

# Blood Metabolite Statuses of Local Sheep Fed With *Indigofera* sp.

Dewi Apri Astuti\*, Sri Rahayu, Budi Satoto, Rudy Priyanto, Lilis Khotidjah, Tuti Suryati, & M. Baihaqi

Faculty of Animal Science, Bogor Agricultural University, Bogor 16680 Indonesia

\*e-mail:dewiapriastuti@yahoo.com

## Abstract

Blood metabolite statuses represent blood nutrients which will be metabolized by the cell. Low nutrient statuses of local sheep fed with sole grass caused low performance. The aim of this experiment was to evaluate blood metabolite statuses of growing male local sheep through improvement of ration containing *Indigofera* sp. Eight local sheep consisted of four UP3-jonggol and four garut growing sheep, were used in this experiment for three months. The rations were pellet concentrate containing 30% of *Indigofera* sp with 15% crude protein (CP) and 73.80% total digestible nutrient (TDN). The animals were reared in individual cages and given water and feed ad libitum. At the end of the experiment, blood was drained and collected from jugular vein using 5 ml spoit. The blood were analysed for the concentrations of plasma glucose, urea and total cholesterol using diagnostic KIT Merck Dya-Cys following laboratory standard procedure. The design of this experiment using simple T-test, the mean data was compared for all parameters. Result showed that plasma glucose concentration was not significance (77.95 vs 85.89 mg%) among the local sheep, while concentrations of blood urea-N (BUN) and plasma cholesterol in jonggol sheep (73.31 mg% and 77.18 mg%) were significant higher than in garut sheep (55.99 mg% and 58.97 mg%). It was concluded that jonggol sheep have higher plasma cholesterol and BUN compared to the garut sheep which fed by 30% *Indigofera* sp. in the ration.

Keywords: cholesterol, garut and jonggol sheep, glucose, *Indigofera* sp., urea-N

## Introduction

Lamb meat has high cholesterol concentration which caused metabolic syndrome disease (*atherosclerosis*). It is important to manage system in order to get good quality of meat without reducing the productivity. Feeding management can solve the problem through diversification kind of forage utilization. Cholesterol concentration in sheep (80 mg%) was higher than in beef (74 mg%). Blood metabolite status, represents blood nutrients, are produced by cell metabolism and will affect

meat quality. Low nutrient status of local sheep fed with sole grass caused low blood metabolite status and their performance *Indigofera* sp. is one of legume which has potential to be used and has 27% protein and 15.5% fiber content, meanwhile the productivity is around 4,096 kg dry matter (DM)/ha (Abdullah, 2010). Fatty acid composition of *Indigofera* sp. is low in poly-saturated fatty acids, so it is promising to be used as the best part in the ration for producing good lamb meat. Substitution poly-saturated fatty acid with poly-unsaturated fatty acid could reduce total cholesterol concentration, including the concentration of LDL-cholesterol (Marsic and Yodice, 1992). On the other hand, local sheep reared under the tropical rainforest with sole mixed-grass, had low blood profil status and low performance (Astuti *et al.*, 2009). So far, it was reported that the concentrations of serum trigliceride, glucose and total protein of those sheep had only 18,71 mg% , 51,86 mg % and 6,40 mg%, respectively. Meanwhile Wiryawan *et al.* (2010) reported that jonggol sheep had low performance (40 g/h/d) caused by unbalance nutritional status and high daily temperature and humidity. There is no study in utilisation of *Indigofera* sp. for local sheep (garut and -jonggol) to improve poor feeding management; so it is expected that feeding the legume will improve metabolite profile and lamb meat quality.

The aim of this experiment was to evaluate blood metabolite statues of growing male local sheep (garut and jonggol) fed with pellet ration containing 30% *Indigofera* sp.

## Materials and Methods

Eight local sheep consisted of four jonggol and four garut growing sheep (average body weight, 20 kg), were used in this experiment for three months. The rations were pelleted containing 30% of *Indigofera* sp. and 70% of concentrate with total ration contained 18% crude protein, 15.40% fiber, 3.14% Extract Ether, 42.43% starch and 73.80% total digestible nutrient (TDN). The animals were reared in individual cages and given water and feed *ad libitum*. At the end of the experiment, blood was drained and collected from jugular vein using 5 ml syringes. Whole blood was separated by centrifugation the blood at 10.000 x g for 10 minutes to obtain the serum. The serums were analyzed for the concentrations of glucose, blood urea nitrogen (BUN) and cholesterol using assay kit DyaSys catalogue number 101592 as standard procedure with spectrophotometer. The data were compared using T-test between two local breeds and presented as figures.

## Results and Discussion

The physiological and biochemical differences between individuals and breeds, which had different types of blood profile are used for indicating response to the

Table 1. Metabolite profile of local sheep fed with *Indigofera* sp.

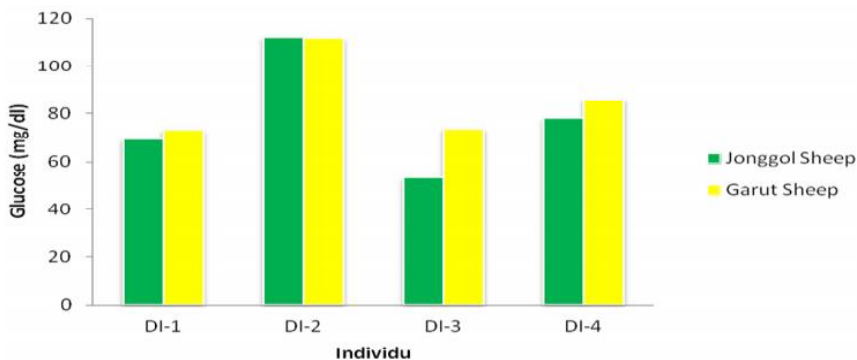
Parameters	Jonggol sheep	Garut sheep
Glucose (mg%)	77.95±24.73	85.89±17.87
Blood Urea (mg%)	73.31±4.18 <sup>a</sup>	55.49±7.46 <sup>b</sup>
Cholesterol (mg%)	77.17±15.27 <sup>a</sup>	58.97±9.74 <sup>b</sup>

Means in the same row followed by different letters are significantly different (P<0.05)

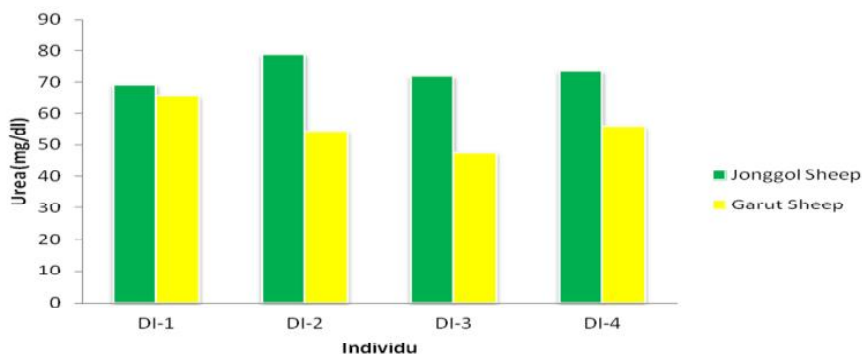
ration containing *Indigofera* sp. Results showed that serum glucose concentration was not significant among two local breeds (jonggol: 77.95 mg% and garut: 85.89 mg%), while concentrations of serum urea-N and cholesterol in jonggol sheep (73.31 mg% and 77.18 mg%) were significantly higher than in garut sheep (55.99 mg% and 58.97 mg%) (P<0.05).

The glucose concentration of both local sheep fed with *Indigofera* sp. showed in good condition compared to the healthy sheep. Riis (1983) reported that the normal glucose concentration of healthy sheep was 35–60 mg%. These ranges covered for growing sheep (58 mg %), pregnant sheep (47 mg%) and lactating sheep (59 mg%). The composition of *Indigofera* sp. ration with high starch (42%) value and rapidly metabolized may increase glucose concentration in both breeds. In ruminant blood metabolite profile, glucose concentration is low, but it is very important to support nutrient for the brain, nervous systems and active organs such mammary gland (Riis,1983).

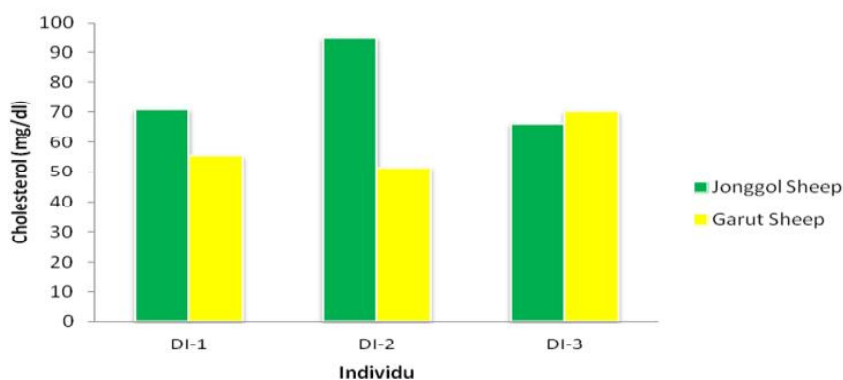
Blood urea nitrogen (BUN) is representing metabolite exes of protein. Jonggol sheep which are usually reared in grazing pasture with low quality of forage has better response to the high quality ration compared to garut sheep (kept in semi intensive farming system). The condition caused a compensatory metabolism which can improve the blood metabolite status in a short time. The evaluation during three months observation showed that the concentration of BUN in UP3-jonggol growing sheep were higher than in garut growing sheep.



Graph 1. Glucose profile of UP3-jonggol and garut growing sheep



Graph 2. Urea-N profile of UP3-jonggol and garut growing sheep



Graph 3. Cholesterol profile of UP3-jonggol and garut growing sheep

Cholesterol status of UP3-jonggol growing sheep were higher than garut growing sheep in the same age fed with *Indigofera sp.* and both higher than other breeds. Cox-Ganser *et al.* (1994) reported that blood compositions in sheep grazing Brassicas had average value of 68 mg/dl, 20 mg/dl and 64 mg/dl for glucose, BUN and cholesterol, respectively. Some factors affecting to the cholesterol concentration were feeding, age, physiological state, health and breed. Cholesterol is needed for the steroids hormone precursor in growing animals (Riis, 1983).

Miresan (2003) reported that serum cholesterol in difference breeds of mountain sheep in grassing area were  $48.00 \pm 2.66$  mg/dl (tsigai);  $51.60 \pm 4.30$  mg/dl (merino) and  $48.40 \pm 2.37$  mg/dl (corriedale), while for the BUN were  $39.80 \pm 2.13$  mg/dl,  $31.00 \pm 1.51$  mg/dl and  $37.00 \pm 1.67$  mg/dl, for tsigai, merino and corriedale, respectively. Different breed cause different fate of nutrient metabolism causing variation in nutrient metabolite status and deposition. Sudarman *et al.* (2006) reported that utilization of 1.5% Ca-saponified lemuru oil in ration could reduce meat cholesterol-LDL concentration in sheep up to 32% and increased feed efficiency up to 36%, while the concentration of triglyceride was around 29 mg%.

## Conclusions

Analysis of biochemical parameters of local sheep fed with 30% *Indigofera* sp. to the blood metabolite profile showed that their values are in normal physiological status. Jonggol growing sheep has higher blood urea-N and cholesterol serum concentrations compared to garut growing sheep.

## Acknowledgement

This research was funded by Research Grant of Penelitian Unggulan Fakultas from IPB 2011.

## References

- Abdullah, L. 2010. Herbage production and quality of shrub *Indigofera* treated by different concentration of foliar fertilizer. *Med. Pet.* 33 : 169-175
- Astuti, D.A., R. Ekastuti, Marwah and Suryani. 2009. Status Nutrien dan Gambaran Darah Domba Lokal yang Dipelihara di Hutan Pendidikan Gunung Walat, Sukabumi. *Jurnal Pertanian UNSYAH* 1 : 1-8
- Astuti D.A. and A. Sudarman. 2009. Blood Profile and Body Composition of Sheep Fed With Lemuru Oil Coated By Herbs. *Proc. ISAI*, November, 21<sup>st</sup> 2009. Bogor Indonesia
- .Cox-Ganser, J.M., G.A. Jung, R.T. Pushkin and R.L. Reid. 1994. Evaluation of Brassicas in grazing systems for sheep : II. Blood composition and nutrient status. *J Anim. Sci.* 72: 1832-1841
- Marsic, V. and R. Yodice. 1992. The Dietary Role of Monounsaturates. *INFORM*, 3 : 681.
- Miresan, V. 2003. Evolution of The Main Blood Indices in Tsigai Fattening Sheep. *J. of Central European Agriculture* 4 (4) : 405-410 (on line).
- Riis, P.M. 1983. *Dynamic Biochemistry of Animal Production*. Mc Graw Hill New York USA. pp 363.
- Sudarman, A., K. G. Wiryawan, H. Nuraeni, M. Muttakin, dan H. Markhamah. 2006. Pengaruh pemberian sabun kalsium dari minyak ikan lemuru terhadap kinerja dan kualitas daging domba jantan lokal. Seminar Nutrisi dan Teknologi Pakan. Departemen Ilmu Nutrisi dan Teknologi Pakan, Fakultas Peternakan, Institut Pertanian Bogor.
- Wiryawan, K.G., D.A. Astuti, R. Priyanto and S. Suharti. 2009. Optimalisasi pemanfaatan rumput dan legume pohon terhadap performa, produksi dan kualitas daging domba jonggol. Laporan Penelitian Unggulan IPB, Bogor.