

THE EFFECT OF USE OF MIXED RED GINGER (*ZINGIBER OFFICINALE* VAR. *RUBRUM*) AND TURMERIC (*CURCUMA LONGA*) IN THE RATION ON PERFORMANCE AND CARCASS QUALITY OF BROILER

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Abstract

The aim of this study was to find out the best dose of red ginger (*Zingiber officinale* var. *rubrum*) and turmeric (*Curcuma longa*) mixture with a ratio of 1:1 which could produce the best performance and carcass quality of broiler. The experiment used 100 broiler day old chicken with a Completely Randomized Design (CRD). There were four kind of treatments (R_0 : Based ration, R_1 : Based ration +0.25% red ginger + 0.25% turmeric, R_2 : Based ration + 0.5% red ginger + 0.5% turmeric, R_3 : Based ration +0.75% red ginger + 0.75% turmeric, where each treatment was repeated five times and each repeated consist five broiler chicks. Analysed variables were feed consumption, body gain weight, feed conversion, carcass weight, fat abdominal and meat cholesterol. Statistical analysis indicated that addition of mixed Red Ginger and turmeric meal did not significantly affect ($P>0.05$) on feed consumption, abdominal fat and significantly to gain on body weight, feed conversion, carcass weight and meat cholesterol. It can be concluded that by using until 1% in the ration produced good performance and carcass quality of broiler.

Keys words: broiler, carcass quality, performance, Red Ginger, turmeric.

INTRODUCTION

Broilers are meat-producing poultry that have considerable potential in meeting people's needs for animal protein. The existence of quality chicken meat commodities requires the requirement to be free from drug residues. In order to meet consumer demands in the form of quality chicken meat, it is usually done by manipulating the nutritional content or the source of certain ingredients in the ration. One of the efforts that can be done is providing feed additives.

Feed additives are ingredients that are deliberately mixed into animal feed with the aim of increasing productivity, health, and the nutritional condition of livestock and not to meet the nutritional needs of livestock (Sinurat et al., 2009) The feed additives that are currently widely used are herbal raw materials, in this study red ginger (*Zingiber officinale* var. *rubrum*) and turmeric (*Curcuma longa*) are used. Red ginger contains bioactive components in the form of oleoresin and gingerol essential which functions to help optimize organ function (Arifin et al., 2013).

Essential oils help digestive enzymes work so that the feed rate increases and along with the growth rate, meat production will increase. Ginger has the power to increase appetite, strengthen the stomach and improve digestion. The essential oils released by the ginger rhizome are illuminated by the mucous membranes of the large stomach and intestines, which results in an empty stomach and the livestock will consume feed (Setyanto et al., 2012) The nature of gingerol as an anticoagulant, which is to prevent blood clots, is also thought to be able to reduce cholesterol levels. Red ginger essential oil is believed to have properties to inhibit the growth of microorganisms (Rahmawati, 2013). Ginger in the ration of broilers can significantly reduce abdominal fat compared to control feeding (Latief et al., 1997).

Turmeric is a type of plant that can be used to replace synthetic antibiotics, because it contains active or bioactive compounds that have functions such as chemicals in synthetic antibiotics. The active compounds are curcumin and essential oils. The essential oil content in turmeric is 3-5% and curcumin 2.5-

6% (Rukmana, 2005). Curcumin compounds and essential oils contained in turmeric rhizomes are thought to increase production levels and facilitate the excretion of bile in broilers, resulting in decreased meat cholesterol content (Legowo, 2004). The addition of saffron meal to the feed indirectly affects feed consumption and absorption of food substances so that it can form meat production and the percentage of meat carcass will increase (Mide, 2012). The curcumin content of turmeric has an antibacterial and antioxidant function. Curcumin contained in turmeric has properties that can affect appetite because it can accelerate the emptying of stomach contents so that appetite increases and expedites bile excretion thereby increasing the activity of the digestive tract (Purwanti, 2008). The curcumin content can reduce the percentage of abdominal fat in broiler meat. The use of phyto-pharmacy in the form of red ginger and turmeric can increase the final weight so that it can increase the slaughter weight and carcass weight of broiler chickens. The curcumin content in turmeric can also reduce abdominal fat and the addition of ginger meal can also reduce abdominal fat.

The addition of red chilies and black pepper as feed additives with a ratio of 0.5% red chili and 0.5% black pepper can increase body weight, feed intake, feed conversion and can reduce abdominal fat (Puvaca et al., 2014). Feed additives at a level of 1% increase the performance and overall quality of broiler chickens where the addition of feed additives is given, namely red pepper with a level of 0.5% and black pepper with a level of 0.5% (Safa, 2014). Because of the effect of essential oils on the function or work of the digestive tract, especially the small intestine, and are toxic in excessive doses, the use of the right mixed red ginger and turmeric meal is expected to increase the body's metabolism and metabolism that affects the digestive tract cells. Therefore this research was conducted to study the effect of adding mixed red ginger and tumeric meal in the ration on the performance and carcass quality of broiler chickens.

MATERIALS AND METHODS

The study used 100 DOC broiler chicken with the average body weight of 42.34 gram

(coefficient of variation 0.23%). DOC broiler were kept in deep litter system until the age of 35 day, 20 pens were used, sized 90 cm x 90 cm x 60 cm (length x width x height). Each pen consisted of 5 chickens.

The feed additives used are red ginger and turmeric mixed in the feed in the form of meal. The dose given in each treatment is different with the ratio between red ginger and turmeric, which is 1:1.

The feed ingredients used for the ration consist of yellow corn, soybean meal, fish meal, fish oil, salt, top mix, methionine and bone meal. The preparation of a ration for broiler chickens contains 22% protein and a metabolic energy of 3000 kcal/kg (Daghir, 1998). The composition of experimental rations is in Table 1 and the nutrient and metabolism energy content of basal ration are in Table 2.

The variables measured were feed consumption, weight gain, feed conversion, carcass weight, abdominal fat weight and meat cholesterol. Statistical test was performed by analysis of variance and differences between treatments effects were examined using Duncan's multiple range test (Daghir, 1998)

Table 1. Basal diets composition

Ingredients	Amount
	%
Yellow corn meal	56.0
Meat Bone Meal	4.5
Soybean Meal	22
Fish Meal	3
Salt	0.2
Corn Glutean Meal	12.5
Lysine	0.2
Methionine	0.1
Bone meal	1.0
Top Mix	0.5
Total	100

Source: Calculations using trial and error Microsoft Excel (2019).

Table 2. Nutrient and Metabolic Energy Content of Basal Ration

Ingredient	Amount
ME (kcal/kg)	300.08
Crude Protein (%)	22.42
Crude Fat (%)	3.61
Crude Fiber (%)	3.95
Calcium (%)	1.00
Phosphorus (%)	0.52
Lysine (%)	1.30
Methionine (%)	0.64
Cystine (%)	0.42
Tryptophane (%)	0.26

RESULTS AND DISCUSSIONS

The results of addition of mixed red ginger and turmeric rations of broiler chickens on the feed consumption, body weight gain, feed conversion, carcass weight, abdominal fat and meat cholesterol for each treatment can be seen in Table 3.

Effect of treatment on feed consumption

The results of the analysis of variance, it showed that the giving of mixed red ginger and turmeric in broiler rations had a significant effect ($P < 0.05$) on feed intake. Rations containing mixed red ginger and turmeric produce a fragrant aroma containing active substances, namely curcumin and essential oils which can increase appetite.

Table 3. Average feed consumption, weight gain, feed conversion, carcass weight, abdominal fat weight and cholesterol content of broiler chicken

Variable	P0	P1	P2	P3
Feed Intake (g)	2803.90 ^a	2537.60 ^b	2814.00 ^b	2420.19 ^a
Body gain (g)	1428.60 ^a	1505.70 ^b	1555.7 ^b	1401.32 ^a
FCR	1.96 ^a	1.69 ^b	1.56 ^b	1.83 ^a
Carcass weight (g)	924.20 ^a	1129.80 ^b	1186.60 ^b	900.20 ^a
Abdominal fat (g)	13.68 ^a	12.40 ^a	12.45 ^a	11.92 ^a
Meat cholesterol (mg/100 g)	91.50 ^a	80.55 ^b	80.33 ^b	78.55 ^b

Note: different superscript shows significant differences.

The active ingredients of curcumin in mixed red ginger and turmeric have cholagogic activity, which functions to increase the production and secretion of bile which is useful for emulsifying fat and can reduce body fat levels. Meanwhile, essential oils can stimulate an increase in the relaxation of the small intestine so that there will be an increase in digestion and absorption of feed substances. The addition of red ginger and turmeric with a dose of P3 (1.5%) will decrease feed consumption due to the presence of active substances in the form of essential oils which cause a pungent odor, added with the bitter taste of turmeric. In accordance with the opinion of Swastike (2012) that the palatability of the ration will decrease in the presence of a bitter taste and pungent odor, from turmeric so

that giving turmeric as much as 4% can reduce ration consumption significantly.

Effect of Treatment on Weight Gain

From Table 3, it can be seen that the average body weight gain in treatment R1 and R2 was significantly higher ($P < 0.05$) compared to treatment R0 and R3. When associated with ration consumption, this means the level of mixed red ginger and turmeric is 0.5-1.0% in the ration can increase body weight gain, while at the level of 1.5% there is a decrease in body weight gain. This is the effect of essential oils on the work of the digestive tract, especially the small intestine, and is toxic at excessive doses. In R3 treatment, it is seen that there are limitations in the function or work of essential oils so that there is a decrease in body weight gain, even though it is still within normal limits. The content of the active ingredient components, the beneficial value is the function of essential oils because the curcumin content is undetectable. The relationship between essential oils and body weight produced shows a working effect on protein digestibility in the formation of animal body tissues, including meat. The facts found provide an illustration that the mixture of red ginger and turmeric flour does not have a negative effect on average body weight gain, so that it can become a feed additive in broiler chicken rations, especially at the right dose. Afifah and Lentera (2002) state that adding ginger can increase body weight and reduce blood cholesterol levels in broiler chickens due to the work of curcumin and essential oils from turmeric.

Effect of Treatment on Feed Conversion

In Table 3, it can be seen that the addition of a mixture of red ginger and turmeric meal to the conversion value gives a positive increase. The average value of feed conversion for the addition of 0.5-1.0% mixture of red ginger and turmeric meal was significantly lower than the basal ration and rations containing 1.5% mixture of red ginger and turmeric. The ration conversion value is influenced by feed consumption and body weight gain. The results showed that body weight gain tended to increase in line with the increasing use of a mixture of red ginger and turmeric meal in the ration, while the consumption of treatment

rations was not different, causing the ration conversion value to tend to decrease. The presence of essential oils in red ginger can help digestion by stimulating the nervous system of secretions, so that gastric juice which contains enzymes such as lipase, amylase and trypsin, is secreted into the stomach and intestines, as a result the chicken is able to remodel all complex amylose, so that it is easily absorbed and broken down into meat. In line with the opinion of Desmayati (2007) which state that the bioactive substances contained in herbal ingredients such as turmeric and red ginger are thought to contain substances that can improve carbohydrate metabolism and metabolize fat in the body, thereby increasing feed efficiency and livestock health.

Effect of Treatment on Carcass Weight

Based on the Duncan test, the carcass weight of broiler chickens for treatment P1 (0.5%) and P2 (1.0%) gave a significantly higher effect than treatment P0 (0.0%) and P3 (1.5%). The addition of red ginger and turmeric can increase body weight in broiler chickens. This is in accordance with the statement of Barton and Hart (2001). Addition of antibiotic feed functions to reduce the number of pathogenic microbes in the digestive tract of chickens, so that it can increase the body weight of chickens by about 3.9% and increase the efficiency of feed use by around 2.9%. Carcass weight is closely related to the live weight of chickens at harvest time. In addition, part of the ration that is very influential for carcass formation is the protein content of the ration (Setiadi et al., 2011). The addition of red ginger and turmeric can increase the percentage of carcass weight because red ginger contains essential oils. According to Setyanto et al. (2012), essential oils can stimulate the mucous membranes in the large stomach and intestines which can cause the stomach to become empty and livestock will consume food and if the ration is added with turmeric, it will indirectly affect feed consumption and absorption of feed substances that will be form the meat and the percentage of meat carcass will be optimal (Mide, 2012).

Effect of Treatment on Abdominal Fat

Abdominal fat is fat found around the gizzard, abdominal muscles and small intestine

(Akhadiarto, 2010). The decreasing of the ration consumption, the nutrients absorbed also decreased, including fat as well as energy, with the decrease in energy, the fat in chickens that occurred was also low, seen in the decreased abdominal fat. The presence of phytochemicals found in ginger meal can bind fat or inhibit cholesterol formation (Argawal and Rao, 2000). Bioactive substances such as essential oils and curcumin, which play a role in improving the work of the digestive organs, stimulate the bile walls to release bile and stimulate the release of pancreatic juice which contains the enzyme lipase to improve fat digestion (Agustina, 2006). Furthermore, Supomo et al. (2016) stated that the content of essential oils stimulates the release of pancreatic juice, where the pancreatic juice releases lipase enzymes which can break down glycerol fatty acids so that the fat formed is reduced. The chemical compounds in turmeric in herbal ingredients can reduce fat in the body, play a role in the process of bile and pancreatic secretion that is excreted through feces (Rahayu and Budiman, 2005). The reduction in abdominal fat weight did not have a significant effect because the broiler chickens were still in their infancy. The age factor of the chicken is one of the factors causing the accumulation of abdominal fat in the body of the chicken. In chicken livestock, fat tissue begins to form rapidly at the age of 6-7 weeks, then from that time the accumulation of fat continues to accelerate, especially abdominal fat at the age of eight weeks so that chicken body weight increases rapidly (Pratikno, 2011).

Meat Cholesterol

Analysis of variance showed that by addition of mixes red ginger and turmeric has significantly effect ($P < 0.05$) on the meat cholesterol broiler chicken. The result indicated that by treatment adding until 1% gave the best results of meat cholesterol. Red ginger and turmeric produces antioxidants such as: scopoletin, nitric oxide, vitamin C and vitamin A, and has the efficacy to increase the secretion of bile and substance NO (Nitrit Oxide) that can stimulate the excretion of cholesterol through feces. Flavonoid in red ginger is one of the phytochemical groups that have the same structure, namely polyphenols, whose mechanism can

reduce cholesterol levels due to HMG-CoA (HydroxyMethyl Glutatyil-CoA) reductase activity, reduce the activity of the enzyme acyl-CoA cholesterol acyltransferase (ACAT), and reduce cholesterol absorption in the digestive tract of proteins for hormones, one of which is the hormone insulin that can increase the number of LDL receptors (low density lipoprotein) hepatic and extra hepatic.

CONCLUSIONS

The present study shows the potential of Mixture red ginger and turmeric basal ration significantly affected on performance broiler chicken and can be natural antibiotics from herbal

The addition of mixture red ginger and turmeric up to 1% in the ration could have positive impact on the growth of broiler chickens and carcass quality so as to produce healthy chicken meat, low in cholesterol, so that it is safe for consumption.

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REFERENCES

Afifah, E., & Lentera, A. (2003). Kasiat dan Manfaat Rimpang Temulawak dalam Penyembuhan Aneka Penyakit. *Agromedi Pustaka*, Jakarta.

Agustina, L., Ardiansya, W., & Jamila (2014). Peran Ramuan Herbal Labio-1 terhadap Performa dan Infeksi *Salmonella pullorum* pada Broiler. <http://repository.unhas.ac.id/handle/123456789/10709>.

Akhadiarto, S. (2010). Pengaruh Pemberian Probiotik Temban, Biovet dan Biolacta terhadap Persentase Karkas, Bobot Lemak Abdomen dan Organ Dalam Ayam Broiler. *Jurnal Sains dan Teknologi Indonesia* 12(1): Argawa, L. S dan A. V. Rao. 2000. Role of Antioxidant Lycopene in Cancer and Heart Disease. *J. Coll. Nutr* 19(5): 563–569.

Argawa, L.S., & Rao, A.V. (2000). Role of Antioxidant Lycopene in Cancer and Heart Disease. *J. Coll. Nutr.*, 19(5), 563–569.

Arifin, R, Suprijatna, E., & Sunarti, D. (2013). Pengaruh penambahan tepung Jahe Merah (*Zingiber officinale* var *Rubrum*) dalam Ransum Terhadap Performa Ayam Kampung Periode Layer. *Animal Agriculture Journal*, 2(3), 31–38.

Barton, M.D., & Hart, W.S. (2001). Public Health Risks: Antibiotic Resistance are Review. *Asian-Aust. J. Anim. Sci.*, 14, 414–422.

Daghir, N.J. (1998). Poultry Production in Hot Climates. *CAB International*, Wallingford, 4, 68–72.

Desmiati, I., & Zainuddin, F. (2007). Tanaman Obat Meningkatkan Efisiensi Pakan dan Kesehatan Ternak Unggas. *Journal Ilmu Ternak dan Veteriner Balai Penelitian Ternak*, Bogor.

Griffiths, L.S., Lesson, M., & Summers, J.D. (1997). Fat Deposition in Broiler. Influence of System of Dietary Energy Evaluation and Level of Various Fat Sources on Abdominal Fat Pad Size. *Poult. Sci.*, 56, 1018–1026.

Guenther, E. (1997). Minyak Atsiri. Diterjemahkan oleh S. Ketaren. *Universitas Indonesia*. Jakarta

Latief, A.S., Yuliati S.N., & Hendra, I. (1997). Pengaruh Jahe dalam Ransum Terhadap Penampilan Ayam Pedaging Proseding Seminar Nasional II. *Ilmu Nutrisi dan Makanan Ternak*.

Legowo, A.M. (2004). Pengembangan Produk Ternak Rendah Lemak dan Tinggi Asam Lemak Tidak Jenuh. *J. Indon. Trop. Anim. Agric.*, 29(4), 225–233.

Maheswari, I. (2002). Pemanfaatan Obat Alami: Potensi dan Prospek Pengembangannya. *Puslitbangtri Departemen Pertanian*, Bogor.

Mangisah, I. (2005). Pemanfaatan Kunyit (*Curcuma demastika*, Val) atau Temulawak (*Curcuma xantorrhiza* Roxb) untuk Menurunkan Kadar Kolesterol Daging Ayam Broiler. <File://A:/curcumin/kunyt/temulawak/cari1.htm>.

Mide, M.Z. (2012). Penampilan Broiler yang Mendapatkan Pakan Mengandung Tepung Daun Katuk dan Rimpang Kunyit. Available at: <http://repository.unhas.ac.id/bitstream/handle/123456789/2383/Seminar%20nasional%20unpad%202012.Pdf?Sequence=1>. (diakses tanggal 07 Januari 2019).

Pratikno, H. (2011). Lemak abdominal ayam broiler (*Gallus sp.*) karena pengaruh ekstrak kunyit (*Curcuma domestica* Vahl.). *BIOMA*, 13, 1–8.

Purwanti, I. (2008). Kajian Efektifitas Pemberian Kunyit, Bawang Putih dan Mineral Zink terhadap Performa, Kadar Lemak, Kolesterol dan Status Kesehatan Broiler. Thesis. *Sekolah Pascasarjana*, Institut Pertanian Bogor.

Puvaca, N., Stanacev, V., Beukovic, M., Ljubojevic, D., Kostadinovic L., & Teodosin, S. (2014). Black Pepper (*Piper nigrum* L.) and Hot Red pepper (*Capsicum annum* L.) in Broiler Chicken Nutrition. *Proceeding of The International Symposium on Animals Science*, Serbia, 249–256.

Rahmawati, N. (2013). *Pengaruh Penggunaan Suplemen Herbal terhadap Penampilan Produksi dan Sistem Imun Itik Hibrida*. Thesis. *Fakultas Peternakan*, Universitas Brawijaya. Malang.

Rukmana, R. (2005). *Kunyit*. Kanisius. Yogyakarta.

Safa, M.A. (2014). Response of Broiler Chicken to Diets Containing Different Mixture Powder Levels of Red Pepper and Black Pepper as Natural Feed Additive. *Animal and Veterinary Sciences*, 2(3), 81–86.

Setiadi, D., Khaira N., & Syahrio, T. (2011). *Perbandingan Bobot Hidup, Karkas, Giblet dan Lemak Abdominal Ayam Jantan Tipe Medium dengan Strain Berbeda yang Diberi Ransum Komersil Broiler*. Skripsi. Jurusan Peternakan. Fakultas Pertanian. Universitas Lampung. Lampung

Setyanto, A., Atmomarsono, U., & Muryani, R. (2012). Pengaruh Penggunaan Tepung Jahe Emprit (*Zingiber*

officinale var *Amarum*) dalam Ransum terhadap Laju Pakan dan Kecernaan Pakan Ayam Kampung Umur 12 Minggu. *Animal Agriculture Journal*, 1(1), 711–720.

Sinurat Sinurat, P.A., Purwadaria, T., Bintang, I.A.K., Ketaren, P.P., Bermawie, N., Raharjo, M., Rizal, M. (2009). Pemanfaatan kunyit dan temulawak sebagai imbuhan pakan untuk ayam broiler. *Jurnal Ilmu Ternak dan Veteriner Indonesia*, 14(2), 90–96.

Soedibyo, M. (1998). *Alam Sumber Kesehatan, Manfaat dan Kegunaan*. Jakarta, Balai Pustaka.

Swatike, W. (2012). *Efektifitas Antibiotik Herbal dan Sintetik pada Pakan Ayam Broiler terhadap Performance, Kadar Lemak Abdominal dan Kadar Kolesterol Darah*. Prosiding SNST ke-3. Fakultas Pertanian Universitas Sebelas Maret.