

Profiles of Pre-Weaning Kacang Goat's Gonadal Hormones Supplemented with *Sauropus androgynus* L. Merr

Heri Dwi Putranto¹, Yossie Yumiati², Ahmad Zueni², and Novitri Kurniati³

¹ Department of Animal Science, Faculty of Agriculture, Universitas Bengkulu, Jalan W.R. Supratman, Kandang Limun, Bengkulu 38371A, Indonesia

² Faculty of Agriculture, Universitas Dehasen Bengkulu, Jalan Raya Meranti, Sawah Lebar, Bengkulu 38227, Indonesia

³ Faculty of Agriculture, Universitas Muhammadiyah Bengkulu, Jalan Bali, Kampung Bali, Bengkulu, Indonesia

E-mail: heri_dp@unib.ac.id

ABSTRACT

Kacang goat is famous among Indonesian as one of small ruminant inhabits Indonesia archipelago. This species easily to find in all across the country especially in Sumatera island. Lately, according to 2012 Bengkulu Province's Ruminant Survey Results it's population significantly decreased even though market demands for kacang goat product (meat) still high and economically recommended. Therefore to increase their population nationwide, it's reproduction capacity should be improved. In this study, There were 9 pre-weaning female kacang goat used and localized in an individual cages. They were pre-sexual mature regarding their age (3 to 5 months of age) and average weight of 8.5 ± 0.4 kg. During 56 days, they fed twice a day fresh grass *ad libitum*, freely drinking water and supplemented by the mixture of katuk (*Sauropus androgynus* L. Merr) flour and concentrate. The supplementation dozed in 3 levels: 0, 7.5 and $15 \text{ gr}^{-1}\text{day}^{-1}$. The purpose of this study was to evaluate the effect of katuk (*Sauropus androgynus* L. Merr) supplementation on profiles of female kacang goat gonadal hormones. The results shown that there was no significant effect of supplementation on goat's serum progesterone and estradiol-17 β concentration. The highest serum progesterone and estradiol-17 β level were detected in goats fed by $15 \text{ gr}^{-1}\text{day}^{-1}$ of katuk flour which are $1.317 \text{ ng}^{-1} \text{ ml}^{-1}$ and $83.373 \text{ pg}^{-1} \text{ ml}^{-1}$, respectively. In comparison, non-supplemented goats gonadal hormones level were the lowest. We can conclude that the supplementation of katuk flour can affects the profile of pre-weaning kacang goat's gonadal hormones.

Keywords: Gonadal Hormones, Kacang Goat, Katuk Flour, Pre-weaning, Supplementation.

INTRODUCTION

Development and breeds of livestock, especially ruminants, in this case goat, has been being done intensively. This is to answer the challenge of meeting the needs of animal protein and food security conforming to the rate of population growth accompanied by increasing the percentage of community nutrition awareness in Indonesia. According to Ismawan and Budiantoro (2005), fattening effort of ruminants is one of development subsector with excellent results.

Kacang goat is a superior race that was first developed in Indonesia, which has the ability to adapt to the tropics and has a high prolificacy (Obst *et al.*, 1980 and Sakul *et al.*, 1994). This species is easy to be found in almost all the islands, particularly in Sumatra. Kacang goat is a local goat with great potential as a supplier some animal protein needs of society and supporting food security programs in Indonesia.

Based on the research results Wiradarya (2004), it was known that the goat population in Indonesia has a serious problem with the population decline. Based on survey data ruminant population in 2012 in the province of Bengkulu showed significant declines despite market demand for Kacang goat's product meat production is still high and economical recommended. Revenue Expenditure Accounts goat in Bengkulu show goats livestock's expenses is greater than revenues so that the goat reproduction management should be improved in order to be able to increase its population. The fact shows that the production of Kacang goat reproduction is very high where the age of puberty goats is six months and seven months (Herman *et al.*, 1983).

The use of katuk (*Sauvopis androgynus* (L.) Merr) as a feed supplement or feed additive have been examined within the past 2 decades (Putranto, 2011). In the field of reproduction, it is stated that the benzoic acid contained in katuk leaves will be converted to estradiol benzoate in the body. Estradiol benzoate role is to improve reproductive function and stimulates the growth of follicles. The aim of this research was to evaluate the effect of three doses of supplementation Katuk flour mixed with the concentrate to display female pre-weaning Kacang goat's gonadal hormones.

MATERIALS AND METHODS

This research used 9 pre-weaning female kacang goat which were placed each in individual cages. Kacang goats were used in the research pre-sexual mature regarding their age (3 to 5 months of age) and average weight of 8.5 ± 0.4 kg During the 56 days of observation, Kacang goat were fed twice a day fresh grass ad libitum, freely drinking water and supplemented by the mixture of katuk (*Sauvopis androgynus* L. Merr) flour and concentrate.

Preparation includes the preparation and sanitation cage. Individual cages with a size of 0.5×1 m is divided based on the treatment and fitted where food and drinking water as well as each treatment filled by 3 goats. Goats should be in good health and should be adapted to the cage surrounding environments and feed ingredients . The design used was a draft Longitude Cage Latin (Latin Square) with 3 treatments and each treatment consisted of three replications. The three kinds of treatment are:

- A = feeding (fresh grass and concentrates) ad libitum + non supplementation
- B = feeding (fresh grass and concentrates) ad libitum + katuk supplementation (7.5 gr-1day-1)
- C = feeding (fresh grass and concentrates) ad libitum + katuk supplementation (15 gr-1day-1)

The parameters to be observed in the form of reproduction, namely:

a. Serum Progesterone Concentration

Blood was drawn from the jugular vein in the tail about 5 ml on days 0, 28 and 56. The taking was conducted in the morning 06.30 am.

b. Estradiol-17 β Concentration

Blood was drawn from the jugular vein in the tail as much as 5 ml of days 0, 28 and 56. The taking was conducted in the morning 06.30 am.

RESULTS AND DISCUSSIONS

The measurements of reproductive parameters (serum progesterone and estradiol - 17 β concentration) was done using a blood sample taken from blood vessels of pre weaning female kacang goat on the back of the ears as much as 5 ml on days 0, 28 and 56. The taking made in the morning at 06.30 pm . The blood samples then were taken immediately to the laboratory for analysis.

Data serum progesterone (P4)

Data serum progesterone (P4) pre - weaning female kacang goat got treated by katuk flour supplementation can be seen in Table 1 below.

Table 1. Profile of hormone progesterone pre - weaning female kacang goat during the research (ng/ml)

Treatment	Taking			Averages
	1	2	3	
A	0.253	0.300	0.347	0.300
B	0.260	0.493	0.777	0.510
C	0.283	0.530	1.317	0.710
Probability	ns	ns	ns	

A = feeding (fresh grass and concentrates) ad libitum + non supplementation, B = feeding (fresh grass and concentrates) ad libitum + supplementation katuk ($7.5 \text{ gr}^{-1}\text{day}^{-1}$), C = feeding (fresh grass and concentrates) ad libitum + supplementation katuk leaves ($15 \text{ gr}^{-1}\text{day}^{-1}$). ns = not significant ($P > 0.05$).

The results of variance analysis showed that supplementation with 3 levels of supplementation of katuk flour on pre-weaning females during the research has no significant effect on the hormone

concentrations of P4 ($P < 0.05$). This is possible because the uniformity of the reproductive phase in goats used in this research.

The lowest hormone concentrations P4 for the females kacang goat which treated non-supplementation of katuk flour (0,253 ng/ml) on day 0 of the research (blood sampling to-1) and the highest is kacang goat treated supplementation katuk flour by $15 \text{ gr}^{-1}\text{day}^{-1}$ on day 56 of the study (1.317 ng/ml).

The mean P4 hormone concentrations (Table 1) indicate that treatment A gave the lowest results (0.300 ng/ml) when compared to other treatments (B and C). The propensity applies to each sampling data to the 1, 2 and 3. The above data also indicate that the amount of katuk flour supplementation on feed would increase the concentration of hormones P4 on Kacang goat's during the research period.

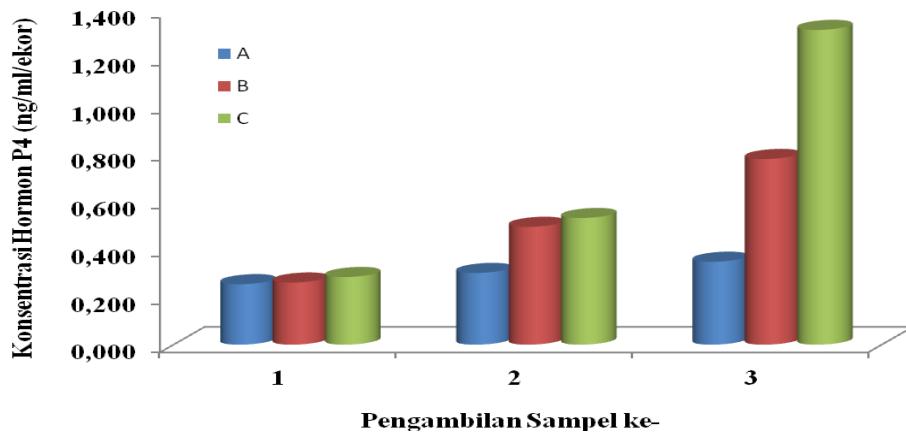


Figure 1. Hormon profile of P4 on pre weaned female Kacang goat during research

The amounts of supplementation of katuk flour given to kacang goat also contribute an increased concentration of hormones produced P4. It can be seen from P4 hormone concentration profiles were continuously tend to continue to increase (Figure 1). P4 hormone generated from each sampling range of treatments to-1, 2 and 3 shows that the longer the time in which the research takes place, the higher the concentration of hormones produced P4.

The concentration of hormones estradiol-17 β (E2)

Goat E2 hormone concentration data pre-weaning females were treated katuk flour supplementation can be seen in Table 2. The results of variance analysis showed that supplementation with 3 levels of supplementation of katuk flour on pre-weaning females during the research has no significant effect on the Estradiol-17 β concentration ($P < 0.05$). As already noted in hormone concentrations P4, this is possible because of the uniformity of the reproductive phase in goats used in this research. The lowest Estradiol-17 β concentration for the females kacang goat which treated non-supplementation of katuk flour (45.553 pg / ml /) on day 0 of the study (blood sampling to-1) and the highest is kacang goat treated supplementation katuk flour by $15 \text{ gr}^{-1}\text{day}^{-1}$ on day 56 of the research (83.373 pg / ml).

Table 2. Profile of hormones estradiol - 17 β pre- weaning kacang goat females during the research (pg/ml)

Treatment	Taking			Averages
	1	2	3	
A	45.553	47.343	56.413	49.103
B	48.073	68.957	80.807	65.946
C	42.047	55.863	83.373	60.428
Probabilitas	Ns	Ns	Ns	

A = feeding (fresh grass and concentrates) ad libitum + non supplementation, B = feeding (fresh grass and concentrates) ad libitum + supplementation katuk ($7.5 \text{ gr}^{-1}\text{day}^{-1}$), C = feeding (fresh grass and concentrates) ad

libitum + supplementation katuk leaves ($15 \text{ gr}^{-1}\text{day}^{-1}$). ns = not significant ($P > 0.05$)

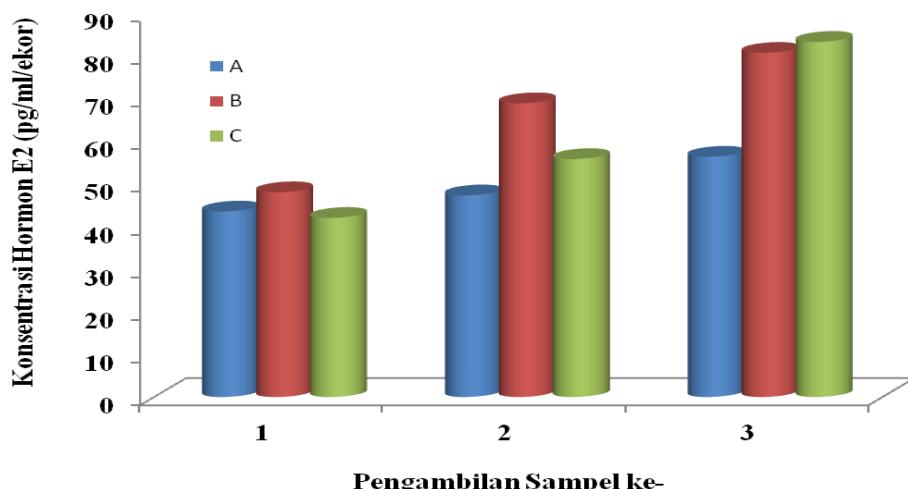


Figure 2. Profile of female hormones E2 Goat Beans pre - weaning for research

Figure 2 shows that increasing Estradiol-17 β concentration supplementation treatment due katuk flour in feed given. An increase in the average Estradiol-17 β concentration lowest for the treatment A is 49.103 pg/ml/ (Table 2) .

Estradiol-17 β concentration measurement results on day 0 of the study (sampling to - 1) looks lower than the results of measurements on day 28 (sampling 2nd) and 56th (sampling 3r) . It is associated with estrus cycle length as stated by Sutama (2007) that the duration of oestrus cycle in goats is 18-24 days with an average of 21 days . Estrogen concentrations during estrus is fluktuatif and peaked 2 days before ovulation (Akusu *et al.*, 2006). Additionally, flour katuk were supplemented in the feed containing estradiol benzoatehas the ability to stimulate steroid hormone biosynthesis of cholesterol (Putranto *et al.*, 2010 and Putranto, 2011) is good for increasing concentrations of E2.

CONCLUSION

The results shown that there was no significant effect of supplementation on goat's serum progesterone and estradiol-17 β concentration. Aras supplementation 0 gr-1day-1 as a control treatment gave the lowest gonadal hormone concentrations than other treatments so that it can be concluded that supplementation of katuk flour can affect the profile of pre-weaning kacang goat's gonadal hormones.

ACKNOWLEDGEMENT

Authors would like to express a highly gratitude for Directorate General of Higher Education, Ministry of Education and Culture Republic of Indonesia and University of Bengkulu for the financial support. This research fully funded by the 2013, 2014 and 2015 Hibah Bersaing Research Grant based on contract number 3217/UN30.10.06.01/HK/2015 dated on March 10th, 2015.

REFERENCE

- Akusu, M.O., E. Nduka, and G.N. Egbunike. 2006. Peripheral plasma levels of progesterone and oestradiol-17 H during the reproductive cycle of West African Dwarf goats. <http://www.ilri.cgiar.org/InfoServ/Webpub/Fulldocs/AnGenReCD/docs/x5 520B/x5520bOp.htm>
- Herman, R., Maman Duldjaman dan Nana Sugana. 1983. Perbaikan produksi kambing kacang. Institut Pertanian Bogor.
- Ismawan, B. dan S. Budiantoro. 2005. Keuangan Mikro Sebuah Revolusi Tersembunyi dari Bawah. Gema PKM Indonesia. Jakarta.

- Obst, J.M., T. Boyer, and T. Chaniago . 1980. Reproductive performances of Indonesian sheep and goats . Proc. Australian Society of Anim. Prod. 13 : 321-324.
- Putranto, H.D. 2011. A Non-Invasive identification of hormone metabolites, gonadal event and reproductive status of captive female tigers. Journal of Biological Diversity 12 (03): 131-135.
- Putranto, H.D., U. Santoso, Warnoto, Y. Fenita, Nurmeliasari, A. Zueni. 2010. A study on population density and distribution pattern of domesticated Bengkulu native burgo chicken. Veterinary Medicine 26 (2): 198-204.
- Sakul, H., G.E . Bradford, and Subandriyo. 1994. Prospects for genetic improvement of small ruminants in Asia. Proc. Symposium: Strategic Development for Small Ruminant Production in Asia and Pacific . SRCRSP Univ. Calif Davis.
- Sutama, I.K. 2007. Tantangan dan Peluang Peningkatan Produktivitas Kambing Melalui Inovasi Teknologi Reproduksi. <http://peternakan.litbang.deptan.go.id/download/info-teknis/kambingpotong/prokpo04-6.pdf>.
- Wiradarya, T. R. 2004. Tantangan dan peluang peningkatan efisiensi usaha ternak kambing dan domba: Peternakan Kambing-Domba Skala Menengah Sistem 3 Strata (Pembibitan, Pembiakan dan Komersial). Prosiding Lokakarya Nasional Kambing Potong: Bogor, 6 Agustus 2004. Puslitbang Peternakan, Bogor. hlm. 109-119.