". Clinical microbiology review. 16: 175-188. 2003.

[5] Giannenas I., D. Tontis, E. Tsalie, E. F. Chronis, D. Doukas, and I. Kyriazakis. "Influence of dietary mushroom Agaricus bisporus on intestinal morphology and microflora composition in broiler chickens". *Research in Veterinary Science*. 89: 78–84. 2010.

[6] Kavyani, A., A. Z. Shahne, J. Pourreza, S. M. A. J. Haji-Abadi, M. Nikkhah, and N. Landy. "Efficiency of Different Levels of Mushroom (*Agaricus Bisporus*) on Intestinal Morphology and Microflora of Broiler Chickens". Journal of Farm Animal Nutrition and Physiology. Vol 9. No. 1: 23-30. 2014.

[7] Kavyani, A., A. Z. Shahne, J. Pourreza, S. M. A. J. Haji-Abadi, M. Nikkhah, and N. Landy. "Evaluation of dried powder of mushroom (*Agaricus bisporus*) as an antibiotic growth promoter substitution on performance, carcass traits and humoral immune responses in broiler chickens". Journal of Medicinal Plants Research. Vol. 6(1): 94-100. 2012.

[8] Widodo, E. "Nutrisi Dan Teknik Pemeliharaan Ayam Organik". Malang: UB Press. 2010.

[9] Suyanto, D., Achmanu, dan Muharlien. "Penggunaan Tepung Kemangi (*Ocimum basilicum*) dalam Pakan Terhadap Bobot Karkas, Presentase Organ Dalam dan Kolesterol Daging pada Ayam Pedaging". 2013.

[10] Aqsa, A.D., K. Kiramang., dan M.N Hidayat. "Profil Organ Dalam Ayam Pedaging (*Broiler*) yang Diberi Tepung Daun Sirih (Piper Betle Linn) Sebagai Imbuhan Pakan". *Jurnal Ilmu dan Industri Perternakan*. Vol. 3 (1). 2016.

[11] Swito., D. Sudrajat., dan R. Handarini. "Substitusi Jagung dan Ampas Kurma dalam Ransum Komersial Terhadap Persentase Giblet dan Lemak Abdomen Ayam Pedaging". *Jurnal Peternakan Nusantara*. Vol. 1 (1): 2442-2541. 2015.

[12] Sulistyoningsih, M. "Seminar Nasional Konservasi Dan Pemanfaatan Sumber Daya Alam". 2015.

[13] Yuanita, I., S. Murtini dan., I. Rahayu. "Performa dan kualitas ayam pedaging yang diberi pakan tambahan ampas buah merah (*Pandaus conoideus*)". *Teknologi Peternakan dan Veteriner*. 2009.

[14] Anggitasari. S., O. Sjofjan., dan I. H. Djunaidi. "Pengaruh Beberapa Jenis Pakan Komersial Terhadap Kinerja Produksi Kuantitatif dan Kualitatif Ayam Pedaging". *Buletin Peternakan*. Vol. 40 (3): 187-196. 2016.

[15] Prayitno, A.H., S. Edi., dan Zuprizal. "Kualitas Fisik Dan Sensoris Daging Ayam pedaging Yang Diberi Pakan Dengan Penambahan Ampas Virgin Coconut Oil (Vco)". *Buletin Peternakan.* Vol. 34(1): 55-63. 2010.