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EVALUATION OF PRE-WEANING GROWTH PERFORMANCE AND SURVIVAL RATE OF SHEEP IN HULET EJU ENESIE DISTRICT, EAST GOJJAM ZONE, ETHIOPIA

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ABSTRACT: **The study was conducted in Hulet Eju Enesie District, East Gojjam Zone, Ethiopia, with the main objectives of evaluating pre-weaning growth performance of sheep. The study district was stratified in to Dega, Weina dega and Kolla agro-ecologies. A total of 48 (16 from each agro-ecology) late pregnant sheep flocks were selected purposely for monitoring. The data were collected from sampled households using semi-structured questionnaires and through monitoring. Birth weight and 90 days weight were taken using 50kg weighing balance with 200g precision. Collected data monitoring of lambs were subject to GLM analyzed by using SPSS software (version 20.0). The average birth weight, 90 days weight and average growth rate of lambs were 2.46 ± 0.07 kg, 10.26 ± 0.12 kg and 89.66 ± 1.28 g/day which were significantly different (P<0.05) among agro-ecology, breed, parity, types of birth and sex of lambs. Survival rate of lambs was 91.67%. Therefore, birth weight, pre-weaning growth weight, pre-weaning growth rate and survival rate were significantly affected by agro-ecology, parity, litter size and sex.**

Keywords: Birth weight, Daily weight gain, Pre-weaning growth rate and Survival rate.

INTRODUCTION

Growth performance is the most important production traits for successful animal production. The growth performance of sheep is influenced by age of the dam, pre-mating weight of the dam, type of birth, sex, breed and season of birth (Mengistie et al., 2009; Solomon et al., 2011). Birth weight and pre-weaning growth rate of lambs have been investigated in several countries on several sheep breeds under varying environmental and/or management conditions (Markos, 2006). In Ethiopia birth weight is strongly influenced by breed (genotype), sex of lamb, birth type, age of dam, feeding conditions, season of birth and production system. Birth weight affects the survival rate and pre-weaning growth of the lamb (Markos, 2006). Pre-weaning growth performance of lambs depends up on the inherent genetic potentiality and the mothering ability of ewes (Aemero et al., 2012). In Ethiopia lambs, which are heavier at birth, are usually single or due to ewes larger body size and good feeding management. Lambs heavier at birth have fast growth capacity and have higher mature body weight (Tesfaye, 2008).The objective of this research was to evaluate pre-weaning growth performance and survival rate of lamb in farmers' level.

MATERIALS AND METHODS

Description of the study area

The study was conducted in Hulet Eju Enese District Amhara Region, Ethiopia. It is located in the North West direction 370 km far from Addis Ababa, in the northeast direction 200 km far from Debre Markos and in the southeast direction 120 km far from Bahir Dar. It is bordered with Goncha Siso Enesie in the East direction, Enarge Enawega in the South direction, Debay Telate in the Southwest direction, Sinan Bibugne in the West direction and South Gondar in the north direction. The district is geographically located 10' 45 00--11' 10 00N Latitude and 37' 45 69---38' 10 00 E longitude (BoARD, 2011). In addition, the district consists of 40 rural and 2 urban *Kebeles*.

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Sampling Methods and Data Collection

Data source and management

Pre-weaning growth performance and survival rate of lambs under traditional management, were evaluated through monitoring. It was performed in three agro-ecologies of Hulet Eju Enesie district for 3 months. To undertake the monitoring 16 households from each agro-ecology (a total of 48) that had late pregnant sheep were selected purposely with the assistance of development agents and the pregnant sheep was given identification number. The birth weights of the lambs were taken within 24 hours after birth. The subsequent weight of lambs was taken at 15 days interval until 90 days of age (Aemero et al., 2012). The agro-ecology, breed, parity, birth type, sex, birth weight, weaning weight (weight at 90 days), average daily weight gain of 90 days and survival rate of the monitored lambs were collected. The live weight measurement was taken early in the morning before the lambs were allowed to suckle their dams by using portable weighing balance which has a capacity to measure 50kg with 200g precision. To estimate lamb survival rate (%) the following formula was used (Ibrahim, 1998)

Overall lamb survival rate (%) of flocks (per sheep):

$$\text{Lamb survival rate (\%)} = \frac{\text{Number of offspring weaned}}{\text{Number of offspring produced}} \times 100\ \% \quad (1)$$

Statistical Analysis

Collected data were organized, summarized and analyzed using SPSS software (2011) version 20.0.

Sex, parity, birth type, breed and agro-ecology were fitted as fixed independent variables, while birth weight, pre- weaning weight and average daily weight gain were fitted as dependent variables. For analysis of pre-weaning growth performance and survival rates of lambs, the following model was used:

$$Yjkz = \mu + Sq + Tl + Bj + Pk + Xz + eqjkz \quad (1)$$

Where, Yqljkz= the observation on (birth weight, pre-weaning weight and average daily weight gain, survival rate) on the nth lamb of the qth agro ecology, lth breed, jth birth type born in kth parity and zth sex

μ= the overall mean common to all animals in the study.

Sq = fixed effect of the qth agro ecology (1= dega, 2=weina dega, 3= kolla).

Tl = fixed effect of the lth breed (1= not characterized ="local" sheep, 2=Washera crossbred).

Bj =fixed effect of the jth birth type (1= single, 2 =twin).

Pk= fixed effect of the kth parity (k = 1, 2, 3.....5).

Xz= fixed effect of the zth sex (1=male, 2= female).

Eqjkz = is the random error.

RESULTS AND DISCUSSION

Birth Weight

The average birth weight of sheep was 2.46 ± 0.07 kg (Table 1). This result is relatively lower than Shigdaf et al. (2013) reported that the average mean birth weight for Washera, Farta and their crossbred sheep were 2.61 ± 0.01 kg, 2.50 ± 0.02 kg and 2.59 ± 0.01 kg, respectively in Western highland of Amhara Region.

Birth weight is strongly influenced by breed (genotype), sex of lamb, birth type, age of dam, agro-ecology and production system (Deribe, 2009). Major factors, which affect birth weight of lambs, are shown in the Table 1. Birth weight of lambs significantly varied ($P<0.05$) in different agro-ecological zone. Lambs born in dega area has significantly lower ($P<0.05$) birth weight than lambs in Weina dega and Kolla areas. This might be due to breed difference; in dega area only "local" sheep were found but in Weina dega and Kolla areas both Washera crossbred and "local" sheep were found so Washera crossbred gave high birth weight (Shigdaf et al., 2013). Lambs born in Kolla area were significantly lower ($P<0.05$) birth weight than Weinadega and significantly ($P<0.05$) higher than dega area lambs. This might due to environmental difference (nutrition of dam, climate) (Yenesew Abebe et al. 2013).

There was a difference in birth weight between two sheep types, Washera crossbred and "local" sheep, birth weight of Washera crossbred lambs (2.78 kg) was heavier ($P<0.05$) than birth weight of lambs born from "local" sheep (2.3 kg). The reason of birth weight difference might due to breed difference (Mesfin et al., 2014) and also due to high birth weight of Washera crossbred than "local" sheep and higher body weight of their dams relatively (Shigdaf et al., 2013). Ewes that gave birth for the first time their lambs were ignificantly lower ($P<0.05$) birth weight than those ewes that gave birth for second, third and fourth parity. This might be due to the higher body weight of ewes from the later parity and better mothering ability than the first parity (Aemero et al.,2012). It might be due to less development of the reproductive organs of first parity ewes to bear large fetus in which the physiology adjusts the fetal size (Markos, 2006). This is accordance with Deribe (2009) and Solomon et al. (2011).

Single born lambs were significantly higher ($P<0.05$) birth weight (2.55 ± 0.08 kg) than twin born lambs (2.28 ± 0.13 kg). This might be due to competition for nutrient and space from their dam before birth in the case of twin births (Ayele, 2015). The current finding is in agreement with reports of Deribe (2009); Solomon et al. (2011); Aemero

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et al.(2012) and Shigdaf et al. (2013), who reported that single -born lambs are heavier than their multiple born contemporaries in Alaba sheep, Gumuz sheep, Sekota sheep and „Washera, Farta and their crossbreed sheep" respectively. Male lambs had significantly heavier (P<0.05) birth weight (2.65 ± 0.09 kg) than female (2.26 ± 0.11 kg). This might be due to the presence of androgen in males, which stimulates skeletal growth (Mesfin *et al.,* 2014).

Table 1 - The mean of birth weight and weight at three months of age of sheep

Factors		N	Birth weight (Kg) Mean ± S.E	N	Weight at 90 days (Kg) Mean ± S.E
Overall		48	2.46 ± 0.07	44	10.26 ± 0.12
Agro-ecology	Dega	16	2.10 ± 0.13^{a}	15	9.28 ± 0.19^{a}
	Weina dega	16	2.69 ± 0.12^{b}	15	11.34 ± 0.18^{b}
	Kolla	16	2.55 ± 0.12^{bc}	14	9.98 ± 0.18^{c}
Breeds	Washera crossbred	16	2.78 ± 0.12^{a}	14	10.78 ± 0.18^{a}
	"Local" sheep	32	2.30 ± 0.09^{b}	30	10.00 ± 0.13^{b}
Parity	1	12	1.97 ± 0.14^{a}	9	7.01 ± 0.21^{a}
	2	13	2.53 ± 0.14^{b}	13	11.22 ± 0.21^{b}
	3	16	2.84 ± 0.13^{b}	16	12.72 ± 0.19^{b}
	4	6	2.62 ± 0.19^{b}	5	10.50 ± 0.69^{b}
	5	1	2.10 ± 0.46^{ab}	1	9.87 ± 0.29^{a}
Type of birth	Single	34	2.55 ± 0.08^{a}	33	10.83 ± 0.13^{a}
	Twines	14	2.28 ± 0.13^{b}	11	9.11 ± 0.19^{b}
Sex	Male	27	2.65 ± 0.09^{a}	26	10.79 ± 0.14^{a}
	Female	21	2.26 ± 0.11^{b}	18	9.67 ± 0.16^{b}

a, b, c means with different letter within the same column are significantly different (P< 0.05); N= number of observations

Pre-weaning growth

The average mean pre-weaning growth of lambs was 10.26 ± 0.12 kg (Table 1). This result is in line with Deribe (2009), who reported that the average 90 days weight of lambs was 10.35 ± 0.19 kg of Alaba sheep in Alaba district Southern Ethiopia.

Factors that affect pre-weaning growth weight of lambs are presented in Table 1. Lambs born at first and fifth parity had significantly lower (P<0.05) pre-weaning growth weight (7.01 ± 0.21 kg and 9.87 ± 0.29 kg) than lambs born from second, third and fourth parity ewes. This might be due to milk production and mothering ability improves with parity of the ewe up to fourth parity (Berhanu and Aynalem, 2011). Single lamb was significantly heavier (P<0.05) pre-weaning growth weight (10.83 ± 0.13 kg) than twins lambs (9.11 ± 0.19 kg) this might be due to single born lambs are the sole users of their dam milk (Markos, 2006). Male was significantly higher at (P<0.05) pre-weaning growth weight (10.79 ± 0.14 kg) than female (9.67 ± 0.16 kg). This might be due to attributed physiological functions, which play a major role in accelerating growth (Abbas *et al*., 2010). The current finding result are comparable to Deribe (2009); Aemeroet al. (2012); Shigdaf et al. (2013) and Mesfin et al. (2014).

Growth Rate

The average daily weight gain of monitored lambs is presented in (Table 2). The average daily growth rate of lambs was 89.66 ± 1.28 g/day. This is in agreement with Deribe (2009), who reported that the least square means of pre-weaning daily gain of Alaba sheep was 89.2 ± 1.98 g/day in Alaba district Southern Ethiopia. In contrast, the current finding is quite lower from the findings of Mesfin et al. (2014) and Aemero et al. (2012) who reported that the average daily weights gains of the local sheep and Sekota sheep breed from birth to weaning age were 121.56 ± 2.31and 101 ± 2.66 g/day respectively. The difference might be due to birth weight, breed, parity and sex (Markos, 2006).

Factors that affect pre-weaning growth rate of lambs are presented in (Table 2). Lambs born in Weina dega had significantly higher (P<0.05) daily weight gain (98.28 ± 2.17 g/day) than dega and Kolla agro-ecologies. Pre-weaning growth rate difference between Weina dega and Kolla might be due to nutritional difference (Yenesew et al., 2013).

Washera crossbred lambs were significantly heavier (P<0.05) in their average daily weight gain (92.68 ± 2.20 g/day) than lambs born from "local" sheep (88.15 ± 1.57 g/day). This might be due to lambs born from Washera crossbred sheep were fast grower since maternal in heritance is high at this age (Shigdaf et al., 2012). Lambs born from first parity had lower (P<0.05) average daily weight gain (64.08 ± 2.51 g/day) than lambs born from second, third and fourth parity of ewes. Lambs born singly had significantly heavier (P<0.05) average daily weight gain than lambs born twins with the average result 93.85 ± 1.53 g /day) and (81.29 ± 2.30 g/ day) respectively. This might be due to their difference in weight at birth (Markos, 2006). Average daily weight gain (92.43 ± 1.71g) of males were heavier (P<0.05) than female (86.56 ± 1.91g). The superiority of males on pre-weaning average daily weight gain was

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apparently might be the result of their superior birth weights (Markos, 2006). In addition it might be to males being heavier than female due to testosterone estrogens and progesterone) hormone predominate in male and female (Mengistie et al., 2009). The current finding is in line with (Deribe, 2009; Aemero et al., 2012).

Table 2 - Effects of different factors on Average Body Weight Gain of monitored lambs

Factors		N	ADWG (g/day) Mean ± S.E
Overall		44	89.66 ± 1.28
Agro-ecology	Dega	15	83.83 ± 2.26[a]
	Weina dega	15	98.28 ± 2.17[b]
	Kolla	14	85.67 ± 2.20[a]
Breeds	Washera cross	14	92.68 ± 2.20[a]
	"Local" sheep	30	88.15 ± 1.57[b]
Parity	1	9	64.08 ± 2.51[a]
	2	13	96.55 ± 2.44[b]
	3	16	109.77 ± 2.27[c]
	4	5	86.11 ± 3.48[d]
	5	1	93.30 ± 8.21[bcd]
Type of birth	Single	33	93.85 ± 1.53[a]
	Twines	11	85.29 ± 2.30[b]
Sex	Male	26	92.43 ± 1.71[a]
	Female	18	89.56 ± 1.91[b]

a, b,c means with different letter within the same column are significantly different (P<0.05); N= Number of observations; ADWG=Average Daily Weight Gain

Survival Rate of Lambs

Factors that affect survival rate of lambs are presented in (Table 3). The overall survival rate of lamb was 89.57%. This result is consistent with Deribe, (2009) reported that the survival rate of lamb was 86.1%.in Alaba district Southern Ethiopia.Type of birth, sex of lambs, birth weight, parity and nutritional status of dam affect survival of lambs (Kassaye, 2011). Lambs born in dega and Weina dega agro-ecology had better pre-weaning survival rate than Kolla agro-ecologies. This might be due to sheep are versatile animal in dega and Weina dega agro-ecology (Deribe, 2009). Low survival rate of lamb in Kolla might be environmental factors (differences in feed availability, housing and ambient temperature, etc). "Local" sheep had highest survival rate than Washera crossbred lambs (Yenesew et al.2013). Lambs born from first parity had lowest survival rate than second, third and fourth party of ewes. This might be due to first parity ewes do not produce enough milk to nurse their lambs (Berhanu and Aynalem,2011). Might be to early age at first mating under uncontrolled traditional breeding system (Demissie, 2015). Single born lambs had higher survival rate than twins. This might be due to lambs born singly was sole user of dam milk and had better body weight during birth. Male lambs had better survival rate than female. The current finding is in agreement with reports of Deribe (2009) and Mengistie et al (2011) for Alaba and Washera sheep respectively.

Table 3 - Survival rate of monitored lambs

Factors		N	Survival to 90 days age (%)
Overall		44	91.67
Agro-ecology	Dega	15	93.75
	Weina dega	15	93.75
	Kolla	14	87.50
Breeds	Washera cross	14	87.50
	"Local" sheep	30	93.75
Parity	1	9	75
	2	13	100
	3	16	100
	4	5	83.33
	5	1	100
Type of birth	Single	33	97.06
	Twines	11	78.57
Sex	Male	26	96.30
	Female	18	85.71

N= number of respondents

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CONCLUSION

Birth weight, pre-weaning growth weight, pre-weaning growth rate and survival rate were significantly affected by agro-ecology, parity, litter size and sex.

To increase production and growth performance of sheep, the breed improvement and selective breeding program should be implemented.

DECLARATIONS

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Authors' contribution

All authors contributed equally to this work from starting proposal writing up to preparation of manuscript.

Competing interests

The authors declare that they have no conflict of interest with respect to the research, authorship or publications of this manuscript.

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REFERENCES

Abebe Y, Melaku S, Tegegne A and Tegegne F (2013). Assessment of Sheep Production System in Burie District North Western Ethiopia, 2(3): 097 – 102.

Aemero Y Firew T, Mussie H, Mengistie T (2012). Pre-Weaning Growth Performance of Sekota Sheep Breed in Waghimra Zone, Ethiopia. Volume 2, Issue 4: 340-343.

Ayele A (2015). Pre-Weaning Growth Performances and Survival Rate of Lambs' in the highlands of Ethiopia. Debre-Birhan Agricultural Research Center, Debre-Birhan, Ethiopia.Vol.5, No.13.pp1-9.

Berhanu B and Aynalem H (2011). Survivability of lambs under village management condition: The case around Jimma, Ethiopia. Pp11.

Bureau of Agriculture and Rural Development (BoARD) (2011). Report on Livestock and Livestock Characteristics, Vol. II (Accessed February 2011), Addis Ababa, Ethiopia.

Demissie C (2015). Husbandry practice and pre-weaning growth performance of goat hand book. 1st edition.LAP LAMBERT Academic Publishing. Germany. 133pp.

Deribe G (2009). On-farm performance evaluation of indigenous sheep and goats in Alaba, Southern Ethiopia. Msc. Thesis Hawassa University, November 2009. Awassa, Ethiopia.176pp.

Markos T (2006). Productivity and health of indigenous sheep breeds and crossbreds in the central Ethiopian highlands; Faculty of Medicine and Animal Science Department of Animal Breeding and Genetic Ph.D. dissertation, Swedish University of Agricultural Sciences, Uppsala, Sweden. pp 11-63.

Mengistie T, Abebe G, Solomon G, Sisay L, Abebe M and Markos T (2009). Growth performances of Washera sheep under small holder management systems in Yilmanadensa and Quarit districts, Ethiopia. Trop. Anim. Health Prod. 42(4), 659-667.

Mesfin L, Mussie H and Gizew M (2014). Evaluation of growth performance of Local and Droper × Local crossbred sheep in Eastern Amhara Region, Ethiopia. Bahir Dar University. 4(4), 787-794.

Shigdaf M, Mengistie T, Zeleke M, Getachew M, Hailu M, Aynalem H (2013). Evaluation of reproductive performances and survival rate of Washera sheep under farm and station management systems in Amhara region, Ethiopia Agricultural Advances, 2 (7): 206-215.

Solomon A, Hegde BP and Mengistie T (2011). Growth and Physical Body Characteristics of Gumuz Sheep under Traditional Management Systems in Amhara Regional State, Ethiopia. Livestock Research for Rural Development, Volume 23, Article #117. Retrieved July 5, 2012, from http://www.lrrd.org/ lrrd23/5 /abeg 23 117 .htm.

SPSS Version 20.0, (2011). Software Package for Social Sciences for Window

Tesfaye A (2008). Performance of Menz sheep under Traditional Management System in Dessie Zuria District of South Wollo, Amhara Region. An M.Sc Thesis presented to the School of Graduate Studies of Mekelle University, Mekelle, Ethiopia. Pp125.

Yenesew A, Solomon M, Azage T and Firew T (2013). Assessment of Sheep Production System in Burie District, North Western Ethiopia. Vol. 2(3), pp. 097 – 102.