# Blood lipid profile of broiler chicken as affected by a combination of Feed restriction and different crude fiber sources

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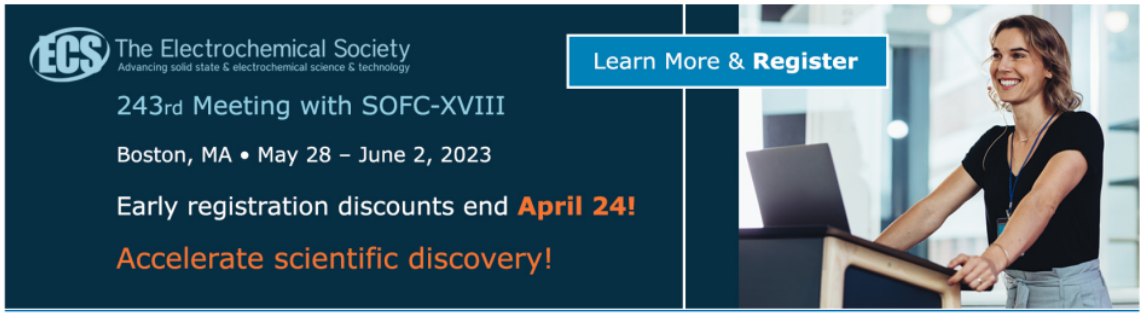


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# Blood lipid profile of broiler chicken as affected by a combination of Feed restriction and different crude fiber sources

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**Abstract.** The aim of this study was to elaborate the effect of feed restriction and different crude fiber sources on blood lipid profiles of broiler chicken. This research was using a Completely Randomized Design (CRD) in Factorial pattern of 2x4 with 3 replications. The 'A' factor was restricted feeding which consisted of no restrictions (A0), and 20% restricted feeding (A1). While 'B' factor was source of crude fiber which consisted of: commercial feed (B0), commercial feed + coffee hull meal (B1), commercial feed + rice bran (B2), and commercial feed + coconut oilcake (B3). Parameters observed were serum cholesterol, triglycerides, LDL, and HDL level. The results showed that the combination of feed restriction and source of crude fiber in the diets did not affect ($P > 0.05$) serum cholesterol, triglycerides, LDL, and HDL level. The 'A' factor gave a significant effect ($P < 0.01$) on serum cholesterol and LDL level, meanwhile 'B' factor gave a significant ($P < 0.05$) on serum cholesterol, LDL, and HDL level. It can be concluded that feed restriction up to 20% and source of crude fiber from coconut oilcake gave a better results on serum cholesterol, triglycerides, LDL, and HDL level.

## 1. Introduction

Chicken meat is one of animal protein sources that has good taste and it is preferred by kids and adults. Its also has a high biological value, relatively low price, relatively affordable by almost every social stratum, and being served from small restaurants to starred hotels. A broiler farm is relatively easy to handle from farm scale management and investment, as well as time needed for the broiler chicken farming is very short (5 weeks). Broiler chicken is able to produce one kilogram of meat or even more just in 30 – 45 days; or in other ways, in 6 – 8 weeks can gain up to 1.5 – 2.0 kg of body weight. The great potential of broiler chicken can not be optimal when it is not supported by required feed both in quantity or quality [1].

One of the obstacles in fulfilling meat consumption requirements is consumer society attitude that limiting the consumption of animal meat due to fat content which is considered has a negative effect on human health (cholesterol phobia). The slogan of "Feed Quality for Food Safety" from Directorate General of Animal Husbandry, Ministry of Agriculture, has become a research target in nutrition and feed technology to utilize locally available feeds. Applying 'feed restriction' or restriction of feed supply in broiler farming at certain growing period or phase is for two reasons which is to increase feed efficiency and meat quality by manipulating diet formulation. Restriction of feed consumption results in reducing amount of feed quantity or quality; as well as time and duration of feed restriction

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(intensity and frequency) will all affect animal response to growth compensation or compensatory growth [2].

Diet formulation by optimizing utilization of fiber rich feedstuffs is very potential in North Sulawesi region, such as: rice bran, coconut oil cake, copra meal, coffee pulp, seaweeds. These locally available fiber rich feedstuffs are proposed to be able to reduce fat content of broiler chicken and in turn it becomes a safe and healthy broiler chicken meat. Theoretically, feed restriction reduces *Acetyl Carboxylase* activity in the liver, a limiting enzyme for fatty acid synthesis in the liver, and as result this will limit triglycerides concentration and reduces the contribution of fat accumulation. The present study was conducted to investigate the effect of feed restriction and different crude fiber sources feedstuffs on blood fat profiles of broiler chicken.

## 2. Methods

One hundred and twenty Cobb strain broiler chicks aged 3 weeks old were randomly allocated into 24 cages. Commercial feed CP12, fish meal, coffee pulp, rice bran, and coconut oilcake were formulated and used in the present study. A Completely Randomized Design (CRD) in Factorial Arrangement (2 x 4 with 3 replications) was employed in the present study [3]. Factor A was restricted feeding regime which consisted of: no restrictions (A0), and 20% restricted feeding regime (A1). Factor B was source of crude fiber which consisted of: commercial feed (B0), commercial feed + coffee hull meal (B1), commercial feed + rice bran (B2), and commercial feed + coconut oilcake (B3). Diet formulation and nutrient content of each treatment was presented in Table 1.

**Table 1.** Nutrient content of treatment diets

| Treatments | Protein | Ether extract | Calcium | Phosphorus | Dry Matter | Crude fiber | ME (Kcal/kg) |
|---|---|---|---|---|---|---|---|
| | ---------- % ---------- | | | | | | |
| B0 | 22 | 6.00 | 1.05 | 0.85 | 88,00 | 5 | 2900.00 |
| B1 | 20 | 6.37 | 0.76 | 0.56 | 88.24 | 10 | 2957.05 |
| B2 | 20 | 6.21 | 1.21 | 1.08 | 87.54 | 10 | 2932.06 |
| B3 | 20 | 14.98 | 1.12 | 0.91 | 88.72 | 10 | 3175.54 |

Feed restrictions were carried out at age of 21 - 28 days old. Soon after feed restriction was terminated, birds were fed commercial diets *ad libitum* until the period of 42 days time. Blood samples were obtained at 29th day of the experimental period, then froze for later assays of serum cholesterol, triglycerides, low density lipoprotein (LDL), and high density lipoprotein (HDL) level.

The data were analyzed using SPSS (version 22.0) for ANOVA. After a significant F test, Least Significant Differences (LSD) (when necessary) was used to inspect differences among group means. Statistical significance was accepted at $P < 0.05$.

## 3. Results and discussion

Serum cholesterol level of broiler chicken with feed restriction and different crude fiber sources was presented in Table 2. There is no interaction between A factor (feed restriction) and B factor (different crude fiber sources) on serum cholesterol level of broiler chicken. Factor A (feed restriction) and factor B (different crude fiber sources) each gave a significant ($P < 0.05$) difference on serum cholesterol level of broiler chicken. Serum cholesterol level of broiler chicken with a feed restriction regime of 20% (A1) significantly ($P < 0.05$) lower compared to without restriction (A0) treatment. Crude fiber sources (B0, as a control diet) gave a significantly ($P < 0.05$) higher serum cholesterol level compared to all three different crude fiber sources (B1 as coffee pulp, B2 as rice bran, and B3 as coconut oilcake); whereas no significant differences in serum cholesterol level of broiler chicken were found between B1and B2 and B3, and there was a significant ($P < 0.05$) difference between B2 and B3. Serum cholesterol level of broiler chicken in the present study was in the range of 139.67±9.46 mg/dl - 164.83±4.71 mg/dl; normal serum cholesterol of broiler chicken is about 125-200 mg/dl [4].

**Table 2.** Average serum cholesterol level (mg/dl) of broiler chicken in each treatment

| Feed Restriction (A Factor) | Crude Fiber Sources (B Factor) | | | | Average |
|---|---|---|---|---|---|
| | B0 | B1 | B2 | B3 | |
| A0 | 168.33±3.05 | 147.00±5.00 | 141.00±5.13 | 146.00±7.00 | 151.75±11.69[a] |
| A1 | 161.33±3.05 | 132.33±6.11 | 130.33±5.51 | 143.67±4.16 | 141.92±13.51[b] |
| Average | 164.83±4.71[a] | 139.67±9.46 [bc] | 136.00±7.82[c] | 144.83±5.30[b] | |

[abc]Average values within a row and column bearing different superscripts differ significantly (P < 0.05)

Blood or serum cholesterol is much affected by genetic factor, feed, and medicines [5]. Cholesterol is originated from two sources which are from feed (exogen cholesterol) and cholesterol produced by body itself (endogen cholesterol). Cholesterol originated from feed play an important role since it is a main sterol in the body, cell surface component, and intracellular membran [6].

Higher serum cholesterol level in B0 treatment is due to lower crude fiber level, about 5% lower compared to B1, B2, and B3 treatments with a crude fiber level of 10%. Fiber has correlation with low cholesterol level of blood or serum of broiler chicken [7]. Serum cholesterol level can be lowered by increasing crude fiber level in animal diets. High crude fiber level in the diet can reduce serum cholesterol level [8]. It is proposed that, crude fiber in the diet can absorb bile acid, which in turn reducing bile acid. Cholesterol is a precursor of bile acid biosynthesis and steroid hormones, so that when bile acid is low it will affect serum cholesterol level [9].

Average serum triglycerides of broiler chicken in the present study was presented in Table 3. There is no significant (P > 0.05) differences among treatment on serum triglycerides level of broiler chicken in this study. Triglyserides level in the present study was about 29.50±3.51 mg/dl to 34.00±4.56 mg/dl, and this value still in a normal triglycerides level in broiler chicken of about ≤ 150 mg/dl [4]. Factors that affect serum triglycerides are: diets, estrogen, fat formation, and diseases [10].

**Table 3.** Average serum triglycerides (mg/dl) of broiler chicken

| Feed Restriction (A Factor) | Crude Fiber Sources (B Factor) | | | | Average |
|---|---|---|---|---|---|
| | B0 | B1 | B2 | B3 | |
| A0 | 34.33±2.51 | 28.67±1.53 | 32.33±2.52 | 34.00±5.57 | 32.33±3.73 |
| A1 | 31.00±2.65 | 30.33±5.13 | 29.33±5.13 | 32.33±2.08 | 30.75±3.60 |
| Average | 32.67±2.94 | 29.50±3.51 | 30.16±3.43 | 34.00±4.56 | |

Average serum HDL level of broiler chicken in the present study was presented in Table 4. There is a significant difference (P < 0.05) among B factor on serum LDL level of broiler chicken. The B0 treatment gave a significantly (P < 0.05) higher serum LDL level compared to B1, B2, and B3 treatments, while no significant difference was found among B1, B2, and B3 treatments. HDL is a lipoprotein which maintains the balance of cholesterol so that it is not accumulated in the cell. This balance is managed by the sterol slough off from membrane at the same rate with the number of cholesterol synthesis entering the liver [11]. HDL (High Density Lipoprotein) often named as a good cholesterol because it is a lipoprotein that transports lipid from peripher to hepar [12]. The function of HDL is to carry the remain cholesterol which is not being used into the liver. This remain cholesterol will be using as a precursor in the formation of bile salt and steroid hormones. The remain cholesterol which is not being used will be excreted [12].

**Table 4.** Average serum HDL (mg/dl) level of broiler chicken

| Feed Restriction (A Factor) | Crude Fiber Sourcesr (B Factor) | | | | Average |
|---|---|---|---|---|---|
| | B0 | B1 | B2 | B3 | |
| A0 | 122.00±3.00 | 155.00±8.72 | 99.00±5.00 | 114.00±7.00 | 112.50±10.27 |
| A1 | 133.67±6.43 | 108.33±4.16 | 101.00±13.75 | 108.67±3.51 | 112.92±14.63 |
| Average | 127.83±7.81[a] | 111.67±7.12 [b] | 100.00±9.32 [b] | 111.33±5.75[b] | |

[abc] Average values within a row and column bearing different superscripts differ significantly (P < 0.05)

Average serum LDL level of broiler chicken in the present study was presented in Table 5. There is a significant ($P < 0.05$) difference between A and B factors. A0 treatment significantly ($P < 0.05$) gave a higher serum LDL level than A1 treatment; while B0 treatment gave a significantly ($P < 0.05$) higher serum LDL level compared to B1, B2, and B3 treatments. There is also a significant ($P < 0.05$) difference was found between B1 and B2 treatments but no difference was found between both B1, B2 and B3 treatments on serum LDL level of broiler chicken in the present study.

**Table 5.** Average serum LDL (mg/dl) of broiler chicken

| Feed Restriction (A Factor) | Crude Fiber Sources (B Factor) | | | | Average |
|---|---|---|---|---|---|
| | B0 | B1 | B2 | B3 | |
| A0 | 40.13±0.50 | 26.27±5.43 | 36.20±1.58 | 25.20±4.39 | 31.95±7.33[a] |
| A1 | 24.80±2.42 | 21.27±6.05 | 25.47±3.14 | 28.53±3.03 | 25.02±4.30[b] |
| Average | 32.47±8.54[a] | 23.77±5.83[c] | 30.83±6.29[b] | 26.87±3.83[bc] | |

[abc] Average values within a row and column bearing different superscripts differ significantly ($P < 0.05$)

Average serum LDL level of broiler chicken in the present study is in the range of normal value (23.77±5.83 mg/dl - 32.47±8.54 mg/dl), which is ≤ 130 mg/dl [4]. LDL plays a role in providing cholesterol in the body tissues because LDL is a main carrier for cholesterol from liver to the body tissues, so that serum LDL level is affected by cholesterol concentration. LDL is a cholesterol with a low density and functions to carry cholesterol and triglycerides to the organs [11].

## 4. Conclusion

Feed restriction of 20% and crude fiber sources from coconut oilcake showed a good result for serum cholesterol, triglycerides, LDL, HDL level of broiler chicken.

## References

[1] Rasyaf M 2000 *Beternak Ayam Pedaging* (Jakarta : Penebar Swadaya)
[2] Tulung B 2010 *Pengaruh tingkat pembatasan ransum terhadap konversi ransum broiler unsex Laporan Penelitian* (Manado : Lembaga Penelitian Universitas Sam Ratulangi Manado)
[3] Steel R G and Torrie J H 1995 *Prinsip dan Prosedur Statistika Suatu Pendekatan Biometrik* Edisi 2 (Jakarta : PT Gramedia)
[4] Basmacioglu H and Ergul M 2005 *Turk. J. Vet. Anim. Sci.* **29** 157–64
[5] Hargis S P 1988 *World Poult. Jour. Sci.* **44** 17–19
[6] Muchtadi D, Palupi N S and Astawan M 1993 *Metabolisme Zat Gizi Sumber, Fungsi dan Kebutuhan dari Tubuh Manusia* Jilid II (Jakarta : Pustaka Sinar Harapan)
[7] Delany B, Nicolisi R J, Wilson T A, Carison T, Frazer F, Zheng G H, Hess R, Ostergren K and Kautson N 2003 *J. Nutr.* **133** 468–95
[8] McNaughton J I 1978 *J. Nutr.* **108** 1842–48
[9] Page H S 1985 *Prinsip-prinsip Biokimia* Diterjemahkan oleh R Soendoro (Jakarta : Erlangga)
[10] Mahan K L and Stump S S 2004 *Krause's food, Nutrition, dan Diet Therapy* (Philadelhia : Saunders)
[11] Hasanuddin S, Yunianto V D and Tristiarti 2013 *JITP* **3** 11–7
[12] Rosadi I 2003 *Jurnal Ilmiah Peternakan* **1** 579–605

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