International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Effect of Maternal Nutrition at Different Stages of Pregnancy in Goats (Etawa Cross and Kacang) on Performance of Does and Goat Kids

Tati Murniati[1, 2], Muhammad Idrus[2], Djoni Prawira Rahardja[3], Abd. Latief Toleng[4], Ambo Ako[5]

[1]Graduate Program, Hasanuddin University, Makassar South Sulawesi, 90245 Indonesia and
Department of Animal Husbandry, Faculty Agiculture ,University Bosowa 45 Makassar, South Sulawesi, 90245 Indonesia

[2]Department of Animal Husbandry, Faculty Agiculture ,University Bosowa 45 Makassar, South Sulawesi, 90245 Indonesia

[3, 4, 5]Faculty of Animal Husbandry, Hasanuddin University, Makassar South Sulawesi, 90245 Indonesia

Abstract: ***Arrangement nutrients to pregnant of does (nutrition in utero) have implicated the good growth changes during prenatal or post natal and goat kids performance. Link age nutritional needs of does to birth weight and physical characteristics of goatling at birth and health status. Birth weight is one of the things that are important in growth patterns, because kids with birth weigh the a vier than the average normal weight more capable of sustaining life. The research was conducted using the animals of some small farmer holders, DistrictTamalatea, Jeneponto, South Sulawesi Indonesia. There were KacangangEtawa does goats used in the experiment, which were divided into 4 groups : (1) pregnant doe early (gestation 1 to 3 months), (2) pregnant doe late (gestation 3 to 5 months), (3)pregnant doe feeding without supplements and U4: Parent bunting with supplementation during pregnancy. The animals were fed native grass ad libitum as basal diet as well as drinking water. Parameters measured were body weight of does, blood metabolites (glucose, urea and creatinine), birth weight goatling. Data were analyzed in accordance with the procedures of variance analysis. The result indicated that UMMB supplementation did improve reproduction performance of does significantly, and the optimum result indicated when UMMB was supplemented from 1 to 3 month of pregnancy age. Feeding UMMB supplements can increase weight gain pregnant does. The optimum time feeding supplements on pregnant does give high weight gainingestation1 to3months(early). The content of the blood glucose is influenced by the type of goat and gestation. High blood glucose content in the parent fed supplements during pregnancy but not different at the beginning and end of pregnancy. The content of blood metabolites (urea and kreatinine) is not influenced by gestation, and blood metabolite content is relatively higher in animals fed a supplement. Birth weight was higher in kids who were fed supplements parent at the age of3 to5monthsof pregnancy followed the holding fed supplements during pregnancy.***

Keywords: Etawa crossbreed goats, Kacang goats, UMMB, blood metabolites and birth weight

1. Introduction

The Food as a regulator of the functions of growth with low content of the nutritional value of food plays an important role so that all production processes will be impaired or delayed the process. The nutritional requirements are basically on goat breeds are the same for all, both in sex and age should contain protein, energy, minerals and vitamins. Nutritional needs, especially for basic necessities of life, growth and reproduction. The nutritional needs depending on the status of the cattle. Results of research on ruminants showed that nutrients can affect prenatal growth if the lack of nutrition during gestation (*in utero nutrition*) will affect the postnatal growth performance. Improvement of nutrition in uterois the approach of nutrition in the prenatal period with the aim of expanding the number of fibers that for mmuscle cells and is expected to generate growth so that the growth of muscle fiber cells reached a maximum in the period of postnatal growth.

2. Research Method

Place of research conducted in the District Tamalatea, Jeneponto, South Sulawesi. Laboratory of the Faculty of Agriculture, University45 Makassar. Balai Besar Kesehatan Laboratory, Makassar, South Sulawesi. Animals used in this study is a goat belonging to farmers in the district Jeneponto. Live stock were fed supplements and basal rations consisting of pieces of grass, leaves of Gliricidia, plantremnants of agricultural products and to fuaregiven *adlbitum* and feed supplements200 g/day. Making the feed supplement with urea molasses Multi nutrient Block (UMMB) with a protein content of 13.5%. Feed supplements made from urea, rice bran, molasses, mineral mix, coconut meal, feather meal, cement, salt, and lime digister waste processed in the form of nutrient blocks. Feeding supplements given *adlibitum* UMMB Parent goats were divided into 2 groups goat nations and divided into stem treatment based on pregnancy status, with a treatment time of feeding supplements in rations.

This study was designed to follow the pattern factorial 2 x 4 with 9 replications, so that the number of goats were used as much as 72 breeding goats, which consists of a group of Etawa cross goats and Kacang goats. In the first year of treatment feeding *nutrition in utero.* Pregnant doe goats were divided into three treatments:

U1: pregnant doe early (gestation 1 to 3 months)
U2: pregnant doe late (gestation 3 to 5 months)
U3: pregnant doe feeding without supplements.
U4: Parent bunting with supplementation during pregnancy

The data were processedwithSPSS20(2012). Parent pregnant goats were divided into two groups ofdoe areKacang goats and Etawa cross goats , in accordance with the treatment of feeding *nutritionin utero*.

3. Results and Discussion

Weight Gain Pregnant Doe. Feeding supplements UMMB the pregnant doe goat in Kacang goats and Etawa cross goats were given at different gestationtimein the show in Table 1, shows the average weight gain different parent for each of gestation

Table 1: Average daily Gains

Goats	Time of Feeding Supplements			
	U1	U2	U3	U4
Etawa Cross	0.2174±.0.6788[a]	0.2144±.067026[a]	0.11500±.058877[b]	0.2102±.101041[a]
Kacang	0.1107±.04987[a]	0.1848±.233836[b]	0.08344±.03443[a]	0.13689±0.5129[a]

These results indicate that the timing of feeding supplements UMMB effect on weight gain pregnant doe, feeding supplements provide effective results can increase body weight pregnant goat. UMMB overall supplementation can provide influence through increased microbial protein, increased digestibility, increased feed consumption to obtain a better balance between amino acids and energy in the nutrients are absorbed. Nutrition plays a major role in improving the efficiency of reproduction on all livestock. Energy and protein is an essential nutrient needed in large quantities in order to optimize the reproduction on the other hand, nutrition should not be over-fed because it can also damage the reproductive(Raj Bindari, etal. 2013).

The time supplementations in pregnant goats deliver improved weight gain that is higher than the goats were not given UMMB (U3). Time supplementation UMMB effect (P <0.05) for weight gain were higher in both nations both PE and goat goats Nuts, where the timing of early pregnancy group(gestation 1 to3months), followed by late gestation group(3 to 5months) and the group fed supplements during pregnancy(1 to 5months).

These results indicate that feeding time UMMB supplements can effectively promote weight loss pregnant goats. Prenatal grow this influenced directly and indirectly from the feed intake of the doe from the earliest stages of embryonic life, when the nutritional needs for growth when the concept us and nutritional needs are not met then the growth will give a negative impact on efficiency and growth post natal body composition (Larson, et.al.2009). Supplementation in goats in the Philippines at the age of4 months increase weight gain of 54.8g/head /day were not given the concentrate of 16.1g/head /day (Hayashidaet al. 2004).Supplementation in groups U1 with gestation age 1 to 3 months (early pregnancy) produce weight gain higher than the group U2 and U4 below shows the supplement feed requirements have been sufficient to meet the nutritional needs of the mother during early pregnancy. The nutritional needs of the doe during the pregnancy are determined by the balance of metabolism in the blood with a balance of nutrients ration (Rahardja, 2003). Recommended that the nutritional needs during the first trimester more 1.5 times in dairy cows and beef cattle were on sheep 2.2 times more on parent with three children than single birth and if the adequacies of nutrition during pregnancy are not met then not optimal genetic potential the growth of the child. Nutritional status of the goats one regulatory factors, especially nutrition for growth and development and function of most organs during pregnancy (Caton and Hess, 2010). Where the pregnant goats when the maintenance need more protein than the energy (Pinkerton and Pinkerton, 2013). Prenatal environment has a very big role and sensitive to ongoing pertubuhan and good development of the fetus during prenatal life in the womb of its doe but have an impact on growth and feed production. Fluctuations doe statuses during pregnancy directly affect myogenesis, adipogenesis and fibrogenesis conceptus in the uterus. At the molecular level that if there are fluctuations in the nutritional status and energy can cause epigenetic and becoming equally harmful character inherited to the next generation (Rahardja, 2014).

Blood metabolites (Glucose, Urea and Kreatinine)

Glucose: The availability of nutrients in the mother either through the supply of food and the metabolism of the parent has a very broad effect on the growth of the fetus during pregnancy. Very necessary efforts to improve the availability of nutrients through increased secretion of endogenous hormones and metabolites important metabolic and other growth factors, the measurement of blood metabolite that is through, among others: Glucose. Glucose in ruminants used as an energy source that can meet the needs of the network, especially ruminants. The average blood Metabolites both types of goats are listed in Table 2.

Table 2: Average Blood Metabolite

Goats	Time of Feeding Supplements			
	U1	U2	U3	U4
Etawa Cross	Glucose 49.56±5.0[a]	50.33±.6.124[a]	44.33±.3.640[b]	59.00±4.123[c]
	Urea 33.11±.13.541	34.67±.11.769	29.44±.5.053	36.44±.6.747
	Creatinine 0.7344±0.2392	0.8356±0.2900	0.6156±0..2512	0.6700±0.2191
Kacang	Glucose49.33±5.7	49.22±4.9[a]	42.00±5.000[b]	48.78±5.094[c]
	Urea 35.00±.11.8	31.33±11.597	28.67±8.789	32.11±3.018
	reatine1.01±0.9	0.7344±0.28465	0.5578±0.30817	0.5122±.0.7546

The results showed that the type of goats and feed supplements time UMMB the pregnant mother showed significant effect (P <0.05) to stem the blood glucose content, where the content of blood glucose was higher in sheep Etawa cross than Kacang goats. These results differ from IrkhamWidiyono and Sarmin, (2011) goat blood metabolite concentrations lower than the values in the literature for other small ruminants. blood pH, bicarbonate, pCO2, BUN and glucose showed no significant changes. The concentration of total protein, globulin and kreatinine in young animals was significantly lower than the adult Etawa cross goats in Indonesia. UMMB supplement feeding time showed that feeding supplements during pregnancy showed that blood glucose content was higher than that given at the beginning of gestation (U1) and the end of pregnancy (U2) while the pregnant mother were not fed the supplement showed blood glucose content the second lowest in the nation goats. Knowledge metabolic profile may be useful in predicting metabolic problems. At the time of pregnancy the blood glucose level is an indication of the energy level of the animal (BulentElitok, 2012). Blood glucose levels below normal values during the rainy season. Blood glucose levels were significantly influenced by the season (Barakat and El-Guindi, 2010). Mains were fed supplements during pregnancy visible blood glucose content tends to be higher, it indicates that the feed supplement members sufficient energy for pregnant mother and her needs have been fulfilled. Results IrkhamWidiyono, et al. (2013) showed that in case of restrictions of feed to about 50% of the feed komsusiadlibitum (80% of maintenance needs) may lead to changes in blood chemistry parameters associated with the metabolic status of Etawa cross goats limited period end feed fosfatanorganik levels, creatinine, urea nitrogen increased blood cholesterol and glucose levels were significantly contrary, calcium and triglyceride levels also decreased significantly.

Urea. Blood urea nitrogen can be used to measure nutritional status in cattle. Urea is a natural product of metabolism in goats and other ruminants. Urea is a nitrogen source used for the synthesis of proteins in the digestive tract. The concentration of urea in the blood is generally interpreted as an indication of a more efficient utilization of amino acids (Cronje, 1992). In case of shortage of the protein would be excessive water wheel and cannot be utilized by rumen microbes excess crude protein intake may increase plasma concentrations of urea. Value range of blood urea content of the research on both types of goats on average between 28.67 - 36.44 mg / dl, of the table above shows that the content of urea Etawa cross goats tend to be higher than the Kacanggoats. Likewise, the rate of feeding supplements to the parent who was given supplements during pregnancy, then followed with a parent who fed the supplement at the end of gestation (3 to 5 months), followed in early pregnancy, while the parent who is not fed supplements lower blood urea content. At mains fed supplements visible blood urea content is higher than without the provision of all gestation. Levels of blood urea in goats is between 29-38 mg / dl (Fachiroh et al. 2012), while Manu (2007). Normal levels of blood urea in goats 13-44 mg / dl. The range of goat blood urea visible research is still in the range of normal blood urea content. Balance and levels of blood urea nitrogen is an indicator that is often used to determine the effectiveness of protein metabolism of feed consumed by ruminants. Data nitrogen balance in general shows the nutrient status of the animal feed. Therefore, nitrogen balance is a way to measure protein metabolism in the body. Nitrogen balance can be used to determine the protein requirements for growth purposes. Where the minimum dose of protein memberj maximum retention for livestock growth prinsif nitrogen balance is the need for animal protein in question (Tillman et al., 2005).

Creatinine. Creatinine is a residual product of an overhaul of keratin phosphate occurring in the muscle. Through creatinine measurement, the amount of protein in the body can be estimated, because the content creatinine in urine was positively correlated with body proteins. The average value creatinine is 0.5122 - 1.0156 mg / dl were obtained regardless of the type of nation goats and gestation parent. Creatinine reference values for normal levels of 0.60 - 1:20 mg / dl. The results showed that the nation and the time of feeding supplements on pregnant mother showed no significant effect on blood creatinine content. But it appears that feeding supplements showed a trend of higher creatinine content, especially at the beginning of pregnancy in goats Nuts and late pregnancy in goats. Creatinine levels were higher in adult animals correlated with the metabolism of proteins associated with muscle mass (BulentEllitok, 2012). Normal value creatinine blood constituents can be influenced by age, gender, race, nutrition and other factors. Creatinine not experiencing catabolic reactions in addition to the decomposition kreatinine (Gottam, et al., 2005). Meanwhile, according to De Campeneere et al (2000) concluded that ekresi creatinine every day is not affected by the consumption of protein. Creatinine levels increased in old age but the goats on urea concentration is higher in young goats from the adult goat. Most of the goats had creatinine levels below the normal value in the second season but a higher level in the dry than in the wet season (Barakat and El-Guindi, 2010). In the goat Mawari research Sharma and Puri (2013) both sexes goats at the age of 0-3 years were measured during hot and moderate climate. The overall average value (mg / dl) kreatinine 0.73 ± 0.02 mg / dl. Climate effect on serum kreatinine, gender goats showed higher values than the female. The average value of serum kreatinine significantly higher during the summer and does not vary during the period of cold temperatures compared with the average moderate overall. In each period the temperature of the environment, the effect of real sex for both metabolites serum urea and serum kreatinine highest value in goats aged 2.5-4 years. This suggests that extreme temperatures can stimulate the liver of cattle of both sexes and all age groups there was an increase of activity of metabolites (Kour, et al. 2014).

Kidding Performance. Birth weight is of significant importance because it is highly correlated with the rate of growth and adult size. Birth weight is one thing that is important in the growth patterns for children with birth weight heavier than the average normal weight more capable of sustaining life. Birth weight had a significant positive correlation to economic value. If the high birth weight will show rapid growth because it can consume more food to produce a high weight. To see the performance of kids can be seen in Table 3 of treatment

Table 3: Average Birth Weight

Goats	Time of Feeding Supplements			
	U1	U2	U3	U4
Etawa cross	2.527[a]	2.643[a]	2.188[b]	2.639[a]
Kacang	2.052[a]	1.938[a]	1.844[b]	1.90[a]

Table 3 shows the results of research that nation goats and time pembeian feed supplements affect performance birthweight kids. In Table 7. Kids goat higher than Kacang goats (2:50 vs. 2192) shows that the nation and the genetic influence birth weight. However, gender did not show differences in this case shows that both sexes showed the same birth weight relative to the two types of goats.

Performance of the parent affects birth weight. Parent influence on birth weight is influenced by both genetic and environmental, especially nutrition during pregnancy. Settings nutrients to pregnant mother (nutrition in utero) have implicated the good growth changes during prenatal and postnatal influences children's performance. Linkage nutritional needs of the mother to birth weight and physical characteristics of children at birth and health status. Mother's nutritional needs during the first half of pregnancy and followed by adequate nutrition from mid produce normal birth weight.

Prenatal environment has a very big role and sensitive to ongoing growth and good development of the fetus during prenatal life in the womb of its mother but have an impact on growth and feed production Fluctuations parent status during pregnancy directly affect myogenesis, adipogenesis and fibrogenesisconceptus in the uterus. At the molecular level that if there are fluctuations in the nutritional status and energy can cause epigenetic and becoming equally harmful character inherited to the next generation (Rahardja, 2014).Observations of birth weight on the parent group given feed supplements during pregnancy UMMB stem from age 1 to 3 months (early) and 3 to 5 months (late pregnancy) as well as during pregnancy 1 to 5 months, higher birth weight children compared pregnant mother who had not fed the supplement. Based on the results of studies in which the parent who fed supplements during pregnancy UMMB 1 to 5 months of pregnancy and the end of the highest birth weight (2,293 kg) and then early pregnancy (2,286 kg) while pregnant mother feeding without supplements just 2,017 kg in the two types of goats. It shows that nutrition plays an important role in the gestation period the does . The nutritional needs of the doe during the pregnancy are determined by the balance of metabolism in the blood with a balance of nutrients ration (Rahardja, 2003). Recommended that the nutritional needs during the first trimester were 1.5 times more sheep and goats 2.2 times more on the parent with three kids than single birth and if the adequacy of nutrition during pregnancy is not met then it is not optimal genetic potential for growth of the child. Energy needs higher old pregnant does used fetus (Matthew, et al., 1996). Dietary restrictions in only one stage of pregnancy generally do not affect plasma concentrations of total protein but the latter was significantly correlated with birth weight (Addah and Karikari, 2008).

4. Conclusions

Based on the research results obtained conclusions: Feeding UMMB supplements can increase weight gain pregnant does. The optimum time feeding supplements on pregnant does give high weight gainingestation1 to 3 months (early).

1) The content of the blood glucose is influenced by the type of goat and gestation. High blood glucose content in the parent fed supplements during pregnancy but not different at the beginning and end of pregnancy.
2) The content of blood metabolites(urea and creatinine) is not influenced by gestation, and blood metabolite content is relatively higher in animals fed a supplement.
3) Birth weight was higher in children who were fed supplements parent at the age of 3 to5monthsof pregnancy followed the holding fed supplements during pregnancy.

References

[1] Abdel-Ghani, A.A., Solouma, M.A., Abd. Elmory, A.K.I., Kassab. A.Y., and Soliman, E.B. 2011. Productive Performance and Blood Metabolites as Affected by Protected in Sheep. Vol.1, No.2, 24-32 *Open Jounal of Animal Science Openly* accessible at http://www.scirp.org/journal/OJS

[2] Addah, W and Karikari, P.K. . 2008. Effects of Dietary Restrictions during Different Stages of Pregnancy on Differential Plasma Protein Concetration, Placental and Birth Weight of Adolescent Djallonke Sheep. *Livestock Research for Rural Development 20 (9) 2008*

[3] Adiati, U., Hastono, RS.,Sianturi, G., Chaniago, T.D., and Sutama, I.K. 1997. SinkronisasiBerahiSecaraBiologisPadaKambing PE. *Pros. SeminariNasionalPeternakandanVeteriner II: 411-416.*

[4] Ashworth, C.J., Dwyer,C.M., McEvoy,T.G., Rooke, J.A and Robinson, J.J. 2009. TheIimpact of *In Utero* Nutritional Programming on Small Ruminant Performances. *Zaragoza: CIHEAM / FAO / NAGREF. Options Méditerranéennes: Série A. SéminairesMéditerranéens; n. 85 2009 pages 337- 349*

[5] Barakat, M.Z and El-Guindi, M.M. 2010. Relationship Between Nutritionally Related Blood Metabolites and Gastrointestinal Parasites in Nguni Goats of South Africa. *Wiley Online Library*.

[6] Bass, J.J., Sharma,M., Oldhama, J and Kambandu. R. 2000. Muscle Growth and Genetic Regulation, in RuminanPhysiology : Digestion, Metabolism, Growth and Reproduction. *Ed.by Cronje, P.B. CABI Pub. New York, USA. Pp : 227-236.*

[7] BulentEllitok. 2012. Reference Values for Hematological and Biochemical Parameters in Saanen Goats Breeding in Afyonkarahisar Province Kocatepe. *Vet. Journal 5 (1): 7 – 1*

[8] Caton, J. S. and Hess, B.W. 2010. Maternal Plane of Nutrition: Impacts on Fetal Outcomes and Postnatal Offspring Responses. *Invited Review. Pages 104-122 in Proc. 4th Grazing Livestock Nutrition Conference Department of Animal Sciences,* 185 Hultz Hall, North Dakota State University

[9] Celi, P., Adriana, D., Trana, C,, Salvatore and Gregorio, P.D. 2008. Effects of Perinatal Nutrition on Metabolic

and Hormonal Profiles of Goat Kids (Capra hircus) during Their First Day of Life .Asian-Aust. *J. Anim. Sci. Vol. 21, No. 11 : 1585 – 1591*

[10] Cronje, P.B. 1992. Differences in Nitrogen and Urea Metabolism between Goats Bred for Fibre Production (Angora goat) or Meat Production (Boer goat). *ARC, Irene Animal Production Institute,Republic of South Africa*

[11] De Campeneere, S., Fiems, L.,Vanacker, and J.Boucque. 2000. Evaluation of Urinary Creatine to ewstimate in Vivo Body Coposition of Belgian Blue Double-Muscle Bills. *Ann. Zootech. 49:335-342*

[12] Du, M.., Tong, J., Zhao, J., Underwood, K.R., Zhu, M., Ford, S.P and P. Nathanielsz, P.W. 2009. Fetal Programming of Skeletal Muscle Development in Ruminant Animals. *J Anim. SCI published online*.

[13] Fachiroh, L., PrasetiyonodanSubrata, A. 2012. *Kadar Protein dan Urea DarahkambingPerahPeranakanEtawa yang diberi wafer PakanKomplitBerbasisLimbah Agroindustri denganSuplementasi protein Terproteksi.*FakultasPeternakandanPertanianUniversitas Diponegoro.

[14] Gao, F., Hou, X.Z., Liu, Y.C., Wu, S.Q and Ao, C.J. 2008. Effect of Maternal Under-Nutrition During Late Pregnancy on Lamb Birth Weight. *Asian-Aust. J. Anim. Sci. 21:371-375.*

[15] Gottam, G.S., Kataria, N., Kataria, K.A., and Singh, L. 2005. Sewrum Metabolic Profile of Goats During Stress. *Veterinary Practtionar, 5(2) 2005, 156-158.*

[16] Greenwood, P. L. and Café, L.M. 2007. Prenatal and Pre-weaning Growth and Nutrition of Cattle: Long-term consequences for Beef Production. *J. Anim. 1:1283-1296*

[17] Haenien, G.F.W. 2006. Feeding Goats For Improved Milk Mlk and Meat Production – Goats and Nutrition. http/www/goatworld.com diakses 16 Pebruari 2006.

[18] Hammond, A.C. 1998. Use of BUN and MUN as Guides for Protein and Energy Supplementation on Cattle. *USDA, ARS, Subtropical Agricultural Research Station Roosville (Florida), 34601-4672 USA*

[19] I.A.E.A. 1984. *Laboratory Training Manual on Radioimmunossay in Animal Reproduction.* Technical Report Series No.223.

[20] IrkhamWidiyonodanSamin. 2011. ProfilBeberpa Parameter Kimia DarahPadaKambingPeranakanettawa. *Database JurnalIlmiah Indonesia. ISJD LIPI.*

[21] IrkhamWidiyono, SamindanBambangSuwignyo. 2013. Respons MetabolikTerhadap Pembatasanasupan Pakanpada Kambing Peranakan Ettawa. *JurnalVeteriner Vol. 14 No. 4:424-429*.

[22] Jainudeen, M.R. and. Hafez, E.S.E. 2000. *Gestation, prenatal physiology and parturation, in Reproduction in Farm Animal*. Ed.by Hafez E.S.E and Hafez, B. 7th ed. Uppincott William & Wilkins, Sydney,Pp : 140-155 Lawrence and Fowler.

[23] Kour, G., NaliniKataria and NinadSahebraoLawhale. 2014. Ambient Temperature Associated Variation in Serum Urea and Creatinine. in Marwari Goats. *IOSR Journal of agriculture and Veterinary Science (IOSR-JAVS): volume 7, Issue 3 Ver.I, 15-18 www.iosjournal.org*

[24] Laporte-Broux, B., Roussel, S., Ponter, A.A., Perault, J., Chavatte-Palmer, P and Duvaux-Ponter, C. 2011. Short-term Effect of Maternal Feed Restriction DuringPregnancyon Goat Kid Morphology, Metabolism and behavior. *J. Anim. Sci. 89:2154-2163*.

[25] Larson, D. M., Martin,J.L., Adams, D.C., and Funston, R.N. 2009. Winter Grazing System and Supplementation during Late Gestation Influence Performance of Beef Cows and Steer Progeny. *J. Anim. Sci. 87:1147-1155.*

[26] Lewis, R.M. and Emmans, G.C. 2010. Feed Intake of Sheep as Affected by Body Weight, Breed, Sex and Feed Composition. *J.Anim.Sci. 88:467-480.*

[27] Manu, E.A. 2007. *SuplementasiPakanLokal Urea Gula Air Multinutrien Blok UntukMeningkatkanKinerjaInduk Bunting danMenyusui Serta MenekanKematianAnakkambingblingon yang digembalakkan di sabana Timor*. DisertasiSekolahpascasarjana, Program studiilmuPeternakan, FakultasPeternakanGajahmada, Yogyakarta

[28] Murniati. T., Idrus, M., Tolleng, A.L. danRaharja, D.P. 2011-2012. *WaktuSuplementasiPakan Yang Optimal GunameningkatkanEfisiensiReproduksidanGenetikKambingPeranakanEtawa (PE)* . LaporanHibahPekerti DIKTI.

[29] Murniati. T., Idrus, M., Tolleng, A.L. danRaharja, D.P., Ako, A and Jussof, K. 2013. Optimalization of supplementasion Time for Improving Reproductive Effeciency and gene Expression of Goats. *World Applied Sciences Journal 26 (Natural Resources Research and Development in Sulawesi Indonesia): 100-104.*

[30] Pazzola, M., Maria, L.D., Carcangiu, V., Luridiana, S and Maria. 2011. Relationship Milk Urea, Blood, Plasma Urea and Body Condition Score in Primiparaous Browsing Goats With Different Milk Yeild Level. *ArchivTierzucht 54, 5, 546-556, Leibniz Institute for Farm Animal Biology, Dummerstorf, Germany*.

[31] Paulus, K., Tahuk, Barliati, E danHatadi, D. 2008. Keseimbangan Nitrogen danKandungan urea DarahkambingBlingonpadaPenggemukkandengan Level Protein PakanBerbeda. *J.Indon.Trop.Anim.agri 33(4) December 2008.*

[32] Pinkerton, F and Pinkerton, B. 2013. Supplemental Winter Feeding of Goat. *Goatworld.com*. diakses 6 Mei 2014.

[33] Rahardja,P.D. 2003. *Functional Relationship Between Nutrition and Reproduction System in Ruminants*. KursussingkatTeknik in vitro dan in saccopakanruminansiadalamupayameningkatkanproduksiternak di KawasanTimur Indonesia. UniversitasHasanuddin Makassar..

[34] Rahadja, P.D., Toleng, A.D dan Effendi, A. 2006. PeningkatanLajuPertubumhan Postnatal Melalui Nutrition in Utero Padakambing. LaporanPenelitian. *Indonesia Science and Technology Digital Library.*

[35] Rahadja, P.D. 2014. Menggas Program Prenatal Development Padasapi Bali SebagaiPedagingandalamdalamMewujudkanSwasembadaDagingNasional. DisampaikanpadaUpacaraPenerimaan Guru BesarFakultasPeternakanUniversitasHasanuddin.

[36] Rehfeldt, C., Neil, C., Stickland.,Ilse Fiedler., and Jochen Wegner. 1999 Environmental and Genetic Factors as Sources of Variation in Skeletal Muscle Fibre Number. *Basic Appl. Myol. 9 (5): 235-253.*

[37] Raj Bindari, Y., Sherestha, S., Sheresthe, N and NathGaire, T. 2013. Effect of Nutrition on Reproduction. *A Review Advance in Applied Science Research 4(1):421-429. Avaible online at www.pelagiaresearchlibrary.com*

[38] Sharma, A.K and Puri, G. 2013. EWffect of Extreme Hot Condition on serum Biochemical Constituens in Mawari Goats. Livestock *ResearchInternational July-September 2013, 4t (1):421-429. Avaible online at www.pelagiaressearchlibrary.com*

[39] Sutama, I., Stiadi, K.B., Buadiarsana, I.G.M danAdiati, U. 1997. AktivitasSeksualSetelahBeranakdariKabing PE dengan Tingkat ProduksiSusu yang Berbeda. Pros. Seminar NasionalPeternakandanVeteriner. 18-19 Noveber 1997. *PusatPenelitiandanPengebanganPeternakan, 402-409.*

[40] Tillman, A.D., Hartadi, H., Reksohadiprojo, S., Prawirokusumo, S danLebdosoekojo, S. 2005. *IlmuMakananDasa*r. Gajahmada University Press, Yogyakarta.

[41] Van Saun, R.J. 2013. Feeding the Pregnant Feeding the Pregnant Doe: Understanding the Need for Supplements, Minerals and Vitamins. *Extension Department of Veterinary Science Penn State University diakses 2013.*

[42] Vonnahme, K.A. 2007. Nutrition during gestation and fetal programming nutrition. *Proceedings, The Range Beef Cow Symposium XX December 11, 12 and 13, 2007 Fort Collins, Colorado*

[43] Wina, E. danAbdurohman, D. 2005. Pembentukan protein 'loloscerna rumen' (*in vitro*) denganpenambahanisolattanindaridaunkaliandraataufor maldehida. *JITV* 10(4): 274-280.

[44] Wu, G., Bazer, F.W., Cudd, T.A., Melninger, C.J and Spencer, T.E. 2004. Maternal Nutrion and Fetal Development. *J. Nutr. 134:2169-2172*.

[45] Xu, Y¨ Zhu, J., Dodson, M.V., Min, D. 2012. Developmental Programming of Fetal Skeletal Muscle and Adipose TissueDevelopment. *J Genomics 1:29-38*

[46] Yulistini, L., Matius, W., Sutana, I.K., Adita, U., Riasari, Sianturi, g., HononadanArsanan, I.G.M. 1999. ResponProduksiKambing PE IndukakibatPerbaikanPemberianpakanPadafaseTuadanL aktasi. *J.IlmuternakdanVeteriner 4(2)88-94*.