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STUDIES OF SOME ECONOMIC CHARACTERISTIC ON AWASSI LAMBS IN JORDAN

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ABSTRACT

A total of 277 Awassi lambs were weighed (277 lambs at birth, reduced to 190 at weaning and to 168 at 5-monthes of age). Body measurements were heart girth (HG), body length (BL), wither height (HH), withers width (WWD), hip width (HW), withers depth (WD), hip depth (HD), tail circumferences (TC) and tail length (TL).

The average weight at birth (BW), weaning weight (WW), average daily gain from birth to weaning (ADG) and 5-months body weight (MW) were 4.388, 17.749, 0.221 and 29.136 kg, respectively. Also means of HG, BL, WH, HH, WWD, HW, WD, HD, TC and TL were 0.69, 0.602, 0.600, 0.603, 0.145, 0.139, 0.238, 0.222, 0.347 and 0.181 m, respectively.

In general, sire genetic group significantly affected MW and WD. Sex of lambs was observed to affect significantly all studied traits except WW, WWD and HW, while type of birth significantly affected most traits except WWD and HW. A non-significant effect of age and parity of dam was observed on all traits while weight of ewe at lambing was significantly affected TC only.

Key words: *Awassi lambs, body weights and measurements.*

INTRODUCTION

The Awassi is the most numerous and widespread sheep breed in southwest Asia. It's the dominant breed in Iraq, the most important sheep in the Syrian Arab Republic, and the only indigenous breed of sheep in Lebanon, Jordan and Israel (Epstein 1985).

In Jordan, the total number of sheep is about 1.458 millions head, while the annual red meat production is 15478 ton which represents 33% of annual consumption (46641 ton) (MOA 2001). Body weights and dimension are the most important traits that revealed the animal potential for producing meat. Body measurements are of value in judging the quantitative characteristics of meat and are also helpful in developing suitable selection criteria (**Bose and Basa 1984**). **Al-Azzawi *et al.* (1995)** showed that factors such as year of birth, sex, genetic group, and type of birth have a significant effect on weight at birth, weaning, 6-months weights and body measurements. A project to improve the local Awassi was initiated at 1993 by National Center for Agriculture Research and Technology Transfer

(NCARTT). An improved Awassi was imported from Israel to improve productively of local Awassi by crossing.

The objectives of this study is to evaluate the first generation (½ local X ½ improved (½ L X ½ I) Awassi lambs), for the effect of some non-genetic factors (sex, type of birth, age and parity of ewe and ewe weight at lambing) and ram breed on body weights (Birth weight (BW) weaning weight (WW) average daily gain between BW and WW and 5 months age weight (MW) and to develop prediction equations to estimate MW from various body weight (BW and WW) and measurements at 5-month of age, that is important to the farmer to predict MW without using balance equipment, which reduced the cost.

MATERIAL AND METHODS

This study was carried out at Al–Khanasri research station (National Center for Agriculture Research and Technology Transfer (NCARTT)), located in the eastern North of Jordan at 32°30′ N and altitude of 860m above sea level, by using a total of 277 Awassi lambs during the year 2003. Because of the death or sale of some produced lambs, body measurement of 198 lambs only was taken at 5-monthes of age (marketing age) to investigate the relationship between body weight (birth weight) (BW), weaning weight (WW), 5-months weight (MW) and dimension traits, Heart girth (HG), Body length (BL), Withers height (WH), Hip height (HH), Withers width (WWD), Hip width (HW), Withers depth (WD), Hip depth (HD) Tail length (TL), and Tail circumference (TC) dam breed.

At birth, sire genetic group, dam birth date, weight at birth, lambs weight, type of birth, sex of lambs, dam weight at lambing, dam age and parity were individually recorded. Lambs were kept continuously with there dams, but were allowed to suckle until 21 days then partial suckling for another 40 days, 12 hours with their dams and 12 hours separated. Creep feeding was provided to lambs till weaning at 60 days age. Lambs were provided with 0.75 kg of concentrate diet (barley 68%, bran 15%, soybean 15%, salts, vitamins and limestone 2%).

Weaning weight (WW) and marketing weight (MW) were adjusted on 60 and 150 days, respectively.

SAS package program (1997) was used to analyze the data by using the following model:

$$Xijklm = \mu + Bi + Sj + Tk + Al + Pm + b(xi - \bar{x}) + Eijklm$$

Where: Xijklm: is any observation. M: is the overall mean. B: is the effect sire genetic group, I = Local, Improved. S = the effect of sex lambs, j = male, female. T= the effect of type of birth, k= signal, Twine. A: the effect of age of ewe, 1 = 2, 3, 4, 5, 6 Years. P = the effect of parity, m = 1,2,3,4, b $(xi-\bar{x})$ = the regression of trait on ewe weight at lambing. Eijklm = is the random error term.

Stepwise regression procedure was used to predict equations to estimate the marketing weight (MW) based on BW, WW and body measurements at MW, and based only on body measurements. The coefficient of determination (R^2) was used to determine the efficiency of predictive equations.

RESULTS AND DISCUSSION

Means of BW, WW, and marketing weights (MW) of Awassi lambs were, 4.388, 17.749, and 29.136 kg respectively (Table 1). These values were higher than those reported by **Juma and Elya (1972), Al-Azzawi et al (1995), Al-kass *et al.* (1996), Al-Anbari (1998), and Al-Khauzai *et al.* (2000)**, but less than those recently reported by **Jawasreh (2000), and Al-Khauzai *et al.* (2000).**

Table 1 shows that sire genetic group had no significant effect on lamb body weight up to weaning age but its influence appears to be significant ($p<0.05$) after this age (MW). This result agree with **Vasely (1978) and Rastugi and Yousef (1979)** who indicated the non-significant effect of genetic group on body weight till weaning. On the other hand Al-Anbari (1998) showed that lambs body weight was improved by using Turkish Awassi rams. Sire genetic group may change the gene frequency of certain traits toward the required target (MW) or introduce new genes (usually required for improving a specific trait or traits) **(Al-Rawi 1995)**, to the local Awassi. Male lambs were heavier than ewe lambs in all weights (Table 1) and had a significant effect ($p<0.05$) on BW and ($p<0.01$) on MW but effect was insignificant on weaning and ADG. Type of birth was found to be the major factor influencing BW, WW, ADG, and MW ($p<0.01$). These results were also supported by those reported by **Al-Azzawi *et al.* (1995), Al- Anbari (1998) and Jawasreh (2000).**

Table 1 shows that age and weight of ewe at lambing and parity had no significant effect on lamb's body weights. These trends are substantiated by others **(Kazzal *et al.* 1974; Al-Amin *et al.* 1983; Al-Khauzai 1998 and Al-Khauzai 2000).**

The overall mean of HG, BL, WH, HH, WWD, HW, WD, HD, TC and TL were 0.69, 0.60, 0.60, 0.60, 0.145, 0.139, 0.238, 0.222, 0.347 and 0.181 m, respectively (Tables 2, 3, 4). These results are within the ranges reported by **Eliya and Juma (1970)** and **Al-Azzawi *et al.* (1995).** Sire genetic group had a significant effect ($p<0.05$) on WD while non significant on the other body dimension at marketing age (5-months old). But, in general, the Awassi lambs, which resulted from crossing, had higher parameters than purebred lambs. HG and WD significantly ($p<0.05$) affected by sex of lambs. BL, WH, HH, HD, TC and TL also significantly ($p<0.01$) affected by sex of lambs. The effect of type of birth was significant ($p<0.05$) only on HG, HH, TC and TL, while not significant on the other dimension traits (Tables 2, 3, 4). The effect of type of birth may be due to

the decrease in the number and weight of cotyledons that associated with the increasing of embryos number in the uterus (**Rhind *et al.* 1980**), in addition to the restricted uterine volume that allows the single embryos to grow in a higher rate than twin embryos (**Alexander 1964**). After birth the differences may be attributed to the variation in birth weights and availability of milk (**Juma *et al.* 1985**). No significant effect were indicated on lambs due to dam age and parity of ewe, while TC was the only dimension trait effected ($p<0.05$) by ewe weight at lambing (Table 4). A similar finding was reported by **Hermiz (1988) and Al-Anbari (1998)** who indicated the non-significant effect of ewe weight at lambing on body weight and dimensions at 6 monthes old. This may be due to the complete dependence of lambs on them selves at this period.

Multiple regression equation were derived to estimate body weight at marketing (MW), using each of weaning and birth body weight with one or more body measurements for Awassi lambs (Table 5) and otherwise it was derived by using only one or more body measurements (Table 6). Table 5 shows several steps of marketing weight estimation based on one, two and more independent variables of body weight and body dimension at marketing by regression. However, all body weights and dimensions can be efficiently used to predict MW. The coefficient of determination ($R^{2)}$ increases gradually as the number of independent variable increases in the equation as shown in Tables 5 and 6. Similar finding were reported by other investigators **(Gajbhiya and Jahar 1985; Al-Azzawi *et al.* 1995 and Mohammed and Amin 1996).**

Therefore, body measurements of lambs at marketing age provide reasonable way to predict (MW) of Awassi lambs based on R^2 of regression equation. In order to predict MW of Awassi lambs, it could be estimated by using more than predication equation (Tables 5).

Table 1. Least Squares Mean ± Standard Error For Some Factors Affecting Some Growth and Body Dimension Traits of Awassi Lambs

Factor \ Traits		BW		WW		MW		ADG1	
		No	Mean±SE	No	Mean±SE	No	Mean±SE	No	Mean±SE
Overall Mean		277	4.388±0.048	190	17.749±0.200	168	29.136±0.592	190	0.221±0.003
Sire	Local	125	4.086±0.060	87	17.023±0.325	78	27.396±0.931b	87	0.214±0.005
	Improved	152	4.165±0.055	103	17.663±0.296	90	29.317±0.860a	103	0.224±0.004
Sex	Male	131	4.206±0.060a	92	17.642±0.322	86	30.786±0.925a	92	0.222±0.005
	Female	146	4.045±0.054b	98	17.044±0.301	82	25.927±0,877b	98	0.216±0.005a
Type of Birth	Single	202	4.691±0.045a	153	18.336±0.226a	131	29.893±0.669a	153	0.227±0.003a
	Twine	75	3.559±0.073b	37	16.349±0.432b	37	26.821±1.207b	37	0.211±0.007b
Dam Age	2	56	4.085±0.180	41	15.939±1.044	34	29.794±2.985	41	0.196±0.017
	3	89	4.257±0.108	65	17.851±0.584	55	27.825±1.687	65	0.226±0.009
	4	53	4.270±0.116	33	17.758±0.660	30	27.995±1.919	33	0.225±0.011
	5	47	4.094±0.109	30	16.643±0.587	25	29.382±1.707	30	0.208±0.009
	≥6	32	3.921±0.145	21	18.523±0.764	24	26.786±2.096	21	0.241±0.012
Parity	1	64	4.098±0.171	46	18.292±0.991	39	28.446±2.798	46	0.235±0.016
	2	46	3..991±0.992	75	16.246±0.539	64	27.259±1.548	75	0.203±0.008
	3	106	4.147±0.107	40	17.329±0.595	37	29.138±1.722	40	0.217±0.009
	4	61	4.265±0.128	29	17.504±0.706	28	28.584±2.037	29	0.221±0.011
Regression on ewe wt. at lambing		277	0.009±0.005	190	0.039±0.026	168	0.020±0.085	190	0.0004±0.0004

BW: Birth Weight ,WW: Adjusted Weaning Weight (60 Days), MW :Marketing weight, ADG1: Pre weaning growth rate

Table 2 Least Squares Mean ± Standard Error for some Factors affecting some Body Dimensions Of Awassi Lambs At Marketing Age.

Factor \ Traits		HG		BL		WH		HH	
		No	Mean±SE	No	Mean±SE	No	Mean±SE	No	Mean±SE
Overall Mean		198	0.690±0.004	198	0.602±0.003	198	0.600±0.003	198	0.603±0.003
Sire	Local	87	0.687±0.006	87	0.595±0.005	87	0.598±0.005	87	0.600±0.005
	Improved	111	0.691±0.005	111	0.599±0.005	111	0.602±0.004	11	0.604±0.004
Sex	Male	88	0.698±0.006 a	88	0.602±0.006a	88	0.614±0.005 a	88	0.616±0.005 a
	Female	110	0.680±0.005 b	110	0.593±0.005b	110	0.585±0.004 b	110	0.588±0.004 b
Type of Birth	Single	145	0.697±0.005	145	0.601±0.004	145	0.605±0.004	145	0.610±0.004 a
	Twine	53	0.594±0.008	53	0.594±0.007	53	0.594±0.006	53	0.594±0.006 b
Dam Age	2	38	0.728±0.020	38	0.629±0.018	38	0.628±0.015	38	0.622±0.016
	3	70	0.684±0.011	70	0.604±0.010	70	0.599±0.008	70	0.604±0.009
	4	36	0.682±0.012	36	0.594±0.011	36	0.593±0.009	36	0.596±0.010
	5	30	0.693±0.011	30	0.587±0.010	30	0.590±0.008	30	0.603±0.009
	≥6	24	0.661±0.014	24	0.573±0.013	24	0.589±0.010	24	0.586±0.011
Parity	1	44	0.672±0.018	44	0.577±0.016	44	0.585±0.013	44	0.587±0.014
	2	80	0.679±0.010	80	0.600±0.009	80	0.595±0.008	80	0.594±0.008
	3	44	0.703±0.011	44	0.603±0.010	44	0.607±0.008	44	0.611±0.009
	4	30	0.704±0.013	30	0.608±0.012	30	0.612±0.010	30	0.616±0.011
Regression on Dam wt. at lambing		198	-0.0007±0.0005	198	0.0007±0.0005	198	0.00008±0.0004	198	-0.0003±0.0004

HG: Heart Girth ,BL: Body Length , WH: Wither Height ,HH: Hip Height

Table 3 Least Squares Mean ± Standard Error For some Factors affecting some Body Dimensions of Awassi Lambs at Marketing Age.

Traits / Factor		WWD		HW		WD		HD	
		No	Mean±SE	No	Mean±SE	No	Mean±SE	No	Mean±SE
Overall Mean		198	0.145±0.0011	198	0.139±0.0009	198	0.238±0.0016	198	0.222±0.0015
Sire	Local	87	0.143±0.002	87	0.129±0,001	87	0.234±0.003 b	87	0.221±0.002
	Improved	111	0.146±0.002	111	0.131±0.001	111	0.241±0.002 a	111	0.223±0.002
Sex	Male	88	0.146±0.002	88	0.131±0.001	88	0.241±0.003 a	88	0.229±0.002a
	Female	110	0.144±0.001	110	0.129±0.001	110	0.234±0.003 b	110	0.216±0.002 b
Type of Birth	Single	145	0.146±0.001	145	0.130±0.001	145	0.239±0.002	145	0.224±0.001
	Twine	53	0.144±0.002	53	0.130±0.002	53	0.236±0.003	53	0.221±0.002
Dam Age	2	38	0.149±0.006	38	0.137±0.005	38	0.245±0.009	38	0.234±0.008
	3	70	0.145±0.003	70	0.128±0.003	70	0.240±0.005	70	0.223±0.004
	4	36	0.145±0.003	36	0.131±0.003	36	0.236±0.005	36	0.218±0.005
	5	30	0.146±0.003	30	0.129±0.003	30	0.236±0.005	30	0.224±0.004
	≥6	24	0.140±0.004	24	0.128±0.004	24	0.232±0.006	24	0.213±0.006
Prity	1	44	0.147±0.005	44	0.127±0.005	44	0.234±0.008	44	0.214±0.007
	2	80	0.141±0.003	80	0.129±0.003	80	0.234±0.005	80	0.220±0.004
	3	44	0.147±0.003	44	0.131±0.003	44	0.240±0.005	44	0.227±0.004
	4	30	0.146±0.004	30	0.135±0.004	30	0.244±0.006	30	0.228±0.005
Regression on Dam Wt.At Lambing		198	-0.00023±0.0001	198	-0.00006±0.0001	198	-0.0003±0.0002	198	-0.0001±0.0002

WWD: Withers Width, HW: Hip Width , WD: Withers Depth, HD: Hip Depth.

Table 4. Least Squares Mean ± Standard Error for some Factors affecting some growth and dimension traits of Awassi Sheep.

Factor \ Traits		TC		TL		ADG2	
		No	MeanSE	No	Mean±SE	No	Mean±SE
Overall Mean		198	0.347 ± 0.004	198	0.181 ± 0.002	168	0.164 ± 0.003
	Local	87	0.361 ± 0.01	87	0.183 ± 0.004	78	0.160 ± 0.008b
	Improved	111	0.361 ± 0.01	111	0.184 ± 0.004	90	0.171 ± 0.007a
Sex	Male	88	0.384 ± 0.009a	88	0.191 ± 0.004 a	86	0.181 ± 0.007a
	Female	110	0.338 ±0.009b	110	0.176 ± 0.004 b	82	0.150 ± 0.007b
Type of Birth	Single	145	0.371 ±0.008a	145	0.188 ±0.004 a	131	0.171 ± 0.006a
	Twine	53	0.352 ±0.011b	53	0.179 ± 0.005 b	37	0.159 ± 0.009b
Dam Age	≤2	38	0.402 ± 0.024	38	0.195 ± 0.012	34	0.175 ± 0.021
	3	70	0.351 ± 0.015	70	0.181 ± 0.007	55	0.161 ± 0.013
	4	36	0.348 ± 0.015	36	0.184 ± 0.007	30	0.162 ± 0.013
	5	30	0.360 ± 0.014	30	0.178 ± 0.006	25	0.174 ± 0.011
	≥6	24	0.346 ± 0.015	24	0.182 ± 0.007	24	0.154 ± 0.012
Parity	1	44	0.318 ± 0.02	44	0.173 ± 0.009	39	0.162 ± 0.018
	2	80	0.346 ± 0.012	80	0.177 ± 0.005	64	0.154 ± 0.01
	3	44	0.363 ± 0.012	44	0.186 ± 0.006	37	0.166 ± 0.011
	4	30	0.351 ± 0.015	30	0.183 ± 0.018	28	0.159 ± 0.013
Regression on Dam wt. at lambing		198	-0.001 ± 0.00*	198	-0.0005 ± 0.003	168	0.00 ± 0.00

Means not having a common letter within each column differ significantly.

* P<0.05 , ** P<0.01, *** P<0.001

TC: Tail Circumference, TL: Tail Length, ADG2: Post weaning growth rate

Table 5. The maximum R^2 and estimates obtained through regression analysis for some growth and measurement traits of Awassi sheep in Jordan.

Coefficient of determination (R^2)	0.78	0.789	0.79
Intercept	57.79	57.78	58.7
Birth weight	------	0.71	0.59
Weaning weight	0.5	0.43	0.4
Heart girth	0.3	0.29	0.25
Withers height	0.36	0.34	-------
Body length	-----	-------	0.09
Withers width	0.85	0.92	0.85
Withers height	------	-------	0.29
Hip DEPTH	0.59	0.57	0.32
Hip width			0.5
Tail length	0.22	--------	0.13
Tail circumference	-----	0.23	0.19

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